CITY OF ANN ARBOR
INVITATION TO BID

Barton Pump Station Valve Improvement Project
DWSRF Project No. 7569-01

ITB No. 4703

Due Date: Thursday, January 20, 2022, 10:00 AM (Local Time)

Water Treatment Services Unit
Public Services Area

Issued By:

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

ADDENDUM No. 1

ITB No. 4703

Barton Pump Station Valve Improvement Project

Due: January 20, 2022 at 10:00 A.M. (local time)

The following changes, additions, and/or deletions shall be made to the Invitation to Bid for Barton Pump Station Valve Improvement Project, ITB No. 4703 on which proposals will be received on/or before the date and time listed above. The bid opening will be at Larcom City Hall (301 E Huron Street, Ann Arbor, MI 48104). Interested parties and/or bidders are welcome to congregate in the north vestibule of City Hall to hear the read bid amounts at bid opening.

The information contained herein shall take precedence over the original documents and all previous addenda (if any) and is appended thereto. **This Addendum consists of one hundred seventy-four (174) pages. Full addendum with updated Contract Drawings and as-built attachments will be provided to primary plan holders with a signed non-disclosure agreement filed with the City. A copy of the non-disclosure agreement is located in Appendix C of the Contract Documents.**

Bidder is to acknowledge receipt of this Addendum No. 1, including all attachments (if any) in its Bid by so indicating on page ITB-1 of the Invitation to Bid Form. Bids submitted without acknowledgment of receipt of this addendum will be considered nonconforming.

The following forms provided within the ITB document should be included in submitted bids:

- **City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **City of Ann Arbor Living Wage Ordinance Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **City of Ann Arbor Non-Discrimination Ordinance Declaration of Compliance**

Bids that fail to provide these completed forms listed above upon bid opening may be rejected as non-responsive and may not be considered for award.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the Bid document which are outlined below are referenced to a page or Section in which they appear conspicuously. The Bidder is to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Contract Documents

SECTION 01 14 00 Work Restrictions

Revise *paragraph 1.4.G.3 as follows:*

3. The demolition and replacement of the existing sluice gate system shall occur in the wet by divers or ***in the dry with installation of stop logs***, and shall be scheduled within the period of October 1 to March 15. The demolition of the existing sluice gate and installation of the new sluice gate will require the shutdown of the 36" raw water supply line by closing and locking out Valve No. 17 and 18. CONTRACTOR shall provide fourteen (14) days' notice of when the work will occur. The shutdown of the 36" raw water supply line shall last no longer than seven (7) days. No other major work is permitted during the sluice gate replacement.

SECTION 01 14 00 Work Restrictions
Revise *paragraph 1.4.H.3.i as follows:*

i. CONTRACTOR shall close and lockout the valves, install line stops, and drain affected sections of the 24" and 42" raw water supply water mains as shown in the plan set. CONTRACTOR shall provide thirty (30) days' notice of when the work will occur. **This work will require the shutdown of the entire raw water supply to the City's water treatment plant facility and the 42" raw water main shall be returned to service no longer than six (6) hours after the section is fully isolated**. No other major work is permitted under this phase of the contract.

SECTION 01 14 00 Work Restrictions
Revise *paragraph 1.4.K as follows:*

K. Group No. 5 – Yard Valving and Piping Installation

1. Removal and replacement of existing 24" raw water supply line, and section of 20" discharge header with future 42" raw water supply line tie-in and backflushing capabilities, and new Valves No. 30~~-31~~ to be installed associated with Group No. 5 located in the Barton Pump Station Yard shall be scheduled within the time period October 15 to March 15. The CONTRACTOR shall remove and replace the existing 24" raw water supply line with a 36"x36" tee with 36"x24" reducer to tie into the existing 24" raw water supply line and new 36" piping with a new 36" gate valve with a 36"X42" reducer that terminates with a ~~42"x20" tee~~ ***42" 45-degree bend*** that is plugged for future connection to future 42" raw water supply line. CONTRACTOR shall follow the steps in the plans for the required piping work, new valve installations, and replacements and all associated work.

2. Remove and replace existing 24" raw water supply line, and 20" discharge header piping with new 36", and 42" piping and 36" and 20" gate valves. CONTRACTOR shall close and lockout valves, install line stop, and drain affected piping as shown on the plan set. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. This work will require the shutdown of the 24" raw water supply line, and shall last no longer than fourteen (14) days. No other major work is permitted during this phase of the contract with the exception of the Group No. 3 valving and piping replacements~~, if both groups are simultaneously awarded~~.

ADD DIVISION 26 Electrical
Includes the following Specifications attached in their entirety:

Electrical System General Requirements	*26 05 00*
Equipment Installation	*26 05 03*
Low Voltage Copper Wire and Cable	*26 05 19*
Grounding	*26 05 26*
Supports and Fasteners	*26 05 29*
Metallic Conduit and Fittings	*26 05 33.13*
Boxes	*26 05 33.16*
Identification	*26 05 50*
Cleaning Underground Conduit	*26 05 93*
Enclosed Contactors	*26 09 19*
Dry Type Transformers	*26 22 00*
Wiring Devices	*26 27 26*
Snap Switches	*26 27 29*
Fuses	*26 28 13*
Molded Case Circuit Breakers	*26 28 16.13*

Disconnect Switches	*26 28 16.16*
Motor Starters	*26 29 13*

ADD SECTION 35 22 29 Stainless Steel Sluice Gates
Specification is attached in its entirety.

SECTION 40 05 00 Process Valves and Accessories
***Add** the entire paragraphs 2.4 and 2.5 as follows:*

2.4 CUSHIONED SWING CHECK VALVES

A. Valves 2-1/2 inches and larger shall have a cast or ductile iron body and bolted cap with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Seats shall be stainless and shall be screwed into the valve body. The disc shall be ductile iron with permanently rolled in stainless faces. The disc hinge pin shall be stainless steel riding in bronze bushings, one on each side of the valve. Valves shall have ANSI 125-pound standard drill flat faced flanges unless otherwise specified or shown on the Plans. Shockless chamber assembly shall be steel and mounted on the external side of the valve. The cushion chamber shall be attached to the side of the valve body externally and constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushion chamber shall be arranged so that the closing will be adjustable to meet the service requirements. Valves shall have outside weighted arm.

B. Swing check valves shall be manufactured by APCO/DeZurik, GA, or J&S Valve.

2.5 STAINLESS STEEL BALL VALVES

A. Valves 2 inches and under shall have a 316 stainless steel body with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Ball shall be 316 stainless steel with PTFE double seal seats. Stem shall be 316 stainless steel with PTFE seals. Valves shall have screwed ends and lever operators unless otherwise specified or shown on the Plans.

B. Valves 2-1/2 inches and larger shall have a 316 stainless steel body with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Ball shall be 316 stainless steel with PTFE double seal seats. Stem shall be 316 stainless steel with PTFE seals. Valves shall have ANSI 125 lb. standard drill flat faced flanges and lever operators unless otherwise specified or shown on the Plans.

Contract Drawings

Updated Contract Drawings will be provided to primary plan holders with a signed non-disclosure agreement filed with the City. A copy of the non-disclosure agreement is located in Appendix C of the Contract Documents.

***Revise** Drawing G-001 Cover Sheet*

Revise *Drawing C-106 Bird Hills Entrance Site Plan & ARV's (1/6)*

Revise *Drawing C-107 Bird Hills Detailed Site Plan ARV's (2/5) & (3/4)*

Revise *Drawing P-005 Barton Pump Station Process Flow Diagrams*

Revise *Drawing P-101 Group 1 Step 1 – Sluice Gate Demolition*

Revise *Drawing P-202 Group 2 Step 2 – Valves (1-4) Installation*

Revise *Drawing P-203 Group 2 Step 3 – Valve (5) Installation*

Revise *Drawing P-204 Group 2 Step 4 – Valve (8) Installation*

Revise *Drawing P-701 Pipe & Valve Details - 1*

Revise *Drawing P-702 Pipe & Valve Details - 2*

Add *Drawing E-001 General Electrical Notes, Abbreviations and Symbols*

Add *Drawing E-100 Electrical Site Plan*

Add *Drawing E-101 Electrical Pre-Eng. Site Plan and Light Panel Schedule*

Add *Drawing E-500 Electrical Details*

Add *Drawing I-001 General Instrumentation Symbols and Abbreviations*

Add *Drawing I-100 Instrumentation PLC I/O Wiring*

II. QUESTIONS AND ANSWERS

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the RFP. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

Question 1: What is the pipe material for the existing 24-inch inlet and the 24-inch discharge lines?

Answer 1: The existing material for the 24-inch inlet is cast iron. The 24-inch discharge line is a combination of cast iron and ductile iron pipe, depending on exact location along the pipe.

Question 2: Please confirm that the 42-inch discharge and 36-inch inlet are both AWWA C301 Pipe? Are the 36" and 42" inch pipes standard push joint or are they restrained joint? Do you have any shop drawing or submittal information on this pipe?

Answer 2: Both the 42-inch discharge pipe and 36-inch inlet pipe are Prestressed Concrete Lined Cylinder Pipe per AWWA C301 with standard push joints. Shop Drawings from the original project are attached for reference.

Question 3: For the work at Valves No. 3 and 4, how is the 36-inch line isolated on the powerhouse side of the replacement section? Is a line stop necessary or are there existing isolation valves than can be used? Please provide as built drawings for the entire 36-inch line including any related elements of the powerhouse?

Answer 3: The contract document sequence for Valves No. 3 and 4 is based on the assumption that the sluice gate would be replaced and used for isolation at the powerhouse. The 36" line can also be isolated with stop logs, although some manageable leakage should be anticipated with a stop log installation. A line stop is not required.

Question 4: For the work at Valve No. 1, how is the 42-inch line isolated on the WTP side of the replacement section? Is a line stop necessary? Are there existing isolation valves than can be used or do we drain the entire line to the high point?

Answer 4: The 42-inch discharge will be isolated at the water treatment plant. This will require draining approximately 5,200 feet of 42-inch water main. The air release points along the 42-inch shall be used to introduce air into the pipe during draining.

Question 5: Specification 01 14 00 indicates that line stops are required for Group 2 Step 3. Drawing P-203 only refers to Valves No. 1 and 6 for isolation of this stage. Can valves 1 and 6 and the existing isolation valves in the pump station be used to isolate without the need for line stops?

Answer 5: Valves No. 1 and 6 will provide isolation on the discharge (west) side of the 24-inch and 42-inch mains. Line Stops No. 3 and 4 should be installed prior to Step 3 so that the 42-inch discharge main can be returned to service immediately once the new 16-inch valve is installed on the flange from the 42-inch main. These line stop locations are shown on the drawings.

Question 6: Does the 6-hour duration for Group 2 Step 3 exclude the time required to close all isolation valves and drain the 36-inch and 42-inch lines?

Answer 6: The 6-hour duration will begin as soon as the 42-inch discharge pipe is fully isolated. Since Valve No. 1 will already be installed, approximately 115 feet of 42-inch main will need to be drained. The 42-inch main will be restored to service as soon as the new 16-inch valve is installed on the existing flange from the 42-inch main.

Question 7: For Group 2 Step 4, is the East point of connection for the new 24-inch line within the limits of existing concrete encasement? Can the connection point be adjusted to the west to avoid the section of pipe that is concrete encased?

Answer 7: The limits of pipe replacement on the 24-inch water main will end at the concrete encasement around the existing cross. No removal of concrete encasement will occur under this project. Contractor shall field verify limits of concrete encasement to determine final limits of pipe replacement. Assumed length of pipe replacement shall be based on the drawings.

Question 8: For Stage 2 step 4 can existing valve 9 be used to isolate the 24-inch line east of the replacement section? Are both stopples 3 and 4 required for this stage or just No. 3?

Answer 8: Prior work along the 24-inch water main has not successfully isolated the portion of pipe where work must occur on Stage 2 Step 4. Both line stops have been included based on the assumption that Valve No. 9 potentially does not seal. There are also concerns about pipe restraint at Valve No. 9 if properly restrained line stops are not utilized. Contractors should verify shutdown requirements during field verification steps prior to the work occurring. If field isolation conditions differ, Contractors are encouraged to submit alternate isolation plans.

Question 9: The drawings show 3 new line stops (3, 4 and 5). Are these the only new line stops required for this project?

Answer 9: Yes, only the three line stops are anticipated to be required for isolation during construction. Line stops No. 1 and 2 are existing line stop fittings along the 24-inch discharge and will both be removed under this project.

Question 10: Group 3/Steps 3 & 4 and Group 5/Steps 1 & 2, both have a maximum duration of 14 days. Do Groups 3 and 5 have to occur simultaneously with a duration of 14 days, or can they occur consecutively both with a combined duration of 28 days?

Answer 10: This work should occur simultaneously with a total duration of 14 days.

Question 11: Will Group 1 step 1 sluice gate replacement be used for flow isolation for the subsequent work groups and associated steps?

Answer 11: The current sequence assumes the sluice gate provides flow isolation for subsequent work on the 36" intake. Isolation of the 36" intake can also be obtained by installation of stop logs at the powerhouse, although manageable leakage should be anticipated while utilizing the stop logs. If the new sluice gate is not

available prior to the start of the first low demand season, stop logs can be used for isolation.

Question 12: Does the 6-hour duration for Stage 2 Group 3 exclude the time required to close all isolation valves and drain the 36-inch and 42-inch lines?

Answer 12: The 6-hour duration will begin as soon as the 42-inch discharge pipe is fully isolated. Since Valve No. 1 will already be installed, approximately 115 feet of 42-inch main will need to be drained. The 42-inch main will be restored to service as soon as the new 16-inch valve is installed on the existing flange from the 42-inch main.

Question 13: Given the extensive phasing and low water demand seasonal constraints, it is imperative that the Contractor be afforded two full October 1st to March 15th periods (2022/2023 and 2023/2024) in order to complete the work. To this end will the Owner delay issuing a Notice to Proceed until after March 15, 2022?

Answer 13: Notice to Proceed is not anticipated until after March 15, 2022. The intent is to provide two periods of low demand to fully complete the work.

Question 14: Specification 40 05 39 requires field pressure testing and disinfection. The PCCP is untreated raw water and the replacement sections are no more than 20 feet at either location. Will pressure testing and disinfection be required or can these requirements be waived for the PCCP replacement sections?

Answer 14: Disinfection on all water mains shall only consist of swab chlorination at the time of installation. PCCP mains shall be placed back in service for visual inspection of leaks prior to encapsulating steel closure pieces in concrete. Standard pressure testing and disinfection will not apply.

Question 15: To what extent does the existing meter vault need to be abandoned. Please clarify.

Answer 15: The meter vault structure only needs to be abandoned to the extent required to properly install Valve No. 8 and associated piping. If the bottom slab is left in place, a minimum of four (4) 4-inch holes shall be cored through the bottom slab.

Question 16: Where specifically does the thrust block / Sheet Pile detail shown on Drawing P-701 apply?

Answer 16: The meter vault structure only needs to be abandoned to the extent required to properly install Valve No. 8 and associated piping. If the bottom slab is left in place, a minimum of four (4) 4-inch holes shall be cored through the bottom slab.

Question 17: Where specifically does the drain port detail shown on Drawing P-701 apply? Is it limited to the Pump Station Piping?

Answer 17: Yes, this detail is limited to the interior pump station piping. Tentative locations for confirmation by Owner during shop drawing review are identified on drawings P-303, P-304, and P-401.

Question 18: Where specifically does the PCCP drain pipe detail shown on Drawing P-701 apply? Is it limited to the outlet for the No. 6 hydrant valve on the 36-inch inlet from the Barton pump house?

Answer 18: Yes, this detail only applies to the outlet for the fire hydrant assembly installed along the 36-inch intake pipe at Valve No.4 as shown on P-202.

Question 19: Note 3 on drawing P-203 indicates the existing line stop is to be reused to isolate the 24-inch DI line for the step 3 work. Is the existing butterfly valve adjacent to the line stop in working order?

Answer 19: This note is incorrect and will be removed via addendum. The existing butterfly valve, valve no. 6, as shown on P-203 shall be used to isolate the 24-inch discharge pipe.

Question 20: Drawing P-101 Note 5 indicates we are to perform the sluice gate field inspection in the wet. Note 8 indicates that the contractor is to be responsible for Stop log installation and sealing to perform the sluice gate installation. This indicated inspection in the wet installation in the dry. Specification section Work Restriction section 1.4 G number 3 indicates demo and installation will be in the wet. Please clarify wet or dry installation?

Answer 20: Inspection should be performed in the wet. Demo and installation may be performed either in the wet or dry. Specification has been updated.

Question 21: From the field visit, it appeared there were stop logs for both sides of the gate and the Contractor is responsible to install them and dewater. Is this correct, or does installing them on one side provide isolation such that the Contractor can drain the work area to install the new gate in the dry?

Answer 21: The Contractor can install one set of stop logs in the forebay to isolate the sluice gate work area. The wood stop logs are available at the Barton Dam Powerhouse and are the property of the Owner. The Owner has previously installed them by moving them by hand and lowering them with a gantry. Contractor shall be responsible for proper installation of the stop logs and maintaining isolation during the work. Stop logs shall be removed and returned to the Owner at the completion of the work. Any damage to the stop logs shall be repaired at the Contractor's expense.

Question 22: Can we leave the stop logs in overnight or do we need to remove them daily? Can we isolate dewater and leave in place for the 7 days to install the new gate in the dry.

Answer 22: Yes, the stop logs can remain in place for the duration of the sluice gate installation and are not required to be removed daily. They can also be installed in lieu of the sluice gate for subsequent steps requiring isolation of the 36-inch intake. Durations of shut down shall be equivalent in either case.

Question 23: When we perform the sluice gate inspection in the wet, can we remove the old gate frame to make the template?

Answer 23: No.

Question 24: If we are performing the sluice gate inspection in the wet, how many hours will the station be shutdown and isolated so that we can have divers in the well? Will any stop logs need to be put in place during this time?

Answer 24: Per the specifications, the inspection in the wet shall last no longer than one day. Stop logs are not required. The 36-inch intake will be isolated at the pump station.

Question 25: Drawing P-101 cut section shows stop log channels on the river side of the gate. Based on the as-built drawing we cannot see a channel on the downstream side of the gate to isolate just the gate area to perform the work in the dry. Please confirm if there is another channel and stop logs for it.

Answer 25: There is no stop log channel on the downstream side of the gate, so the downstream piping will require partial dewatering to perform the work in the dry.

Question 26: Do additional As-built drawing exist? Can we get copies of them? The current as-builts for the gate replacement are insufficient to develop a means and method to replace the sluice gate.

Answer 26: Yes, additional drawings associated with the area of the gate replacement are included with the Addendum. These drawings are only available to those bidders that have provided a signed Non-Disclosure Agreement.

Question 27: On Drawing P-102 there is a dotted line after the new Sluice gate labeled sluiceway. Is the dotted line representing the work area? Or is the room/chamber open to the ceiling?

Answer 27: The sluiceway was modified during subsequent projects to directly connect to the Barton PS intake. The dashed line represents the piping that forms the intake.

Question 28: On Drawing P-102 the actuator on the left section view is orientated in the direction face the front side of the gate. In the right section view it is orientated 90 of the face of the gate. Which is correct?

Answer 28: The left section view is correct, and the actuator should be facing downstream.

Question 29: On Drawing P-103, the top right detail for the gate actuator shows a stem guide off the wall. Drawing P-102 shows mid support beams, but no steam guide off the wall. Please clarify.

Answer 29: One or both may be required based on field inspection and recommendations from gate manufacturer. Contractor and manufacturer responsible for final design based on inspection.

Question 30: On Drawing P-302, we are installing a new 36-inch BFV (Group 3 Step 2), Valve No. 11. Next to it is an existing 24" BFV. Note on the drawing indicates to blind flange the 36" BFV and the 24" BFV. There will not be any room to perform that task. Can we at this point remove the 24" BFV and blind flange the 36" BFV and the 24" pipe/flange?

Answer 30: Yes. Removal of the 24" BFV will require the line stop to be installed on the 24" intake. Custom 36" x 16" tee can also be adjusted to allow space for flange(s).

Question 31: Can alternate materials be submitted for review and approval prior to bidding?

Answer 31: No. Contractors are encouraged to submit alternate materials or equipment utilizing Bid Form Section 2 "Material, Equipment and Environmental Alternates" located in the Front End of the Contract Documents. This form provides Contractors a place to propose alternate material and equipment from those included in the project design. Contractors should follow the instructions on this form if they are intending to propose the use of an alternate item. Any change in price or schedule related to the alternate should be identified on this form.

Question 32: Can the pre-bid meeting sign-in sheet be provided?

Answer 32: Yes, the pre-bid meeting sign-in sheet is attached.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

Stantec

CITY OF ANN ARBOR
BARTON PUMP STATION VALVE IMPROVEMENT PROJECT, ITB #4703, DWSRF #7569-01
PRE-BID MEETING SIGN IN SHEET
FRIDAY, DECEMBER 17, 2021 AT 10:00 AM

Name	Company/Agency	Email Address	Discipline (General, Electrical, Mechanical)
Joe Mulville	Weiss Construction	jmulville@weiss-construction.com	G.C.
Bret Solomon	Solomon Diving	Bret@Solomondiving.com	Diving Contractor
MATT KEMPER	KIEWIT	MKEMPER@WEISS-CONSTRUCT-N.COM	GC
Alex Phillco	Bristone International	Alex.Phillco@Bristone.com	NACE CIP 2 Inspector.
Joe Fekan	L D'Agostini + Sons	JFekan@Ldagostini.com	GC
Jalal Joulan	Commercial Contracting Corp	JALAL.JOULAN@CCCNETWORK.COM	GC
Jennifer Duff	JETT Pump & Valve	jennifer@jettpump.com	

Stantec

CITY OF ANN ARBOR
BARTON PUMP STATION VALVE IMPROVEMENT PROJECT, ITB #4703, DWSRF #7569-01
PRE-BID MEETING SIGN IN SHEET
FRIDAY, DECEMBER 17, 2021 AT 10:00 AM

Name	Company/Agency	Email Address	Discipline (General, Electrical, Mechanical)
J GREENE	JETT PUMP & VALVE	JGREENE@JETTPUMP.COM	MECH/SUPPLY
MIDWEST POWER SYSTEMS	matt Shaeffer	midwestpowers@Hotmail.com	General Contractor Mechanical
Blastek	Eric Waddell	eric@blastekLLC.com	Blast & Paint
RICK ALVAREZ	KENNEDY	RALVAREZ@KENNEDYIND.COM	SUPPLIER
Eric Wilde	Kennedy	ewilde@kennedyind.com	Supplier
Ken Jewison	Stantec	Kenjewison@stantec.com	Engineer
John Szarama	SIGNATURE Contracting	JSzarama@signaturecontractingsg.com	Painting Contractor

Stantec

CITY OF ANN ARBOR
BARTON PUMP STATION VALVE IMPROVEMENT PROJECT, ITB #4703, DWSRF #7569-01
PRE-BID MEETING SIGN IN SHEET
FRIDAY, DECEMBER 17, 2021 AT 10:00 AM

Name	Company/Agency	Email Address	Discipline (General, Electrical, Mechanical)
Nathan Hunter	Hamlett Environmental	nathanh@hamlettenvironmental.com	Supplier

ADDENDUM No. 2

ITB No. 4703

Barton Pump Station Valve Improvement Project

Due: January 20, 2022 at 10:00 A.M. (local time)

The following changes, additions, and/or deletions shall be made to the Invitation to Bid for Barton Pump Station Valve Improvement Project, ITB No. 4703 on which proposals will be received on/or before the date and time listed above. The bid opening will be at Larcom City Hall (301 E Huron Street, Ann Arbor, MI 48104). Interested parties and/or bidders are welcome to congregate in the north vestibule of City Hall to hear the read bid amounts at bid opening.

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Bidder is to acknowledge receipt of this Addendum No. 2, including all attachments (if any) in its Bid by so indicating on page ITB-1 of the Invitation to Bid Form. Bids submitted without acknowledgment of receipt of this addendum will be considered nonconforming.

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Contract Documents

REQUIRED STANDARD CONTRACT LANGUAGE: CLEAN WATER STATE REVOLVING FUND AND DRINKING WATER REVOLVING FUND, Davis-Bacon/Prevailing Federal Wages
Replace *General Decision Number MI20210074 Dated 11/12/2021 with attached General Decision Number MI20220074 Dated 01/07/2022*

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

"General Decision Number: MI20220074 01/07/2022

Superseded General Decision Number: MI20210074

State: Michigan

Construction Type: Heavy

County: Washtenaw County in Michigan.

Heavy, Includes Water, Sewer Lines and Excavation (Excludes Hazardous Waste Removal; Coal, Oil, Gas, Duct and other similar Pipeline Construction)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022, Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least $15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022, Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at www.dol.gov/whd/govcontracts.

Modification Number | Publication Date
0 | 01/07/2022

* CARP0687-006 06/01/2021

	Rates	Fringes
CARPENTER, Includes Form Work	$ 35.16	29.22

ELEC0252-009 06/01/2021

	Rates	Fringes
ELECTRICIAN	$ 48.48	27%+12.25

ENGI0325-019 09/01/2021

POWER EQUIPMENT OPERATORS: Underground Construction (Including Sewer)

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1	$ 37.63	24.85
GROUP 2	$ 32.90	24.85
GROUP 3	$ 32.17	24.85
GROUP 4	$ 31.60	24.85

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Backhoe/ Excavator, Boring Machine, Bulldozer, Crane, Grader/ Blade, Loader, Roller, Scraper, Trencher (over 8 ft. digging capacity)

GROUP 2: Trencher (8-ft digging capacity and smaller)

GROUP 3: Boom Truck (non-swinging, non- powered type boom)

GROUP 4: Broom/ Sweeper, Fork Truck, Tractor, Bobcat/ Skid Steer /Skid Loader

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ENGI0326-008 06/01/2021

EXCLUDES UNDERGROUND CONSTRUCTION

	Rates	Fringes

OPERATOR: Power Equipment

GROUP 1	$ 44.69	24.95
GROUP 2	$ 43.19	24.95
GROUP 3	$ 41.69	24.95
GROUP 4	$ 41.39	24.95
GROUP 5	$ 40.57	24.95
GROUP 6	$ 39.71	24.95
GROUP 7	$ 38.74	24.95
GROUP 8	$ 37.03	24.95
GROUP 9	$ 28.69	24.95

FOOTNOTES: Tower cranes: to be paid the crane operator rate determined by the combined length of the mast and the boom.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane with boom & jib or leads 400' or longer

GROUP 2: Crane with boom & jib or leads 300' or longer

GROUP 3: Crane with boom & jib or leads 220' or longer

GROUP 4: Crane with boom & jib or leads 140' or longer

GROUP 5: Crane with boom & jib or leads 120' or longer

GROUP 6: Regular crane operator

GROUP 7: Backhoe/Excavator, Bobcat/Skid Loader, Boring Machine, Broom/Sweeper, Bulldozer, Grader/Blade, Loader, Roller, Scraper, Tractor, Trencher

GROUP 8: Forklift

GROUP 9: Oiler

IRON0025-006 06/01/2019

	Rates	Fringes
IRONWORKER		
Reinforcing	$ 30.98	27.99
Structural	$ 36.77	29.03

LABO0334-009 06/01/2021

EXCLUDES OPEN CUT CONSTRUCTION

	Rates	Fringes

Landscape Laborer
GROUP 1.....$ 21.35 7.40
GROUP 2.....$ 19.35 7.40

LANDSCAPE LABORER CLASSIFICATIONS

GROUP 1: Landscape specialist, including air, gas and diesel equipment operator, lawn sprinkler installer and skidsteer (or equivalent)

GROUP 2: Landscape laborer: small power tool operator, material mover, truck driver and lawn sprinkler installer tender

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LABO0334-018 09/01/2018

SCOPE OF WORK:
OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

	Rates	Fringes
LABORER		
(1) Common or General	$ 23.75	12.85
(2) Mason Tender-Cement/Concrete	$ 23.86	12.85
(4) Grade Checker	$ 24.05	12.85
(5) Pipelayer	$ 22.90	12.75
(524.20) Pipelayer	$ 22.90	12.85
(7) Landscape	$ 18.14	12.85

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* LABO0499-020 08/01/2021

EXCLUDES OPEN CUT CONSTRUCTION

	Rates	Fringes
LABORER		
GROUP 1	$ 30.21	14.45
GROUP 2	$ 30.42	14.45
GROUP 3	$ 30.56	14.45

LABORER CLASSIFICATIONS

GROUP 1: Common or General; Grade Checker

GROUP 2: Mason Tender - Cement/Concrete

GROUP 3: Pipelayer

PAIN0022-005 07/01/2008

	Rates	Fringes
PAINTER		
Brush & Roller	$ 25.06	14.75
Spray	$ 25.86	14.75

PLAS0514-002 06/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 31.47	13.81

PLUM0190-010 06/01/2021

	Rates	Fringes
PLUMBER	$ 44.31	23.70

TEAM0007-006 06/01/2020

	Rates	Fringes
TRUCK DRIVER		
Dump Truck under 8 cu. yds.; Tractor Haul Truck	$ 27.90	.50 + a+b
Dump Truck, 8 cu. yds. and over	$ 28.00	.50 + a+b
Lowboy/Semi-Trailer Truck	$ 28.15	.50 + a+b

FOOTNOTE:
a. $470.70 per week.
b. $68.70 daily.

SUMI2010-072 11/09/2010

	Rates	Fringes
TRUCK DRIVER: Off the Road Truck	$ 20.82	3.69

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union, which prevailed in the survey for this classification, which in this example would be Plumbers 0198 indicates the local union number or district council number

where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Division National Office Branch of Wage Surveys. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

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Appendix A – Geotechnical Information
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ATTACHMENTS

City of Ann Arbor Prevailing Wage Declaration Form
City of Ann Arbor Living Wage Forms
City of Ann Arbor Vendor Conflict of Interest Disclosure Form
City of Ann Arbor Non-Discrimination Ordinance Declaration Form and Notice

NOTICE OF PRE-BID CONFERENCE

A pre-bid conference for this project will be held on **Friday, December 17, 2021 at 10:00 am** on site at the **Barton Pump Station, 1010 W Huron River Drive, Ann Arbor, Michigan**.

Attendance at this conference is highly recommended. Administrative and technical questions regarding this project will be answered at this time. The pre-bid 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 bid will be affirmed in an addendum.

INSTRUCTIONS TO BIDDERS

General

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. All work to be done under this Contract is located in or near the City of Ann Arbor.

Any Bid which does not conform fully to these instructions may be rejected.

Due to the sensitive nature of the infrastructure associated with this project, Contract Drawings will only be provided following receipt of a signed non-disclosure agreement by the Bidder. A copy of the non-disclosure agreement is located in Appendix C. Please contact Chris Elenbaas at Christopher.Elenbaas@stantec.com to submit a signed non-disclosure agreement and receive the Contract Drawings.

Preparation of Bids

Bids should be prepared providing a straight-forward, concise description of the Bidder's ability to meet the requirements of the ITB. Bids shall be written in ink or typewritten. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed and dated in ink by the person signing the Bid.

Bids must be submitted on the "Bid Forms" provided with each blank properly filled in. If forms are not fully completed it may disqualify the bid. No alternative bid will be considered unless alternative bids are specifically requested. If alternatives are requested, any deviation from the specification must be fully described, in detail on the "Alternate" section of Bid form.

Each person signing the Bid certifies that he/she is the person in the Bidder's firm/organization responsible for the decision as to the fees being offered in the Bid and has not and will not participated in any action contrary to the terms of this provision.

Questions or Clarifications / Designated City Contacts

All questions regarding this ITB shall be submitted via email. Emailed questions and inquires will be accepted from any and all prospective Bidders in accordance with the terms and conditions of the ITB.

All questions shall be due on or before **Thursday, January 6, 2021 at 5:00 PM** and should be addressed as follows:

Specification/Scope of Work questions emailed to christopher.elenbaas@stantec.com
Bid Process and Compliance questions emailed to cspencer@a2gov.org

Any error, omissions or discrepancies in the specification discovered by a prospective contractor and/or service provider shall be brought to the attention of **Chris Elenbaas** at **christopher.elenbaas@stantec.com** after discovery as soon as possible. Further, the contractor and/or service provider shall not be allowed to take advantage of errors, omissions or discrepancies in the specifications.

Addenda

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

Each Bidder must in its Bid, to avoid any miscommunications, acknowledge all addenda which it has received; but 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 written addenda.

Bid Submission

All Bids are due and must be delivered to the City of Ann Arbor Procurement Unit on or before **Thursday, January 20, 2022 at 10:00 AM (local time).** Bids submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each Bidder must submit one (1) original Bid and two (2) Bid copies in a sealed envelope clearly marked: **ITB No. 4703 - Barton Pump Station Valve Improvement Project, DWSRF Project No. 7569-01.**

Bids must be addressed and delivered to:

City of Ann Arbor
Procurement Unit,
c/o Customer Services, 1st Floor
301 East Huron Street
Ann Arbor, MI 48104

All Bids received on or before the Due Date will be publicly opened and recorded immediately. No immediate decisions are rendered.

The following forms provided within this ITB Document should be included in submitted bids.

- **City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **City of Ann Arbor Living Wage Ordinance Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **City of Ann Arbor Non-Discrimination Ordinance Declaration of Compliance**

Bids that fail to provide these forms listed above upon bid opening may be rejected as non-responsive and may not be considered for award.

Hand delivered bids 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 Bidder for any unforeseen circumstances, delivery or postal delays. Postmarking to the Due Date will not substitute for receipt of the Bid. Each Bidder is responsible for submission of their Bid.

Additional time for submission of bids past the stated due date and time will not be granted to a single Bidder; however, additional time may be granted to all Bidders when the City determines

in its sole discretion that circumstances warrant it.

Award

The City intends to award a Contract(s) to the lowest responsible Bidder(s). On multi-divisional contracts, separate divisions may be awarded to separate Bidders. The City may also utilize alternatives offered in the Bid Forms, if any, to determine the lowest responsible Bidder on each division, and award multiple divisions to a single Bidder, so that the lowest total cost is achieved for the City. For unit price bids, the Contract will be awarded based upon the unit prices and the lump sum prices stated by the bidder for the work items specified in the bid documents, with consideration given to any alternates selected by the City. If the City determines that the unit price for any item is materially different for the work item bid than either other bidders or the general market, the City, in its sole discretion, in addition to any other right it may have, may reject the bid as not responsible or non-conforming.

The acceptability of major subcontractors will be considered in determining if a Bidder is responsible. In comparing Bids, the City will give consideration to alternate Bids for items listed in the bid forms. All key staff and subcontractors are subject to the approval by the City.

Qualifications

The City will evaluate Proposals based on cost as well as experience. Contractors that have not included the required list of similar work experience, resumes for project manager and superintendent, and associated references in Section 5 of the Bid Form may have their bid rejected.

As part of the proposal, Bidders shall provide documentation that the Bidder's company has at least 10 years' experience performing construction of water and wastewater facilities. Bidders shall also submit for the proposed Project Manager and Superintendent, resumes documenting 7 years of professional experience for each individual in the construction industry as a full-time employee, along with 3 references for each individual from previous projects completed within the past 5 years. Bidders shall also submit the attached for, "Section 5-References", which identifies a minimum of three similar projects completed in the past 5 years, including construction cost, contractor and subcontractor information, that demonstrate similar work experience and complexity to that included within these contract documents, specifically process mechanical equipment, electrical and instrumentation and controls work.

All key staff and subcontractors are subject to the approval of the City.

Official Documents

The City of Ann Arbor officially distributes bid documents from the Procurement Unit or through the Michigan Intergovernmental Trade Network (MITN). Copies of the bid documents obtained from any other source are not Official copies. Addenda and other bid information will only be posted to these official distribution sites. If you obtained City of Ann Arbor Bid documents from other sources, it is recommended that you register on www.MITN.info and obtain an official Bid. Bidders do not need to be shown on the plan holders list provided by MITN to be considered an official plan holder.

Due to the sensitive nature of the infrastructure associated with this project, Contract Drawings will only be provided following receipt of a signed non-disclosure agreement by the Bidder. A copy of the non-disclosure agreement is located in Appendix C. Please contact Chris Elenbaas

at Christopher.Elenbaas@stantec.com to submit a signed non-disclosure agreement and receive the Contract Drawings.

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.

Withdrawal of Bids

After the time of opening, no Bid may be withdrawn for the period of one hundred eighty (180) days

Contract Time

Time is of the essence in the performance of the work under this Contract. The available time for work under this Contract is indicated on page C-2, Article III of the Contract. If these time requirements can not be met, the Bidder must stipulate on Bid Form Section 3 - Time Alternate its schedule for performance of the work. Consideration will be given to time in evaluating bids.

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.

Human Rights Information

All contractors 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 Section 5, beginning at page GC-2 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.

Wage Requirements

Section 4, beginning at page GC-1, outlines the requirements for payment of prevailing wages and for payment of a "living wage" to employees providing service to the City under this contract. The successful bidder and its subcontractors must comply with all applicable requirements and provide proof of compliance.

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 the Sample Certified Payroll form provided in the Appendix section 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 bids 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: beta.SAM.gov.

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

Conflict Of Interest Disclosure

The City of Ann Arbor Purchasing Policy requires that prospective Vendors complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected Vendor 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 Vendor Conflict of Interest Disclosure Form is attached.

Major Subcontractors

The Bidder shall identify on Bid Form Section 4 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.

Debarment

Submission of a Bid in response to this ITB is certification that the Bidder 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.

Disclosures

After bids are opened, all information in a submitter's bid is subjected to disclosure under the provisions of Michigan Public Act No. 442 of 1976, as amended (MCL 15.231 et seq.) known as the "Freedom of Information Act." The Freedom of Information Act also provides for the complete disclosure of contracts and attachments thereto except where specifically exempted.

Bid Protest

All Bid protests must be in writing and filed with the Purchasing Agent within five (5) business days of the award action. The bidder must clearly state the reasons for the protest. If a 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 Agent. The Purchasing Agent 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 any prospective 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.

Cost Liability

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the Bidder prior to the execution of a contract with the City. By submitting a bid, a bidder agrees to bear all costs incurred or related to the preparation, submission and selection process for the bid.

Reservation of Rights

The City of Ann Arbor reserves the right to accept any bid or alternative bid proposed in whole or in part, to reject any or all bids or alternatives bids in whole or in part and to waive irregularity and/or informalities in any bid and to make the award in any manner deemed in the best interest of the City.

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.

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.

INVITATION TO BID

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, Instructions to Bidders, 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 1 & 2, 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 20th DAY OF January, 2022.

Weiss Construction Co. LLC
Bidder's Name

Authorized Signature of Bidder

41001 Grand River
Novi, MI 48375
Official Address

Kevin Markhardt, Vice President
(Print Name of Signer Above)

313.567.4500
Telephone Number

kmarkhardt@weiss-construction.com
Email Address for Award Notice

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 Michigan, whom Kevin Markhardt bearing the title of Vice President 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** January 20, 2022

(Print) Name Kevin Markhardt Title Vice President

Company: Weiss Construction Co. LLC

Address: 41001 Grand River Ave, Novi, MI 48375

Contact Phone (313) 567-4500 Fax ( ) N/A

Email kmarkhardt@weiss-construction.com

BID FORM

Section 1 – Schedule of Prices

Company: Weiss Construction Co. LLC

Project: **ITB No. 4703 - Barton Pump Station Valve Improvement Project, DWSRF Project No. 7569-01**

Notes:

1. Bidders shall provide a Total Price for all bid items specified.
2. Quantities included in the bid table represent estimated quantities for different work. The CONTRACTOR shall be compensated for the actual number of items completed using the unit prices provided.
3. 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.
4. Any item not provided in the following list shall be considered incidental.
5. Any exceptions to the Schedule, including deadlines identified in Specification Section 01 14 00 Work Restrictions, shall be clearly identified in Section 3 - Time Alternate.

Item No.	Item Description	Qty	Unit	Total Price
1	General Conditions (Maximum 10% of Total Base Bid)	1	LS	$ 460,000.00
2	Bird Hills Air Relief Improvements	1	LS	$ 320,000.00
3	Sanitary System Improvements	1	LS	$ 245,000.00
4	Group 1 Sluice Gate Replacement	1	LS	$ 160,000.00
5	Group 2 Valve Replacement	1	LS	$ 169,900.00
6	Group 3 Valve Replacement	1	LS	$ 625,000.00
7	Group 4 Valve Replacement	1	LS	$ 575,000.00
8	Group 5 Valve Replacement	1	LS	$ 425,000.00
9	Surge Tank Improvements	1	LS	$ 115,000.00
10	Project Closeout	1	LS	$ 1,000.00
11	Certified Payroll Compliance and Reporting	1	LS	$ 2,500.00
12	Permit Allowance	1	LS	$ 30,000.00
TOTAL	**BASE BID ITEMS 1-12**			$ 4,656,400.00

Base Bid

For the entire work outlined in these documents for the **Barton Pump Station Valve Improvement Project**, complete as specified, using equipment and materials only of the type and manufacturers where specifically named.

Four Million Six Hundred Fifty Six Thousand Four Hundred ($ 4,656,400.00)

BID FORM

Section 2 – 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 January 20, 2022

Kevin Markhardt, Vice President

BID FORM

Section 3 - Time Alternate

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 below its proposed time for performance of the work. Consideration will be given to time in evaluating bids.

Our bid is based on the following modifications to the allowable work periods as specified in 01 14 00 for the following "Valve Groups":

* Group No. 1 - Spetember 1st to March 15th
* Group No. 2 - September 1st to March 15th
* Group No. 5 - September 1st to March 15th

Additionally, our bid is based on the following adjustment sto the allowed shut down periods as specified in 01 14 00 for the following Group/Steps:

* Group 2, Step No. 1 (36" GV) - 10 days
* Group 2, Step No. 2 (42" GV) - 10 days
* Group 2, Step No. 4 - 10 days
* Group 2, Step No. 5 - 6 days
* Group 3, Step No. 3 - 20 days
* Group 4, Step No. 3 & 4 - 10 days
* Group 4, Step No. 1 & 2 - 20 days

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 January 20, 2022

Kevin Markhardt, Vice President

BID FORM

Section 4 - 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
SELF Perform	Process Piping	— NA —
PETERSON & MATZ	BFV	PETERSON & MATZ $ 325,060
ETNA	GATE Valve Supplier	ETNA $ 215,000
PETERSON & MATZ	CHECK	PETERSON & MATZ $ 55,000
SELF Perform	Earthwork/Underground Utilities	— NA —
Signature Contracting	Painting	$ 100,000.00

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 January 20, 2022

Kevin Markhardt, Vice President

BID FORM

Section 5 – References

Include a minimum of three (3) references from similar projects completed within the past five (5) years.

[Refer also to Instructions to Bidders for additional requirements, if any]

2019-03

1) Ann Arbor WTP UV Disinfection System Project — Project Name
$2,702,496.00 — Cost
8/13/2020 — Date Constructed

Glen Wiczorek - City of Ann Arbor — Contact Name
734.794.6426 — Phone Number

2019-02

2) Oakland County Dequindre Pump Station Rehabilitation — Project Name
$6,107,854.11 — Cost
9/3/2021 — Date Constructed

John Arvi - Wade Trim — Contact Name
734.947.9740 — Phone Number

2018-11

3) GLWA-CON-270 West Service Center Pump Station — Project Name
$1447,744.00 — Cost
3/25/2020 — Date Constructed

Andrew Juergens - GLWA — Contact Name
313.917.6640 — Phone Number

If bidder answered "no" to the question above, please provide details on how you assess the skills and qualifications of any employees who do not have master or journeyperson certification or status, or are not participants in a Registered Apprenticeship Program.

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22. Will bidder comply with all applicable state and federal laws and visa requirements regarding the hiring of non-US citizens, and disclosure of any work visas sought or obtained by the bidder, any of the bidder's subcontractors, or any of the bidder's employees or independent contractors, in order to perform any portion of the project?

Yes No

23. Submit evidence that bidder has financial resources to start up and follow through on the project and to respond to damages in case of default as shown by written verification of bonding capacity equal to or exceeding the amount of the bidders scope of work on the project. The written verification must be submitted by a licensed surety company rated B+ or better in the current A.M. Best Guide and qualified to do business within the State of Michigan, and the same audited financial information for any subcontractor estimated to be paid more than $100,000 related to any portion of the project.

24. Submit evidence of a quality assurance program used by the bidder and the results of same on the bidder's previous projects.

See attached "Table of Contents" for Weiss Construction Corporated "Quality Management Plan"

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)
Weiss Construction Co. LLC
41001 Grand River Ave.
Novi, MI 48375

SURETY:
(Name, legal status and principal place of business)
Liberty Mutual Insurance Company
175 Berkeley Street
Boston, MA 02116

OWNER:
(Name, legal status and address)
City of Ann Arbor
301 East Huron Street
Ann Arbor, MI 48104
BOND AMOUNT: Five Percent (5%) of Amount Bid

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

PROJECT:
(Name, location or address, and Project number, if any)
Barton Pump Station Valve Improvement Project, DWSRF Project No. 7569-01, ITB No. 4703

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this **20th** day of **January, 2022**

(Witness)	**Weiss Construction Co. LLC** *(Principal)* *(Seal)*
	(Title) **Kevin Markhardt, Vice President**
(Witness)	**Liberty Mutual Insurance Company** *(Surety)* *(Seal)*
	(Title) **Susan L Small , Attorney-in-Fact**

Init.

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This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: **8206562-013056**

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Alan P. Chandler; Ian J. Donald; Jeffrey A. Chandler; Kathleen M. Irelan; Meagan L. Reynolds; Robert Trobec; Susan L. Small; Wendy L. Hingson

all of the city of Troy state of MI each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 15th day of October, 2021.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: _____
David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 15th day of October, 2021 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: _____
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 20th day of January, 2022.

By: _____
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

REQUIRED STANDARD CONTRACT LANGUAGE: CLEAN WATER STATE REVOLVING FUND AND DRINKING WATER REVOLVING FUND

- **Davis-Bacon/Prevailing Federal Wages, Including Labor Standards Provisions**
- **Disadvantaged Business Enterprise (DBE) Requirements***
- **Debarment/Suspension Certification***

*** Bidders should note these sections contain instructions regarding forms/information that must be completed/included with any submitted bid.**

Davis-Bacon/Prevailing Federal Wage Rates

P.L. 111-88 requires compliance with the Davis Bacon Act and adherence to the current U.S. Department of Labor Wage Decision. Attention is called to the fact that not less than the minimum salaries and wages as set forth in the Contract Documents (see Wage Decision included herein) must be paid on this project. The Wage Decision, including modifications, must be posted by the Contractor on the job site. A copy of the Federal Labor Standards Provisions is included and is hereby a part of this contract.

"General Decision Number: MI20210074 11/12/2021

Superseded General Decision Number: MI20200074

State: Michigan

Construction Type: Heavy

County: Washtenaw County in Michigan.

Heavy, Includes Water, Sewer Lines and Excavation (Excludes Hazardous Waste Removal; Coal, Oil, Gas, Duct and other similar Pipeline Construction)

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate,if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/01/2021
1	06/25/2021
2	08/13/2021
3	09/10/2021
4	10/01/2021
5	10/29/2021
6	11/12/2021

* CARP0687-006 06/01/2021

	Rates	Fringes
CARPENTER, Includes Form Work	$ 35.16	29.22

ELEC0252-009 06/01/2021

	Rates	Fringes
ELECTRICIAN	$ 48.48	27%+12.25

ENGI0325-019 09/01/2021

POWER EQUIPMENT OPERATORS: Underground Construction (Including Sewer)

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1	$ 37.63	24.85
GROUP 2	$ 32.90	24.85
GROUP 3	$ 32.17	24.85
GROUP 4	$ 31.60	24.85

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Backhoe/ Excavator, Boring Machine, Bulldozer, Crane, Grader/ Blade, Loader, Roller, Scraper, Trencher (over 8 ft. digging capacity)

GROUP 2: Trencher (8-ft digging capacity and smaller)

GROUP 3: Boom Truck (non-swinging, non- powered type boom)

GROUP 4: Broom/ Sweeper, Fork Truck, Tractor, Bobcat/ Skid Steer /Skid Loader

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ENGI0326-008 06/01/2021

EXCLUDES UNDERGROUND CONSTRUCTION

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 44.69	24.95
GROUP 2	$ 43.19	24.95
GROUP 3	$ 41.69	24.95
GROUP 4	$ 41.39	24.95

GROUP 5	$ 40.57	24.95
GROUP 6	$ 39.71	24.95
GROUP 7	$ 38.74	24.95
GROUP 8	$ 37.03	24.95
GROUP 9	$ 28.69	24.95

FOOTNOTES: Tower cranes: to be paid the crane operator rate determined by the combined length of the mast and the boom.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane with boom & jib or leads 400' or longer

GROUP 2: Crane with boom & jib or leads 300' or longer

GROUP 3: Crane with boom & jib or leads 220' or longer

GROUP 4: Crane with boom & jib or leads 140' or longer

GROUP 5: Crane with boom & jib or leads 120' or longer

GROUP 6: Regular crane operator

GROUP 7: Backhoe/Excavator, Bobcat/Skid Loader, Boring Machine, Broom/Sweeper, Bulldozer, Grader/Blade, Loader, Roller, Scraper, Tractor, Trencher

GROUP 8: Forklift

GROUP 9: Oiler

IRON0025-006 06/01/2019

	Rates	Fringes
IRONWORKER		
Reinforcing	$ 30.98	27.99
Structural	$ 36.77	29.03

LABO0334-009 06/01/2021

EXCLUDES OPEN CUT CONSTRUCTION

	Rates	Fringes
Landscape Laborer		
GROUP 1	$ 21.35	7.40
GROUP 2	$ 19.35	7.40

LANDSCAPE LABORER CLASSIFICATIONS

GROUP 1: Landscape specialist, including air, gas and diesel equipment operator, lawn sprinkler installer and skidsteer (or equivalent)

GROUP 2: Landscape laborer: small power tool operator, material mover, truck driver and lawn sprinkler installer tender

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LABO0334-018 09/01/2018

SCOPE OF WORK:
OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

	Rates	Fringes
LABORER		
(1) Common or General	$ 23.75	12.85
(2) Mason Tender-Cement/Concrete	$ 23.86	12.85
(4) Grade Checker	$ 24.05	12.85
(5) Pipelayer	$ 22.90	12.75
(524.20) Pipelayer	$ 22.90	12.85
(7) Landscape	$ 18.14	12.85

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* LABO0499-020 08/01/2021

EXCLUDES OPEN CUT CONSTRUCTION

	Rates	Fringes
LABORER		
GROUP 1	$ 30.21	14.45
GROUP 2	$ 30.42	14.45
GROUP 3	$ 30.56	14.45

LABORER CLASSIFICATIONS

GROUP 1: Common or General; Grade Checker

GROUP 2: Mason Tender - Cement/Concrete

GROUP 3: Pipelayer

PAIN0022-005 07/01/2008

	Rates	Fringes
PAINTER		
Brush & Roller	$ 25.06	14.75
Spray	$ 25.86	14.75

PLAS0514-002 06/01/2018

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 31.47	13.81

PLUM0190-010 06/01/2021

	Rates	Fringes
PLUMBER	$ 44.31	23.70

TEAM0007-006 06/01/2020

	Rates	Fringes
TRUCK DRIVER		
Dump Truck under 8 cu. yds.; Tractor Haul Truck	$ 27.90	.50 + a+b
Dump Truck, 8 cu. yds. and over	$ 28.00	.50 + a+b
Lowboy/Semi-Trailer Truck	$ 28.15	.50 + a+b

FOOTNOTE:
a. $470.70 per week.
b. $68.70 daily.

SUMI2010-072 11/09/2010

	Rates	Fringes
TRUCK DRIVER: Off the Road Truck	$ 20.82	3.69

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave

for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

29 CFR Part 5 – Labor Standards Provisions for Federally Assisted Projects

§ 5.5 Contract provisions and related matters.

(a) The Agency head shall cause or require the contracting officer to insert in full in any contract in excess of $2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in Sec. 5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, *Provided*, That such modifications are first approved by the Department of Labor):

(1) *Minimum wages*. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in Sec. 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) *Withholding*. The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of

1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) *Payrolls and basic records*. (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.*, the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/whd/forms/wh347.pdf* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a ``Statement of Compliance,'' signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under Sec. 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the ``Statement of Compliance'' required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees*--(i) *Apprentices.* Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its

program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) *Trainees*. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) *Equal employment opportunity*. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) *Compliance with Copeland Act requirements*. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) *Compliance with Davis-Bacon and Related Act requirements*. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Sec. 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) *Overtime requirements*. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible there for shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages*. The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in Sec. 5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

Disadvantaged Business Enterprises (DBE)

Prime contractors bidding on this project must follow, document, and maintain documentation of their Good Faith Efforts, as listed below, to ensure that Disadvantaged Business Enterprises (DBEs) have the opportunity to participate in the project by increasing DBE awareness of procurement efforts and outreach. Bidders must make the following Good Faith Efforts for any work that will be subcontracted.

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. Place DBEs on solicitation lists and solicit DBEs whenever they are potential sources.

2. Make information on forthcoming opportunities available to DBEs. Arrange time-frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. Whenever possible, post solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date. The DBEs should be given a minimum of 5 days to respond to the posting.

3. Consider in the contracting process whether firms competing for large contracts can be subcontracted with DBEs. Divide total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.

4. Encourage contracting with a consortium of DBEs when a contract is too large for one DBE firm to handle individually.

5. Use the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce.

Subsequent to compliance with the Good Faith Efforts, the following conditions also apply under the DBE requirements. Completed Good Faith Efforts Worksheets (Attachment 1), along with the required supporting documentation outlined in the instructions, must be submitted with your bid proposal. EPA form 6100-2 must also be provided at the pre-bid meeting. A copy of this form is available on the Forms and Guidance page of the Revolving Loan website.

1. The prime contractor must pay its subcontractor for work that has been satisfactorily completed no more than 30 days from the prime contractor's receipt of payment from the owner.

2. The prime contractor must notify the owner in writing prior to the termination of any DBE subcontractor for convenience by the prime contractor and employ the Good Faith Efforts if soliciting a replacement contractor.

3. If a DBE contractor fails to complete work under the subcontract for any reason, the prime contractor must employ the Good Faith Efforts if soliciting a replacement contractor.

4. The prime contractor must employ the Good Faith Efforts.

Debarment Certification

The prime contractor must provide a completed **Certification Regarding Debarment, Suspension, and Other Responsibility Matters Form** with its bid or proposal package to the owner (Attachment 2).

Attachment 1

Disadvantaged Business Enterprise (DBE) Utilization
GOOD FAITH EFFORTS WORKSHEET

Michigan Department of Environmental Quality
Office of Drinking Water and Municipal Assistance– Revolving Loan Section
Disadvantaged Business Enterprise (DBE) Utilization
State Revolving Fund/Drinking Water Revolving Fund
GOOD FAITH EFFORTS WORKSHEET

Bidder:_____

Subcontract Area of Work (one per worksheet:_____

Outreach Goal: Solicit a minimum of three (3) DBEs via email/letter/fax. It is recommended that various sources be used to locate the minimum number of DBEs. The Michigan Department of Transportation (MDOT) website and www.sam.gov registries may be two resources used to find a minimum of three DBEs.

List the DBEs contacted for the above area of work and complete the following information for each DBE.

Company Name	Type of Contact	Date of Contact	Price Quote Received	Accepted/ Rejected	Please Explain if Rejected
				☐ A ☐ R	
				☐ A ☐ R	
				☐ A ☐ R	
				☐ A ☐ R	
				☐ A ☐ R	
				☐ A ☐ R	

Explanation for Not Achieving a Minimum of Three Contacts; you may include a printout of the MDOT and www.sam.gov search results (attach extra sheets if necessary):

MITA DBE Posting Date (if applicable): _____
(attach a copy of the DBE advertisement)

Other Efforts (attach extra sheets if necessary):

Please include the completed worksheet and supporting documentation with the bid proposal.

Rev.3-2015

Michigan Department of Environmental Quality
Office of Drinking Water and Municipal Assistance– Revolving Loan Section
Disadvantaged Business Enterprise (DBE) Utilization
State Revolving Fund/Drinking Water Revolving Fund
GOOD FAITH EFFORTS WORKSHEET

Instructions to Bidders for the Completion of the Good Faith Efforts Worksheet

1. Separate worksheets must be provided for each area of work to be subcontracted out. This includes both major and minor subcontracts.

2. A minimum of three (3) DBEs must be contacted by a verifiable means of communication such as e-mail, letter, or fax for each area of work to be subcontracted out. Copies of the solicitation letters/e-mails and fax confirmation sheets must be provided with the worksheet.

3. If less that three (3) DBEs exist statewide for the area of work, then provide documentation that other DBE resources were consulted. This may include the MDOT and www.sam.gov registries and an advertisement is a publication. A printout of the website searched (conducted prior to the end of the bid period) must be submitted.

4. Posting solicitations for quotes/proposals from DBEs on the MITA website (www.mitadbe.com) is highly recommended to facilitate participation in the competitive process whenever possible. The solicitation needs to identify the project and the areas of work to be subcontracted out. A copy of the MITA DBE advertisement must be submitted with the Good Faith Efforts worksheet, if used, or a printout of the resulting quotes posted to the MITA website can be submitted with this form as supporting documentation.

5. If the area of work is so specialized that no DBEs exist, then an explanation is required to support that conclusion, including the documentation required in No. 3 above.

6. The date of the DBE contact must be identified, as it is important to document that the DBE solicitation was made during the bid period and that sufficient time was given for the DBE to return a quote.

7. Each DBE firm's price quote must be identified if one was received or N/A entered on the worksheet if a quote was not received. Copies of all quotes must be submitted with the worksheet.

8. If a quote was received, indicate if it was accepted or rejected. Justification for not accepting a quote and not using the DBE subcontractor must be provided.

9. Under Other Efforts, please indicate additional steps you have taken to obtain DBE contractors and provide the appropriate supporting documentation such as:
   - Follow-up e-mails, faxes, or letters.
   - Copies of announcements/postings in newspapers, trade publications, or minority media that target DBE firms.

Rev. 3-2015

Attachment 2

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters

Certification Regarding
Debarment, Suspension, and Other Responsibility Matters

The prospective participant certifies, to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in transactions under federal nonprocurement programs by any federal department or agency;

(2) Have not, within the three year period preceding the proposal, had one or more public transactions (federal, state, or local) terminated for cause or default; and

(3) Are not presently indicted or otherwise criminally or civilly charged by a government entity (federal, state, or local) and have not, within the three year period preceding the proposal, been convicted of or had a civil judgment rendered against it:

(a) For the commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public transaction (federal, state, or local) or a procurement contract under such a public transaction;

(b) For the violation of federal or state antitrust statutes, including those proscribing price fixing between competitors, the allocation of customers between competitors, or bid rigging; or

(c) For the commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

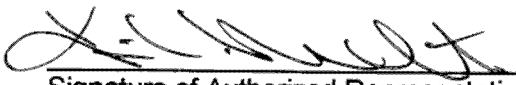
I understand that a false statement on this certification may be grounds for the rejection of this proposal or the termination of the award. In addition, under 18 U.S.C. §1001, a false statement may result in a fine of up to $10,000 or imprisonment for up to five years, or both.

Kevin Markhardt, Vice President

Name and Title of Authorized Representative

Weiss Construction Co. LLC

Name of Participant Agency or Firm



Signature of Authorized Representative

January 20, 2022

Date

☐ I am unable to certify to the above statement. Attached is my explanation.

Attachment 3

Frequently Asked Questions About
Disadvantaged Business Enterprise (DBE) Solicitation

Disadvantaged Business Enterprise (DBE) Requirements
Frequently Asked Questions Regarding Contractor Compliance

Q: What is the Good Faith Efforts Worksheet form and how is it to be completed?

A: This form captures efforts by the prime contractor to solicit DBEs for each area of work type that will be subcontracted out. A separate Good Faith Efforts Worksheet must be provided by the prime contractor for each area of work type to be subcontracted out. There are specific instructions that accompany this form that prescribe minimum efforts which bidders must make in order to be in compliance with the DBE requirements.

Q: Can non-certified DBEs be used?

A: While non-certified DBEs can be used, only DBEs, MBEs, and WBEs that are certified by EPA, SBA, or MDOT (or by tribal, state and local governments, as long as their standards for certification meet or exceed the standards in EPA policy) can be counted toward the fair share goal. Proof of certification by one of these recognized and approved agencies should be sought from each DBE.

Q: How does a DBE get certified?

A: Applications for certification under MDOT can be found at http://mdotjboss.state.mi.us/UCP/LearnHowServlet.

Applications for certification under EPA can be found on EPA's Small Business Programs website at http://www.epa.gov/osbp/dbe_firm.htm under Certification Forms.

Q: If a bidder follows the MDOT DBE requirements, will the bidder be in compliance with the SRF/DWRF DBE requirements?

A: No. Federally funded highway projects utilize DBE goals, which require that a certain percentage of work be performed by DBE subcontractors. For SRF/DWRF projects, there is no financial goal. However, there is a solicitation effort goal. Bidders must use Good Faith Efforts for each and every area of work to be subcontracted out to obtain DBEs. The bidders are not required to use DBEs if the quotes are higher than non-DBE subcontractors. **There is no required DBE participation percentage contract goal for the SRF/DWRF.** However, if the SRF/DWRF project is part of a joint project with MDOT, the project can be excluded from SRF/DWRF DBE requirements (i.e., the Good Faith Efforts Worksheet is not required) as it would be difficult to comply with both programs' requirements.

Q. Must the Good Faith Efforts Worksheet and supporting documentation be turned in with the bid proposals?

A: Yes. This is a requirement to document that the contractor has complied with the DBE requirements and the Good Faith Efforts. These compliance efforts must be done during the bidding phase and not after-the-fact. It is highly recommended that the need for these efforts and the submittal of the forms with the bid proposals be emphasized at the pre-bid meetings. Failure to show that the Good Faith Efforts were complied with during the bidding process can lead to a prime contractor being found non-responsive.

Q: Does EPA form 6100-2 need to be provided at the pre-bid meeting?

A: Yes. The form must be made available at the pre-bid meeting.

Q: What kinds of documentation should a contractor provide to document solicitation efforts?

A: Documentation can include fax confirmation sheets, copies of solicitation letters/e-mails, printouts of online solicitations, printouts of online search results, affidavits of publication in newspapers, etc.

Q: How much time will compliance with the Good Faith Efforts require in terms of structuring an adequate bidding period?

A: Due to the extent of the efforts required, a minimum of 30 calendar days is recommended between bid posting and bid opening to ensure adequate time for contractors to locate certified DBEs and solicit quotes.

Q: How does a contractor locate certified DBEs?

A: The Michigan Department of Transportation has a directory of all Michigan certified entities located at http://mdotjboss.state.mi.us/UCP/. Additionally, the federal System for Award Management (SAM) is another place to search and can be found at www.sam.gov. SAM contains information from the former Central Contractor Registration (CCR) database.

Q: If the bidder does not intend to subcontract any work, what forms, if any, must be provided with the bid proposal?

A: The bidder should complete the Good Faith Efforts Worksheet with a notation that no subcontracting will be done. However, if the bidder is awarded the contract and then decides to subcontract work at any point, then the Good Faith Efforts must be made to solicit DBEs.

Q: In the perfect world, the Good Faith Efforts Worksheet is required to be turned in with the proposal. What if no forms are turned in with the bid proposal or forms are blank or incomplete? Should this be cause to determine that the bidder is non-responsive?

A: While the Good Faith Efforts Worksheet is important, it is more critical to confirm that the contractor complied with the DBE requirements prior to bid opening. The owner should contact the bidder as soon as deficiencies are noted for a determination/documentation of efforts taken to comply with the DBE requirements. Immediate submittal of the completed forms will be acceptable provided the Good Faith Efforts were made and it is just a matter of transferring information to the forms.

Q: If the prime contractor is a DBE, does he have to solicit DBE subcontractors?

A: Yes, the DBE requirements still apply if the prime intends to subcontract work out. Good Faith Efforts must be used to solicit DBEs.

Q: If the area of work is one where there are less than three DBE contractors, how is the contractor to document this?

A: Copies of printouts from MDOT and SAM showing no DBEs and advertisements soliciting quotes for all subcontract areas, including the questionable areas, will be adequate if the dates on the printouts are prior to the bid or proposal closing date.

American Iron and Steel Contract Language

The Contractor acknowledges to and for the benefit of the City of Ann Arbor ("Purchaser") and the Michigan Department of Environmental Quality (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the State Revolving Fund and/or the Drinking Water Revolving Fund and such law contains provisions commonly known as "American Iron and Steel (AIS);" that requires all iron and steel products used in the project be produced in the United States ("AIS Requirements") including iron and steel provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the AIS Requirements, (b) all iron and steel used in the project will be and/or have been produced in the United States in a manner that complies with the AIS Requirements, unless a waiver of the requirements is approved or the State made the determination in writing that the AIS Requirements do not apply to the project, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the AIS requirements, as may be requested by the Purchaser. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Administrative Use Only
Contract Date: 03/21/2022

CONTRACT

THIS CONTRACT is between the CITY OF ANN ARBOR, a Michigan Municipal Corporation, 301 East Huron Street, Ann Arbor, Michigan 48104 ("City") and Weiss Construction Co. LLC ("Contractor") a limited liability company doing business under the laws of the State of Michigan, 41001 Grand River Avenue, Novi, Michigan 48375.

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 ITB No. 4703 - Barton Pump Station Valve Improvement Project 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 Water Treatment Services Unit.

Project means ITB No. 4703 - Barton Pump Station Valve Improvement Project.

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: Glen Wiczorek whose job title is Senior Utilities Engineer. 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 Kevin Markhardt whose job title is Vice President.

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 Seven Hundred Thirty (730) consecutive calendar days. Intermediate deadlines identified in Specification Section 01 14 00 Work Restrictions shall be applicable to individual sections of work.

(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 $1,000 for each calendar day of delay in the completion of all the work. Additional damages for individual sections of work are identified in Specification Section 01 14 00 Work Restrictions. 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

(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:

Four Million Six Hundred Fifty-Six Thousand Four Hundred and 00/100 Dollars ($4,656,400.00)

(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: Kevin Markhardt, Vice President

FC

By _____ 03/21/2022

CHRISTOPHER TAYLOR, MAYOR

By _____ 03/21/2022

JACQUELINE BEAUDRY, CITY CLERK

Ap

By _____ 03/21/2022

MILTON DOHONEY JR., INTERIM CITY ADMINISTRATOR

Milton Dohoney Jr
Interim City Administrator

By _____ 03/15/2022

BRIAN STEGLITZ, PUBLIC SERVICES AREA ADMINISTRATO
PROXY SIGNED BY VHARRISON

_____ 03/21/2022

KEVIN S. MCDONALD, INTERIM CITY ATTORNEY

PERFORMANCE BOND

Bond No. 013131268

(1) Weiss Construction Co. LLC
of 41001 Grand River Ave., Novi, MI 48375 (referred to as "Principal"), and Liberty Mutual Insurance Company - 175 Berkeley Street, Boston, MA 02116, 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 $4,656,400.00, 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 Barton Pump Station Valve Improvement Project, DWSRF Project No. 7569-01, for ITB No. 4703 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 4th day of March, 2022.

Liberty Mutual Insurance Company
(Name of Surety Company)
By _____
(Signature)

03/21/2022
KEVIN S. MCDONALD, INTERIM CITY ATTORNEY
Approved as to form:

Stephen K. Postema, City Attorney

Weiss Construction Co. LLC
(Name of Principal)
By _____
(Signature)
Its Kevin Markhardt, Vice President
(Title of Office)

Name and address of agent:
VTC Insurnace Group
1175 W. Long Lake Rd., Suite 200
Troy, MI 48098

LABOR AND MATERIAL BOND

Bond No. 013131268

(1) Weiss Construction Co. LLC

of 41001 Grand River Ave., Novi, MI 48375 (referred to as "Principal"), and Liberty Mutual Insurance Company - 175 Berkeley Street, Boston, MA 02116, 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 $ 4,656,400.00, 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 Barton Pump Station Valve Improvement Project, DWSRF Project No. 7569-01, for ITB No. 4703; 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 4th day of March, 2022

Liberty Mutual Insurance Company
(Name of Surety Company)
By _____
(Signature)

03/21/2022
KEVIN S. MCDONALD, INTERIM CITY ATTORNEY

Stephen K. Postema, City Attorney

Weiss Construction Co. LLC
(Name of Principal)
By _____
(Signature)
Its Kevin Markhardt, Vice President
(Title of Office)

Name and address of agent:
VTC Insurnace Group
1175 W. Long Lake Rd., Suite 200
Troy, MI 48098

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

Certificate No: 8206562-013056

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That The Ohio Casualty Insurance Company is a corporation duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Alan P. Chandler; Ian J. Donald; Jeffrey A. Chandler; Kathleen M. Irelan; Meagan L. Reynolds; Robert Trobec; Susan L. Small; Wendy L. Hingson

all of the city of Troy state of MI each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 15th day of October, 2021.

Liberty Mutual Insurance Company
The Ohio Casualty Insurance Company
West American Insurance Company

By: _____
David M. Carey, Assistant Secretary

State of PENNSYLVANIA
County of MONTGOMERY ss

On this 15th day of October, 2021 before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of Liberty Mutual Insurance Company, The Ohio Casualty Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at King of Prussia, Pennsylvania, on the day and year first above written.

Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: _____
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.
Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 4th day of March, 2022.

By: _____
Renee C. Llewellyn, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

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 section 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 13. 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 180 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 10 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, which, notwithstanding anything to the contrary herein, shall be maintained for three years from the date the Project is completed.

(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

DETAILED SPECIFICATIONS

SECTION 01 10 00

CERTIFIED PAYROLL COMPLIANCE AND REPORTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification covers all administrative requirements, payroll reporting procedures to be followed by Contractors performing work on City-sponsored public improvements projects, and all other miscellaneous and incidental costs associated with complying with the applicable sections of the City of Ann Arbor Code of Ordinances with regard to payment of prevailing wages and its Prevailing Wage Compliance policy.

B. This specification is **not** intended to include the actual labor costs associated with the payment of prevailing wages as required. Those costs should be properly incorporated in all other items of work bid.

1.2 GENERAL

A. The Contractor is expected to comply with all applicable sections of Federal and State prevailing wage laws, duly promulgated regulations, the City of Ann Arbor Code of Ordinances, and its Prevailing Wage Compliance Policy as defined within the contract documents. The Contractor shall provide the required certified payrolls, city-required declarations, and reports requested elsewhere in the contract documents within the timeline(s) stipulated therein.

B. The Contractor shall also provide corrected copies of any submitted documents that are found to contain errors, omissions, inconsistencies, or other defects that render the report invalid. The corrected copies shall be provided when requested by the Supervising Professional.

C. The Contractor shall also attend any required meetings as needed to fully discuss and ensure compliance with the contract requirements regarding prevailing wage compliance. The Contractor shall require all employees engaged in on-site work to participate in, provide the requested information to the extent practicable, and cooperate in the interview process. The City of Ann Arbor will provide the needed language interpreters in order to perform wage rate interviews or other field investigations as needed.

D. Certified Payrolls may be submitted on City-provided forms or forms used by the Contractor, as long as the Contractor's forms contain all required payroll information. If the Contractor elects to provide their own forms, the forms shall be approved by the Supervising Professional prior to the beginning of on-site work.

1.3 UNBALANCED BIDDING

A. The City of Ann Arbor will examine the submitted cost for this item of work prior to contract award. If the City determines, in its sole discretion, that the costs bid by the Contractor for complying with the contract requirements are not reasonable, accurately reported, or may contain discrepancies, the City reserves the right to request additional documentation that fully supports and justifies the price as bid. Should the submitted information not be determined to be reasonable or justify the costs, the City reserves the right to pursue award of the contract to the second low bidder without penalty or prejudice to any other remedies that it may have or may elect to exercise with respect to the original low-bidder.

B. The Contract Completion date will not be extended as a result of the City's investigation of the as-bid amount for this item of work, even if the anticipated contract award date must be adjusted. The only exception will be if the Contractor adequately demonstrates that their costs were appropriate and justifiable. If so, the City will adjust the contract completion date by the number of calendar days commensurate with the length of the investigation, if the published Notice to Proceed date of the work cannot be met. The contract unit prices for all other items of work will not be adjusted regardless of an adjustment of the contract completion date being made.

1.4 MEASUREMENT AND PAYMENT

A. The completed work as measured for this item of work will be paid for at the Contract Unit Price for the following Contract (Pay) Item:

Contract Item (Pay Item)	Pay Unit
Certified Payroll Compliance and Reporting	Lump Sum

B. The unit price for this item of work shall include all supervisory, accounting, administrative, and equipment costs needed to monitor and perform all work related to maintaining compliance with the tasks specified in this Detailed Specification, the City of Ann Arbor Code of Ordinances, its Prevailing Wage Compliance policy and the applicable Federal and State laws.

C. Payment for this work will be made with each progress payment, on a pro-rata basis, based on the percentage of construction completed. When all of the work of this contract has been completed, the measurement of this item shall be 1.0 times the Lump Sum bid amount. This amount will not be increased for any reason, including extensions of time, extra work, and/or adjustments to existing items of work.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

PART 1 – GENERAL

1.1 SUMMARY OF WORK

A. Work to be done includes the demolition, construction, startup, and testing of valving improvements at the Barton Pump Station. The project will include new yard valves, valve vaults, pump isolation valves, check valves, piping and all other related work.

B. The principal features of the Work to be performed under this Contract are:

SINGLE PRIME CONTRACT: Includes furnishing and installing new valves, piping, valve vaults, and all required appurtenances as described in the Contract Documents including all related work.

C. The foregoing description(s) shall not be construed as a complete description of all work required.

1.2 CONTRACT DOCUMENTS

A. The Work to be done is shown on the set of Drawings entitled Barton Pump Station Valve Replacement Project. The numbers and titles of all Drawings appear on the cover sheet of the Drawings. All drawings so enumerated shall be considered an integral part of the Contract Documents as defined herein.

B. Certain Document Sections refer to Divisions of the Contract Specifications. Sections are each individually numbered portions of the Specifications (numerically) such as 08 11 00, 13 18 22, 15 20 66, etc. The term Division is used as a convenience term meaning all Sections within a numerical grouping. Division 1 would thus include Sections 01 11 00 through 01 91 00.

C. Where references in the Contract Documents are made to CONTRACTORS for specific disciplines of work (e.g. Electrical CONTRACTOR, etc.), these references shall be interpreted to be the single prime CONTRACTOR when the project is bid or awarded as a single prime Contract.

D. The prime CONTRACTOR shall be responsible for all work in the Contract Documents regardless of the division of disciplines.

E. ENGINEER shall provide the CONTRACTOR an electronic copy on CD of the Specifications and Contract Drawings. The CONTRACTOR shall be responsible for the production of his construction sets.

1.3 GENERAL ARRANGEMENT

A. Drawings indicate the extent and general arrangement of the work. If any departures from the Drawings are deemed necessary by the CONTRACTOR to accommodate the materials and equipment CONTRACTOR proposes to furnish, details of such departures and reasons therefore shall be submitted as soon as practicable to the ENGINEER for approval by OWNER and ENGINEER. No such departures shall be made without the prior written approval of the OWNER or ENGINEER. Approved changes shall be made without additional cost to the OWNER for this work or related work under other Contracts of the Project.

B. The specific equipment proposed for use by the CONTRACTOR on the project may require changes in structures, auxiliary equipment, piping, electrical, mechanical, controls or other work to provide a complete satisfactory operating installation. The CONTRACTOR shall submit to the ENGINEER, for approval by OWNER and ENGINEER, all necessary Drawings and details showing such changes to verify conformance with the overall project structural and architectural requirements and overall project operating performance. The Bid Price shall include all costs in connection with the preparation of new drawings and details and all changes to construction work to accommodate the proposed equipment, including increases in the costs of other Contracts.

1.4 CONSTRUCTION PERMITS, EASEMENTS AND ENCROACHMENTS

A. The OWNER shall obtain or cause to be obtained all permanent and temporary construction easements required. No easements are anticipated for this project.

B. The CONTRACTOR shall obtain, keep current and pay all fees for any other necessary construction permits from those authorities, agencies, or municipalities having jurisdiction over land areas, utilities, or structures which are located within the Contract limits and which will be occupied, encountered, used, or temporarily interrupted by the CONTRACTOR's operations unless otherwise stated. CONTRACTOR shall pay plan review fees and any other fees for required permits. Record copies of all permits shall be furnished to the ENGINEER and OWNER.

C. When construction permits are accompanied by regulations or requirements issued by a particular authority, agency or municipality, it shall be the CONTRACTOR's responsibility to become familiar with and comply with such regulations or requirements as they apply to CONTRACTOR's operations on this Project.

D. The CONTRACTOR will be required to follow the requirements established by all permits necessary for the construction of this project. The following is a list of all permits that must be obtained prior to the beginning of construction.

1. EGLE Permit for Water System Construction (Act 399)

2. Applicable City Building Permits (all trades)

3. Soil Erosion Control

E. The permit for water system construction will be applied for and obtained by the OWNER through the Michigan Department of Environment, Great Lakes, and Energy. The CONTRACTOR shall obtain a copy of this permit from the ENGINEER prior to construction.

F. The permits for the various trades shall be applied for, paid for and procured by the CONTRACTOR. An allowance of $30,000 has been included in the Contract price for the payment of the permit fees. The CONTRACTOR must submit a copy of these permits to the ENGINEER prior to construction.

G. The Soil Erosion and Sedimentation Control permit shall be applied for and paid for by the CONTRACTOR and issued by the City of Ann Arbor. The CONTRACTOR will be required to adhere to all requirements of the permit. The CONTRACTOR shall have an SESC-certified inspector assigned to the project to complete all required inspections and reports. An electronic copy of all inspections shall be provided to the OWNER.

1.5 ADDITIONAL ENGINEERING SERVICES

A. In the event that the ENGINEER is required to provide additional engineering services as a result of substitution of materials or equipment which are not "or equal" by the CONTRACTOR, or changes by the CONTRACTOR in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the ENGINEER is required to examine and evaluate any changes proposed by the CONTRACTOR for the convenience of the CONTRACTOR, then the ENGINEER's charges in connection with such additional services shall be charged to the CONTRACTOR by the OWNER.

B. Structural design shown on the Contract Drawings is based upon typical weights for major items of equipment as indicated on the Contract Drawings and specified. If the equipment furnished exceeds the weights of said equipment, the CONTRACTOR shall assume the responsibility for all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the ENGINEER's expenses in connection therewith.

C. In the event that the ENGINEER is required to provide additional engineering services as a result of CONTRACTOR's errors, omissions, or failure to conform to the requirements of the Contract Documents, or if the ENGINEER is required to examine and evaluate any changes proposed by the CONTRACTOR solely for the convenience of the CONTRACTOR, then the ENGINEER's charges in connection with such additional services shall be charged to the CONTRACTOR by the OWNER.

1.6 ADDITIONAL OWNER'S EXPENSES

A. In the event the Work of this Contract is not completed within the time set forth in the Contract or within the time to which such completion may have been extended in accordance with the Contract Documents, the additional engineering or inspection charges incurred by the OWNER may be charged to the CONTRACTOR and deducted from the monies due the CONTRACTOR. Extra work or supplemental Contract work added to the original Contract, as well as extenuating circumstances beyond the control of the CONTRACTOR, will be given due consideration by the OWNER before assessing engineering and inspection charges against the CONTRACTOR.

B. Charges assessed to the CONTRACTOR for additional engineering and inspection costs will be determined based on actual hours charged to the job by the ENGINEER. Daily rates will depend on the number and classifications of employees involved, but in no case shall such charges exceed $1,200 per day for field personnel and $1,500 per day for engineering personnel, based on an eight-hour workday.

C. Charges for additional OWNER's expenses shall be in addition to any liquidated damages assessed in accordance with the Contract.

1.7 PROTECTION OF WORK

A. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy or freezing weather. Only such work as will not suffer injury to workmanship or materials will be permitted. CONTRACTOR shall carefully protect the work against damage or injury from the weather, and when work is permitted during freezing weather, CONTRACTOR shall provide and maintain approved facilities for heating the materials and for protecting the finished work.

1.8 SUBSURFACE DATA

A. Subsurface data is offered in good faith solely for placing the Bidder in receipt of all information available to the OWNER and ENGINEER.

B. The Bidder must interpret such subsurface data according to Bidder's own judgment and shall acknowledge that Bidder is not relying upon the same as accurately describing the subsurface conditions, which may be found to exist.

1. The test boring logs present factual information of the subsurface conditions at the specific test boring location only. The Bidder should not consider, or conclude, that the subsurface conditions will be consistent between test boring locations.

C. The Bidder further acknowledges that Bidder assumes all risks contingent upon the nature of the sub-surface conditions to be actually encountered in performing the work covered by the Contract, even though such actual conditions may result in the Bidder performing more or less work than Bidder originally anticipated.

D. The Bidder is further advised that the OWNER has made sub-surface investigations and a report has been prepared, in connection with this project for the ENGINEER, a copy of which is appended to the rear of these specifications.

E. In making this data available, the OWNER makes no guarantee, either expressed or implied, as to their accuracy or to the accuracy of any interpretation thereof.

1.9 SURVEYS AND LAYOUT

A. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings or as directed by the ENGINEER or OWNER. Elevation of existing ground and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the stake out survey shall be referred immediately to the ENGINEER for interpretation or correction.

B. All survey work for construction control purposes shall be performed by the CONTRACTOR who shall retain the professional services of a Michigan licensed professional surveyor to perform the survey work.

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C. CONTRACTOR shall have the responsibility to carefully preserve the bench marks, reference points and stakes, and in the case of destruction thereof by the CONTRACTOR or resulting from CONTRACTOR's negligence, the CONTRACTOR shall be charged with the expense and damage resulting therefrom and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.

D. Existing or new control points, property markers and monuments that will be or are destroyed during the normal causes of construction shall be reestablished by the CONTRACTOR and all reference ties recorded therefore shall be furnished to the OWNER and ENGINEER. All computations necessary to establish the exact position of the work shall be made and preserved by the CONTRACTOR.

E. The OWNER or ENGINEER may check all or any portion of the work and the CONTRACTOR shall afford all necessary assistance to the OWNER and ENGINEER in

carrying out such checks. Any necessary corrections to the work shall be immediately made by the CONTRACTOR. Such checking by the OWNER or ENGINEER shall not relieve the CONTRACTOR of any responsibilities for the accuracy or completeness of CONTRACTOR's work.

1.10 FIRE PROTECTION

A. CONTRACTOR shall take all necessary precautions to prevent fires at or adjacent to the work, buildings, etc., and shall provide adequate facilities for extinguishing fires which do occur. Burning of debris is not permitted on the project site.

B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks, or similar hazardous utilities or devices, the CONTRACTOR shall immediately alert the local Fire Marshal, the ENGINEER, and the OWNER of such tank or device. The CONTRACTOR shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the OWNER of the tank or device to prevent the occurrence of fire or explosion.

C. Fire protection alarm and detection systems shall comply with the Michigan International Building Code 2015 and NFPA standards.

D. Hydrants must be maintained in service and approved during all phases of work.

E. Storage area for construction materials must not interfere with fire/emergency site access.

F. All material demolished from site should not be stored on location.

1.11 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of either the EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable rules and regulations.

B. Provide MSDS sheets for all chemicals to OWNER.

1.12 FIRST AID FACILITIES AND ACCIDENTS

A. First Aid Facilities

1. The CONTRACTOR shall provide at the site such equipment and facilities as are necessary to supply first aid to any of CONTRACTOR's personnel who may be injured in connection with the work.

B. Accidents

1. The CONTRACTOR shall promptly report, in writing, to the ENGINEER and OWNER all accidents whatsoever out of, or in connection with, the performance of the work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses.

2. If death, serious injuries, or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the OWNER and the ENGINEER.

3. If any claim is made by anyone against the CONTRACTOR or a Subcontractor on account of any accidents, the CONTRACTOR shall promptly report the facts, in writing, to the ENGINEER and OWNER, giving full details of the claim.

1.13 ULTIMATE DISPOSITION OF CLAIMS BY ONE CONTRACTOR ARISING FROM ALLEGED DAMAGE BY ANOTHER CONTRACTOR

A. During the progress of the work, other CONTRACTORS may be engaged in performing other work or may be awarded other Contracts for additional work on this project and/or on this site. In that event, the CONTRACTOR shall coordinate the work to be done hereunder with the work of such other CONTRACTORS and the CONTRACTOR shall fully cooperate with such other CONTRACTORS and carefully fit its own work to that provided under other Contracts as may be directed by the OWNER. The CONTRACTOR shall not commit or permit any act which will interfere with the performance of work by any other CONTRACTOR.

B. If the OWNER shall determine that the CONTRACTOR is failing to coordinate this work with the work of the other CONTRACTORS as the OWNER directed, then the OWNER shall have the right to withhold any payments otherwise due hereunder until the CONTRACTOR completely complies with the OWNER's directions.

C. If the CONTRACTOR notifies the OWNER in writing that another CONTRACTOR is failing to coordinate his work with the work of this Contract as directed, the OWNER will promptly investigate the charge. If the OWNER finds it to be true, he will promptly issue such directions to the other CONTRACTOR with respect thereto as the situation may require. The OWNER, the ENGINEER, nor any of their agents shall not, however, be liable for any damages suffered by the CONTRACTOR by reason of the other CONTRACTOR's failure to promptly comply with the directions so issued by the OWNER, or by reason of another CONTRACTOR's default in performance, it being understood that the OWNER does not guarantee the responsibility or continued efficiency of any CONTRACTOR.

D. The CONTRACTOR shall indemnify and hold the OWNER and the ENGINEER harmless from any and all claims of judgments for damages and from costs and expenses to which the OWNER may be subjected or which it may suffer or incur by reason of the CONTRACTOR's failure to comply with the OWNER's directions promptly.

E. Should the CONTRACTOR sustain any damage through any act or omission of any other CONTRACTOR having a Contract with the OWNER for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a Subcontractor of such Contract, the CONTRACTOR shall have no claim against the OWNER or the ENGINEER for such damage, but shall have a right to recover such damage from the other CONTRACTOR.

F. Should any other CONTRACTOR having or who shall hereafter have a Contract with the OWNER for the performance of work upon the site sustain any damage through any act or omission of the CONTRACTOR hereunder or through any act or omission of any Subcontractor of the CONTRACTOR, the CONTRACTOR agrees to reimburse such other CONTRACTOR for all such damages and to defend at his own expense any suit based upon such claim and if any judgment or claims against the OWNER shall be allowed, the CONTRACTOR shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and shall indemnify and hold the OWNER harmless from all such claims.

G. The OWNER's right to indemnification hereunder shall in no way be diminished, waived or discharged, by its recourse to assessment of liquidated damages as provided in the Contract, or by the exercise of any other remedy provided for by Contract Documents or by law.

1.14 BLASTING AND EXPLOSIVES

A. The use of blasting or explosives shall not be allowed under this project.

1.15 LIMITS OF WORK AREA

A. The CONTRACTOR shall confine the construction operations within the Contract limits shown on the Drawings and/or property lines and/or fence lines. Storage of equipment and materials, or erection and use of sheds outside of the Contract limits, if such areas are the property of the OWNER, shall be used only with the OWNER's approval. Such storage or temporary structures, even within the Contract's limits, shall be confined to the OWNER's property and shall not be placed on properties designated as easements or rights-of-way unless specifically permitted elsewhere in the Contract Documents.

1.16 WEATHER CONDITIONS

A. No work shall be done when the weather is unsuitable. The CONTRACTOR shall take necessary precautions (in the event of impending storms) to protect all work, materials, or equipment from damage or deterioration due to floods, driving rain, or wind, and snow storms. The OWNER reserves the right to order that additional protection measures over and beyond those proposed by the CONTRACTOR, be taken to safeguard all components of the Project. The CONTRACTOR shall not claim any compensation for such precautionary measures so ordered, nor claim any compensation from the OWNER for damage to the work from weather elements.

B. The mixing and placing of concrete or pavement courses, the laying of masonry, and installation of sewers and water mains shall be stopped during rainstorms and when ordered by the OWNER; and all freshly placed work shall be protected by canvas or other suitable covering in such manner as to prevent running water from coming in contact with it. Sufficient coverings shall be provided and kept ready at hand for this purpose. The limitations and requirements for mixing and placing concrete, or laying of masonry, in cold weather shall be as described elsewhere in these Specifications.

C. The ENGINEER shall have permissive authority over the work which is proposed to be done during the winter months. The CONTRACTOR shall provide adequate weather protection, temporary heating and take any other measures which are necessary to ensure that the work performed during the winter months is properly installed and protected against damage from freezing.

1.17 USE OF FACILITIES BEFORE COMPLETION

A. The OWNER reserves the right to enter and use any portion of the constructed facilities before final completion of the whole work to be done under this Contract. However, only those portions of the facilities which have been completed to the OWNER's satisfaction, as evidenced by issuing a Certificate of Partial Completion covering that part of the work, shall be placed in service.

B. It shall be the OWNER's responsibility to prevent premature connections to or use of any portion of the installed facilities by private or public parties, persons or groups of persons, before the OWNER issues the Certificate of Partial Completion covering that portion of the work to be placed in service.

C. Consistent with the approved progress schedule, the CONTRACTOR shall cooperate with the OWNER, his agents, and the ENGINEER to accelerate completion of those facilities, or portions thereof, which have been designated for early use by the OWNER.

1.18 PIPING, VALVES AND SUPPORTS

A. Various pipelines and conduits are shown on the Plans in diagram form. Where such pipelines and conduits are shown only in diagram, they shall be arranged clear of other pipelines, equipment and walking areas, and be accessible for maintenance. Such pipelines shall be fitted and installed in a neat and workmanlike manner in accordance with approved shop drawings. An adequate number of unions shall be provided in main pipe and branch pipe runs to facilitate dismantling or removal of pipeline sections without disturbing adjacent branch or connecting lines. Pipe and conduit supports shall be designed by CONTRACTOR and approved by ENGINEER unless noted otherwise in the Contract Documents.

1.19 DELIVERY, STORAGE, AND HANDLING

A. All materials, supplies and equipment, whether furnished by the CONTRACTOR or by the OWNER, shall be delivered, stored and handled as to prevent the inclusion of foreign materials and/or damage by water, freezing, breakage or other causes. The ENGINEER may require the CONTRACTOR to provide an enclosed storage shed for the storage of the above-mentioned materials, supplies and equipment. Packaged materials shall be delivered in the original unopened containers and shall be stored until ready for use. All materials which have been stored shall meet the requirements of the Specifications at the time they are used in the project.

1.20 PROTECTION OF TREES

A. All trees which are to be preserved and which, in the opinion of the ENGINEER, might be subject to damage by the CONTRACTOR's operations, shall be adequately protected against damage to the bark by 2-inch thick vertical planking securely wired or tied completely around the tree trunk. Such protection shall not be removed until authorized by the ENGINEER.

B. Machine excavation shall not be made within a circular area of any tree, the diameter of the area in feet being equal to the radius of the tree in inches. Snow fencing shall be placed around this area for any tree in or facing the work area. If hand excavation within this area cuts across a large root of a tree, the butting of which, in the opinion of the ENGINEER, would be injurious to the tree, the CONTRACTOR shall tunnel under such root and protect it from injury throughout the work.

C. Trees which interfere with the work, and the removal of which is permitted, shall be removed by the CONTRACTOR at his expense and in a safe manner. Such tree removal shall be considered incidental to the work. No trees are to be removed without the expressed approval of the governmental body having jurisdiction thereof, and of the ENGINEER.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. The proposed improvements shall be fully constructed, started, tested and put into operation while portions of the existing pump station remain in service.

B. The existing pump station shall be maintained in continuous operation during the entire construction period of this Project. The intent of this section is to outline the minimum requirements necessary to provide continuous piping of the required capacity throughout the construction period.

C. Work under this Contract shall be scheduled and conducted by the CONTRACTOR so as not to impede any pumping process, discharge water, or cause odor or other nuisance except as explicitly permitted hereinafter. In performing the work shown and specified, the CONTRACTOR shall plan and schedule his work to meet the OWNER's operating requirements, and the constraints and construction requirements as outlined in this Section. The CONTRACTOR shall pay all civil penalties, costs, assessments, etc., associated with any failure or inability to supply water from the pump stations that do not meet water quality standards, adequate quantity requirements or maintain system pressure requirements; provided the inadequacy was associated with the CONTRACTOR's work.

D. The CONTRACTOR shall be responsible for coordinating the general construction and valve and piping construction schedules and for ensuring that permanent or temporary power is available for all existing, proposed, and temporary facilities that are required to be on line at any given time.

E. The CONTRACTOR has the option of providing temporary facilities that can eliminate a constraint, provided it is done without cost to the OWNER and provided that all requirements of these Specifications are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

F. The CONTRACTOR shall review and understand all schedule constraints during the bidding process. Any exceptions or required changes to the schedule shall be clearly identified for the OWNER's review in the Bid Form, Section 3 – Time Alternate.

1.2 GENERAL CONSTRAINTS

A. The CONTRACTOR shall schedule the Work so that the pump stations are maintained in continuous operation. Portions of the pumping 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

shutdown 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, 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 72 hours 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 shall 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 14 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 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 pump station operations. The OWNER reserves the right to cancel a scheduled shutdown, without additional compensation due the CONTRACTOR, and shall 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 pump station as a result of not complying with specified provisions for maintaining pump station operations, then the CONTRACTOR shall immediately make all repairs or replacements and do all work necessary to restore the pump stations 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.

1.3 GENERAL REQUIREMENTS

A. Access to Site, Roadways, and Parking Areas

1. An unobstructed traffic route through all gates shall be maintained at all times for the OWNER's operations personnel and maintenance equipment. The CONTRACTOR shall be responsible for providing access to the construction area and for preparing and maintaining temporary access road, fence, and gate.

   Barton Pump Station: The CONTRACTOR shall park all equipment and vehicles within the boundaries of the fence area. No equipment or vehicles shall be permitted to occupy the adjacent recreational area parking.

2 An unobstructed traffic route around the site shall be maintained at all times for the OWNER's operations personnel, maintenance equipment, and delivery vehicles. Vehicular access to the buildings, and storage facilities for OWNER personnel and for delivery vehicles shall be maintained at all times by the CONTRACTOR except as explicitly permitted hereinafter.

3. The CONTRACTOR shall provide temporary measures to protect the existing pavement by filling over with temporary asphalt or supplying other measures acceptable to the ENGINEER, and he shall repair any damage to existing paved surfaces that occurs during the construction period. Any areas disturbed along the shoulders of the access road and interior roads and elsewhere inside and outside of the plant shall be repaired, graded, seeded, etc. as necessary to match pre-construction conditions.

4. The CONTRACTOR shall not undertake the restoration/construction of roadway (paved, gravel, or asphalt overlay) shown on the Contract Drawings, until all other work has been completed.

5. It shall be the responsibility of the General CONTRACTOR to apply for and obtain any permits required from the State of Michigan and City of Ann Arbor and pay all associated fees.

6. The CONTRACTOR shall be responsible for removal of snow in areas of the CONTRACTOR's work.

7. The CONTRACTOR shall not disturb the maintenance of pump station operations without a written and approved plan.

8. The CONTRACTOR shall submit plans for approval for any needed outages or disturbances to operations. These plans shall include the area, process or systems that shall be impacted and duration of the outage. No plans can be implemented without written authorization from OWNER or ENGINEER.

B. Personnel Access

1. OWNER's personnel shall have access to all areas which remain in operation throughout the construction period. The CONTRACTOR shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the ENGINEER to maintain personnel access to areas in operation. Access and adequate parking areas for OWNER's personnel must be maintained throughout construction.

C. Plumbing Facilities

1. Unless otherwise allowed by the ENGINEER, sanitary facilities in the existing structures shall be operational at all times for OWNER operating personnel. All other building plumbing systems such as roof and floor drains, pumping, etc., shall be maintained for all structures.

D. Building Heating and Ventilating

1. Building heating and ventilating for the existing structures shall be in service for the entire construction period. Additional temporary heating and ventilation shall be provided as required to maintain facilities under construction adequately heated and vented. The temperatures to be maintained in any areas occupied by OWNER operating personnel such as offices, bathrooms, etc., shall be at least 65°F. The temperatures to be maintained in all other interior areas, whether new, existing or temporary, shall be maintained at a minimum of 55°F.

E. Power, Light and Communications Systems (General)

1. Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation. Individual units may be disconnected as required for replacement, but service shall be available at all times including periods when pump station elements are out of service. Shutdown of electrical facilities, when allowed, shall be limited to not more than two (2) hours unless otherwise noted or approved by the OWNER. The CONTRACTOR shall coordinate shutdowns required to minimize the duration of shutdowns and the total number of shutdowns required to complete construction. OWNER's phone service to the pump station shall be maintained in continuous operation during construction.

F. Draining Process Pipes and Conduits (General)

1. The contents of all pipes and conduits to be removed, replaced or relocated (or dewatered for a specific purpose) shall be transferred to a suitable facility in a manner approved by the OWNER through hoses or piping, or by using pumps if hydraulic conditions so require them. The CONTRACTOR shall provide the pumps, piping, taps, valves and hoses at no additional cost to the OWNER. No uncontrolled spillage of a pipe or conduit shall be permitted. Any spillage, other than potable water, shall be immediately washed down and flushed to the appropriate disposal location. The CONTRACTOR may use drains if available, appropriate and approved by the OWNER.

G. Sump Pumps and Sumps

1. All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps until replaced with new. Interim piping, power and controls shall be provided as required by the staged construction sequence.

H. Seal Water and Service Water Piping

1. A new supply service of seal water and the necessary connections to existing equipment shall be installed during construction after the completion of the Group No. 4 phase of the project.

1.4 SPECIFIC OPERATIONAL CONSTRAINTS

A. The General CONTRACTOR shall schedule the work for the following based on the constraints given in such a manner as to maintain the pump station operation. CONTRACTOR shall submit a proposed construction schedule including all planned system and shutdowns and tie-ins for the OWNER's and ENGINEER's review no later than 30 calendar days after issuance of the Notice to Proceed. At a minimum, Construction Schedule shall indicate a proposed start date and duration for each of the items listed in this section. No construction shall begin on any of the items listed in this section until the proposed schedule has been approved. Refer to Table 1 and Table 2 for further details on dates and expected durations.

B. CONTRACTOR shall install as much of the new equipment that is to replace the existing equipment as feasible prior to shut-down of any pipe, to minimize the duration of the shut-down.

C. OWNER shall be responsible to turn all valves necessary to isolate pipe sections for connection, and to place the new pipe section to service.

D. OWNER will need operational access to the Barton Pump Station for the entire duration of the contract. If the CONTRACTOR cannot provide the operational access to the OWNER's staff, the CONTRACTOR shall provide a qualified staff member(s) to man and operate the pump station 24 hours a day/7 days per week per WTP facility's instructions at no additional cost to the OWNER.

E. CONTRACTOR shall provide a schedule with guaranteed hours to return to normal operations in case of unexpected equipment failures.

F. CONTRACTOR is not permitted to completely restrict water supply to the WTP facility during the high demand season within the time period of March 16 to October 14. The CONTRACTOR is only permitted to completely restrict the water supply to the WTP facility during the low demand season within the time period of October 15 to March 15 for a maximum of 6 hours. CONTRACTOR shall provide thirty (30) days' notice of a total shut down of the pump station.

G. Group No. 1 – Sluice Gate Replacement

1. The existing 36" x 72" sluice gate serves to isolate the 36" raw water supply line from Barton Pond, located at the Barton Dam Powerhouse and shall be scheduled within the time period October 1 to March 15. The CONTRACTOR shall inspect the existing sluice gate, determine the condition of the gates thimble, vertical bracing, and bolt pattern. CONTRACTOR shall follow the steps in the plans for the installation of new sluice gate, and all associated work.

2. The inspection shall be performed in the wet by divers. The inspection will require the shutdown of the 36" raw water supply line by closing and locking out Valve No. 17 and 18. CONTRACTOR shall provide fourteen (14) days' notice of when the inspection will occur. The shutdown for the sluice gate inspection of the 36" raw water supply line shall last no longer than one day. No other major work is permitted during the sluice gate inspection except for the field verification and inspection of the 42" PCCP, and 36" PCCP pipe lines, and Valve No. 5 from Group No. 2.

3. The demolition and replacement of the existing sluice gate system shall occur in the wet by divers, and shall be scheduled within the period of October 1 to March 15. The demolition of the existing sluice gate and installation of the new sluice gate will require the shutdown of the 36" raw water supply line by closing and locking out Valve No. 17 and 18. CONTRACTOR shall provide fourteen (14) days' notice of when the work will occur. The shutdown of the 36" raw water supply line shall last no longer than seven (7) days. No other major work is permitted during the sluice gate replacement.

H. Group No. 2 – Yard Valving and Piping Replacements

1. The valving and piping to be removed and replaced associated with group No. 2 located in the Barton Pump Station's yard shall be scheduled within the time period October 15 to November 30. The CONTRACTOR shall remove, replace existing valves with new, and install new valves (Valves No. 1-9 & 32), install a new drain line system for the 36" raw water supply line, and new piping as required for to ensure a trouble-free installation. Prior to any valve or piping replacement work being permitted, the CONTRACTOR shall perform field verifications of the dimensions, joint locations, connections and type of existing water mains at each location of proposed work and report findings to the ENGINEER and OWNER. CONTRACTOR shall follow the steps in the plans for the installation of new valves, replacements and all associated work.

2. Step 2 – Installation of Valves No. 1 to 4 along 36" and 42" PCCP

i. The work on the 36" PCCP shall be completed prior to starting work on the 42" PCCP. Work on the 42" PCCP shall start immediately following completion of the work on the 36" PCCP. Contractor shall only drain and remove the sections of the 36" raw water supply line, and the 42" raw water supply water main once the field verification report has been reviewed by the ENGINEER and required PCCP replacement sections and valves are onsite for installation. The CONTRACTOR shall remove and replace required sections of the 42" PCCP and 36" PCCP piping with new piping and 42" and 36" gate valves, and associated pipe line drain systems as shown on the Plan Set.

ii. The 36" and 42" lines are to be drained to the stream located east of the storage building as shown on the Plan Set.

iii. CONTRACTOR shall provide thirty (30) days' notice of when the work will occur. This work will require the shutdown of the 42" raw water supply watermain, and the 36" raw water supply line and shall last no longer than seven (7) days. No other major work is permitted under this phase of the contract.

iv. CONTRACTOR shall isolate and lockout the 36" PCCP piping in coordination with the OWNER. CONTRACTOR shall hot tap the 36"

PCCP line within the limits of pipe removal to drain the pipe and confirm isolation. CONTRACTOR to remove pipe section and install new PCCP pipe, gate valve and closure section in accordance with the plans and the pipe manufacturer's recommendations. Pipe shall be restored to service and visually inspected for leaks.

v. Following completion of the work on the 36" PCCP, CONTRACTOR shall isolate and lockout the 42" PCCP piping in coordination with the OWNER. CONTRACTOR shall drain the 42" PCCP at the fire hydrant located west of the work area. Pipe must be drained from the water treatment plant to Barton PS and air valve work in the Bird Hills Nature Area shall be complete prior to draining to allow air into the main.

3. Step 3 - Removal and replacement of Valve No. 5 with a new 16" gate valve.

i. CONTRACTOR shall close and lockout the valves, install line stops, and drain affected sections of the 24" and 42" raw water supply water mains as shown in the plan set. CONTRACTOR shall provide thirty (30) days' notice of when the work will occur. **This work will require the shutdown of the entire raw water supply to the City's water treatment plant facility and shall last no longer than six (6) hours to restoration of service in the 42" raw water main**. No other major work is permitted under this phase of the contract.

ii. The CONTRACTOR and OWNER shall develop a detailed contingency plan for Step 3. This shall at a minimum include having a 16" blind flange onsite in the event that the valve cannot be installed on the flange from the 42" PCCP main. If feasible, existing bolts shall be swapped for new bolts on the existing flange prior to valve removal to expedite replacement.

iii. Following completion of Step 3, service shall immediately be restored to the 42" raw water main. The 24" raw water main shall remain isolated and the CONTRACTOR shall immediately proceed to work on Step 4.

4. Step 4 – Installation of Valve No. 8 and Replacement of 24" water main

i. CONTRACTOR shall begin work on Step 4 immediately following the installation of Valve No. 5 on Step 3. Verify isolation of the 24" raw water main after placement of the 42" raw water main back into service following Step 3.

ii. CONTRACTOR shall provide thirty (30) days' notice of when the work will occur. This work will require the shutdown of the 24" raw water supply water main and shall last no longer than seven (7) days. No other major work is permitted under this phase of the contract.

iii. Existing meter vault shall be sawcut and removed as necessary to facilitate valve installation. Bottom slab of vault shall have a minimum of four (4) 6" diameter holes cored through it to allow drainage.

iv. The existing 24" raw water main shall be replaced from the line stop fitting west of the 16" interconnect to the existing cross south of the pump station. The existing cross and adjacent piping is encased in concrete and the CONTRACTOR will be responsible for field verifying final connection point prior to starting pipe replacement.

v. Following completion of Step 4, the 24" raw water main shall remain isolated and the CONTRACTOR shall immediately proceed to work on Step 5.

5. Step 5 – Installation of Valves No. 9 & 32 and Surge Tank Improvements

i. CONTRACTOR shall begin work on Step 5 immediately following Step 4. Verify continued isolation of the 24" raw water main.

ii. Remove and replace 24" butterfly valves (Valves No. 9 & 32) along the 24" raw water supply water main and 24" piping to the existing surge tank.

iii. CONTRACTOR shall provide thirty (30) days' notice of when the work will occur. This work will require continued shutdown of the 24" raw water supply water main and shall last no longer than four (4) days. Total length of isolation of the 24" raw water supply water main from Step 3 to Step 5 shall not exceed eleven days (11) days. No other major work is permitted under this phase of the contract.

iv. Improvements to the surge tank system including controls replacement, wiring/conduit replacement and air compressor replacement shall coincide with the work occurring on Steps 3 through 5.

v. Restore 24" raw water main and surge tank to service following completion of this work.

I. Group No. 3 – Valving and Piping Replacements

1. The valving and piping to be removed and replaced associated with group No. 3 located in the Barton Pump Station pump room shall be scheduled within the time period October 15 to March 15. The CONTRACTOR shall remove and replace Valves No. 10-16, remove and replace custom steel tee and reducer with new valves and custom 36" x 16" tee. Remove and replace the 24" raw water supply header with a new 36" raw water supply header, and 36" butterfly valve to be located in between pumps No. 3 and 4. CONTRACTOR shall follow the steps in the plans for the required piping work, new valve installations, and replacements and all associated work.

2. Removal and replacement of custom 36" x 24" x 16" steel tee with new 36" butterfly valve and custom 36" x 16" tee, and replacement of 16" butterfly valve on the suction header of Pump No. 2 with a new 16". CONTRACTOR shall close and lockout valves, and drain the affected piping as shown on the plan set. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. The shutdown of Pump No. 2, Waukesha and affected process piping shall last no longer than seven (7) days. No other major work is permitted during this phase in the contract.

3. Removal and replacement of Valves No. 12-15, and 24" raw water supply header with new 36" raw water supply header, butterfly Valves No. 12-15, and new 36" butterfly valve (Valve No. 16) to be installed between pumps No. 3 and 4 on the new 36" raw water supplied header as shown on the plan set. CONTRACTOR shall close and lockout the valves, install line stops(s), and drain affected piping as shown on the plan set. This work will require the shutdown of pumps No. 3 and 4 and associated piping, and shall last no longer than fourteen (14) days. No other

major work is permitted during this phase in the project with the exception of Group No. 5 valving and piping replacements if both groups are simultaneously awarded.

J. Group No. 4 – Valving and Piping Replacements

1. The valving and piping to be removed and replaced associated with group No. 4 located in the Barton Pump Station Pump Room shall be scheduled within the time period October 15 to March 15. The CONTRACTOR shall remove and replace Valves No. 17-29, remove and replace a section of 24" raw water supply discharge header, and install a new 24" butterfly valve to the discharge header. Remove and replace a 36"x16" tee and install a new 36" butterfly valve on the existing 36" raw water supply header. The existing gate valve on the 24" discharge header is to be replaced with a new 24" butterfly valve. CONTRACTOR shall follow the steps in the plans for the required piping work, new valve installations, and replacements and all associated work.

2. Removal and replacement of Valves No. 17-25 and 24" discharge header, 36"x16" tee with new butterfly and check valves and piping. CONTRACTOR shall close and lockout the valves, sluice gate, line stops, and drain the 36" raw water supply line as shown on the plan set. The removal of the section of 24" discharge header and installation of a new 24" butterfly valve (Valve No. 24) shall take place first to allow for Pump No. 2 to be placed back in service increasing the stations total and firm capacity as stated on the plans. This work will require the shutdown of pumps No. 1, 2, Waukesha, and associated piping. CONTRACTOR shall close and lockout the valves, line stops(s), and drain affected piping as shown on the plan set. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. The shutdown of the pumps and associated process piping shall not last longer than fourteen (14) days. No other major work is permitted during this phase of the contract.

3. Removal and replacement of valves 26-28 with new butterfly and check valves. CONTRACTOR shall close and lockout the valves, line stops(s), and drain affected piping as shown on the plan set. The work will require the shutdown of pump No. 2, Waukesha, and associated piping. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. The shutdown of the pumps and associated process piping shall not last longer than four (4) days. No other major work is permitted during this phase of the contract.

4. Removal and replacement of the valve No. 29 with a new butterfly valve. CONTRACTOR shall close and lockout the valves, and drain affected piping as shown on the plan set. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. This work will require the shutdown of pump No. 1, Waukesha, and the 42" raw water supply water main and shall last no longer than two (2) days. No other major work is permitted during this phase of the contract.

K. Group No. 5 – Yard Valving and Piping Installation

1. Removal and replacement of existing 24" raw water supply line, and section of 20" discharge header with future 42" raw water supply line tie-in and backflushing capabilities, and new Valves No. 30-31 to be installed associated with Group No. 5 located in the Barton Pump Station Yard shall be scheduled within the time period October 15 to March 15. The CONTRACTOR shall remove and replace the existing 24" raw water supply line with a 36"x36" tee with 36"x24" reducer to tie into the existing 24" raw water supply line and new 36" piping with a new 36" gate valve with a 36"X42" reducer that terminates with a 42"x20" tee that is plugged for future connection to future 42" raw water supply line. CONTRACTOR shall follow the steps in the plans for the required piping work, new valve installations, and replacements and all associated work.

2. Remove and replace existing 24" raw water supply line, and 20" discharge header piping with new 36", and 42" piping and 36" and 20" gate valves. CONTRACTOR shall close and lockout valves, install line stop, and drain affected piping as shown on the plan set. CONTRACTOR shall provide seven (7) days' notice of when the work will occur. This work will require the shutdown of the 24" raw water supply line, and shall last no longer than fourteen (14) days. No other major work is permitted during this phase of the contract with the exception of the Group No. 3 valving and piping replacements, if both groups are simultaneously awarded.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

Table 1
City of Ann Arbor
Barton Pump Station
Spec Section 01 14 00
Summary of Shutdown Notices, Durations, Dates, Deadlines, and Liquidated Damages

Part	Item	Notice to OWNER (days)	Maximum Duration	Dates and Deadlines	Liquidated Damages (See Note)
1.1.D	General short-term	7	< 24 hours	NA	$750/day
	General long-term	14	> 24 hours	Submit schedule/sequence Requires coordination meeting	$750/day
1.4.G	Group No. 1 – Sluice Gate Replacement			Submit schedule/sequence Requires coordination meeting	
	Step No. 1	14	1 day		$500/day
	Step No. 2	14	7 days		
1.4.H	Group No. 2 – Valving and Piping Replacements			Submit schedule/sequence Requires coordination meeting	
	Step No. 1	30	7 days		$500/day
	Step No. 2	30	7 days		$500/day
	Step No. 3	30	6 hours		$500/hour
	Step No. 4	14	7 days		$500/day
	Step No. 5	7	4 days		$500/day
1.4.I	Group No. 3 – Valving and Piping Replacements			Submit schedule/sequence Requires coordination meeting	
	Steps No. 1 and 2	7	7 days		$500/day
	Steps No. 3 and 4	7	14 days		$500/day

Note: Liquidated damages shall apply for each shutdown that exceeds its assigned maximum duration. Liquidated damages shall also apply for each shutdown that is not completed by its assigned deadline or within its assigned dates. Liquidated damages for exceeding durations shall be in addition to damages for missing assigned deadlines or dates.

Table 1
City of Ann Arbor
Barton Pump Station
Spec Section 01 14 00
Summary of Shutdown Notices, Durations, Dates, Deadlines, and Liquidated Damages

Part	Item	Notice to OWNER (days)	Maximum Duration	Dates and Deadlines	Liquidated Damages (See Note)
1.4.J	Group No. 4 – Sluice Gate Replacement			Submit schedule/sequence Requires coordination meeting	
	Steps No. 1 and 2	7	14 days		$500/day
	Steps No. 3 and 4	7	4 days		$500/day
	Steps No. 5 and 6	7	2 days		$500/day
1.4.K	Group No. 5 – Yard Valving and Piping Installation			Submit schedule/sequence Requires coordination meeting	
	Step No. 1	7	14 days		$500/day

Note: Liquidated damages shall apply for each shutdown that exceeds its assigned maximum duration. Liquidated damages shall also apply for each shutdown that is not completed by its assigned deadline or within its assigned dates. Liquidated damages for exceeding durations shall be in addition to damages for missing assigned deadlines or dates.

SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Allowances

1.2 DEFINITIONS

A. Allowance: A monetary sum that includes, as part of the contract price, the associated costs and requirements to complete the specified allowance.

1.3 SUBMITTALS

A. Submit detailed invoices to indicate the work performed or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.4 OWNER'S INSTRUCTIONS

A. At the earliest feasible date after contract award the Contractor shall notify all utility companies and begin coordination efforts in order to avoid delay in performance of the work.

B. Use allowances only as directed for Owner's purposes, and only by Change Orders which designate amounts to be charged to the allowance.

C. If the actual price for the specified allowance is more or less than the stated allowance, the contract price shall be adjusted accordingly by Change Order. The adjustment in contract price shall be made in accordance with the General Conditions.

D. At project closeout, any amounts remaining in allowances will be credited to Owner by Change Order.

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. Contractor shall apply for and pay all fees for the City of Ann Arbor building trade permits. An allowance of $30,000 shall be included in the contract price for the payment of the permit fees. This allowance shall only be used to pay for the documented permit fees. All paperwork and coordination between the Contractor and City shall be considered incidental to the Contract.

END OF SECTION

SECTION 01 23 00

AMERICAN IRON AND STEEL ACT CONTRACT REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification covers the American Iron and Steel Act's language and requirements for this project.

1.2 AMERICAN IRON AND STEEL CONTRACT LANGUAGE

A. The Contractor acknowledges to and for the benefit of the City of Ann Arbor ("Purchaser") and the Michigan Department of Environmental Quality (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the State Revolving Fund and/or the Drinking Water Revolving Fund and such law contains provisions commonly known as "American Iron and Steel (AIS);" that requires all iron and steel products used in the project be produced in the United States ("AIS Requirements") including iron and steel provided by the Contractor pursuant to this Agreement.

B. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that:

1. The Contractor has reviewed and understands the AIS Requirements

2. All iron and steel used in the project will be and/or have been produced in the United States in a manner that complies with the AIS Requirements, unless a waiver of the requirements is approved or the State made the determination in writing that the AIS Requirements do not apply to the project

3. The Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the AIS requirements, as may be requested by the Purchaser.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

1.3 VIOLATIONS OF AMERICAN IRON AND STEEL ACT

A. If any product(s) supplied by the Contractor that are under the jurisdiction of the American Iron and Steel Act is found to be deficient by the governing government agencies. The deficient product(s) shall be replaced with a product(s) that fully meets the requirements of the American Iron and Steels Act at no additional cost to the Owner.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 CERTIFICATION CERTIFICATES AND LETTERS

A. It is the responsibility of the Contractor for supplying the specified certification letters for all required products as required under the American Iron and Steel Act.

*The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.*

Date
Company Name
Company Address
City, State Zip

Subject: American Iron and Steel Step Certification for **Barton Pump Station Valve Replacement Project: ITB No. XXXXXX**.

I, **<company representative>**, certify that the **<melting, bending, coating, galvanizing, cutting, etc.>** process for **<manufacturing or fabricating>** the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:
1. **Xxxx**
2. **Xxxx**
3. **Xxxx**

Such process took place at the following location:
Company Name, Address, City, State, Zip Code

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date
Company Name
Company Address
City, State Zip

Subject: American Iron and Steel Certification for **Barton Pump Station Valve Replacement Project; ITB No. XXXXXX.**

I, **<company representative>**, certify that the following products and/or materials **<shipped/provided>** to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:
1. **Xxxx**
2. **Xxxx**
3. **Xxxx**

Such process took place at the following location:
Company Name, Address, City, State, Zip Code

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Schedule of Values.

B. Initial Application of Payment

C. Application for Payment

D. Application for Payment at Substantial Completion

E. Final Payment Application

1.2 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures

1.3 SCHEDULE OF VALUES

A. Submit typed schedule for review and approval. The approved schedule of values will be used to prepare future Applications for Payment.

B. Submit Schedule of Values in triplicate to the ENGINEER within 15 days after date of OWNER-CONTRACTOR Agreement for approval.

C. Format: Identify each line item with number and title of the major specification Section.

D. Include within each line item, a direct proportional amount of CONTRACTOR's overhead and profit.

E. Revise schedule to list approved Change Orders, with each Application for Payment.

F. Include the following Project Identification on the Schedule of Values:

1. Project Name and Location

2. Name of ENGINEER

3. Project Number

4. CONTRACTOR's Name and Address

5. Date of Submittal

G. Arrange Schedule of Values in a tabular form with separate rows for each Specification Section and separate columns for each major structure of area of Work. Additionally, separate line items for the following shall be included:

1. Mobilization (Maximum 5% of Contract Total)

2. Bonds & Insurance

3. Allowances

4. Start-Up and Commissioning

5. Training and O&M Manuals (Minimum 1% of Contract Total)

6. Project Close-Out

H. Provide a breakdown of the Contract Price in sufficient detail to facilitate continued evaluation of Application for Payment and progress reports. Break principal subcontract amounts down into several line items.

I. For each part of the Work where an Applicant for Payment may include materials for 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.

J. Update and resubmit schedule of values when change orders result in a change in the contract price.

K. Schedule of Values shall be submitted as a shop drawing for OWNER approval.

L. Schedule of Values shall be divided into the following major headings:

1. General Requirements (Division 1)

2. Existing Conditions (Division 2)

3. Concrete (Division 3)

4. Metals (Division 5)

5. Composites (Division 6)

6. Finishes (Division 9)

7. Mechanical (Division 15)

8. Excavation (Division 31)

9. Exterior Improvements (Division 32)

10. Waterway Construction (Division 35)

11. Process Interconnections (Divisions 40)

M. The Schedule of Values shall provide a cost for the following items separate from the Divisions noted above.

1. Sluice Gate Installation

2. Yard Valve Installations

3. Yard Piping

4. Connection to Existing 24" Intake Line

5. Pump Station Basement Piping

6. Pump Station Basement Valve Installations

1.4 INITIAL APPLICATION FOR PAYMENT

A. 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 not final)

5. Submittal Schedule (preliminary if not final)

1.5 APPLICATIONS FOR PAYMENT

A. Submit six (6) copies of each application.

B. Content and Format: Utilize Schedule of Values and Change Orders for listing items in Application for Payment.

C. Payment Period: Payments made according to the schedule described in the General Conditions and or in accordance with the OWNER's requirements.

D. With each copy of the applications submit Waiver of Lien from all subcontractors or suppliers for work included in Application for Payment, other than the first pay application.

E. Submit a completed CONTRACTOR's Declaration with each Application for Payment.

1.6 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

A. Following issuance of Certificate of Substantial Completion, submit an Application for Payment.

B. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.

2. Warranties (guarantees) and maintenance agreements.

3. Maintenance instructions; O&M manuals.

4. Start-up performance reports and inspection reports.

5. Changeover information related to OWNER's occupancy, use, operation and maintenance.

6. Final cleaning.

7. Application for reduction of retainage, and consent of surety.

8. Advice on shifting insurance coverage.

9. List of incomplete work, recognized as exceptions to ENGINEER's Certificate of Substantial Completion.

10. As-Built Drawings.

1.7 FINAL PAYMENT APPLICATION

A. 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. Assurance that unsettled claims will be settled.

4. Assurance that work not complete and accepted will be completed without undue delay.

5. Proof that taxes, fees, and similar obligations have been paid.

6. Removal of temporary facilities and services.

7. Removal of surplus materials, rubbish, and similar elements.

8. CONTRACTOR's waivers of liens for project.

9. Written description of how all punch list items were addressed.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Project Superintendence.

B. Coordination and project conditions.

C. Field Engineering.

D. Pre-Construction Conference.

E. Site Mobilization Meeting.

F. Progress Meetings.

G. Pre-installation Meetings.

1.2 PROJECT SUPERINTENDENCE

A. CONTRACTOR's superintendent shall be on site full time for the duration of the project and shall meet the experience requirements identified in the instructions to bidders.

1.3 COORDINATION AND PROJECT CONDITIONS

A. Coordinate with utility companies for construction of utilities to the construction site.

B. Coordinate with OWNER/ENGINEER to request OWNER-supplied surveying.

C. Coordinate with other contractors to complete connections to other work.

D. Coordinate construction operations included under different Section 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. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at Site in accordance with Laws or Regulations. CONTRACTOR shall train CONTRACTOR's employees on use of these sheets and shall keep a master copy on hand at site.

F. 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. Request of information.

6. Project closeout activities.

H. Coordinate scheduling, submittals, and Work of the various sections of the Contract Documents to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

I. After OWNER occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

1.4 FIELD ENGINEERING

A. CONTRACTOR shall protect survey control and reference points. Promptly notify ENGINEER of any discrepancies discovered.

B. Control datum for survey is shown on Drawings.

C. Field verify all dimensions and measurements.

D. Verify setbacks and easements; confirm drawing dimensions and elevations.

E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

F. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

G. Promptly report to ENGINEER the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

H. Replace dislocated survey control points based on original survey control. Make no changes without prior written Notice to Engineer.

1.5 PRE-CONSTRUCTION CONFERENCE

A. OWNER will schedule a pre-construction 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 and ENGINEER's consultants, CONTRACTOR and its superintendent, major subcontractors, manufacturers, suppliers, utility companies, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matter relating to the work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Site Access and Badging.

2. Tentative Construction Schedule.

3. Critical Work sequencing.

4. Designation of responsible personnel.

5. Coordination with other construction work and other contractors.

6. Procedures for processing field decisions and Change Orders.

7. Procedures for processing Applications for Payment.

8. Distribution of Contract Documents.

9. Submittal of Shop drawings, Product Data, Samples and Schedule.

10. Preparation of record documents.

11. Use of the premises.

12. Office, work, and storage areas.

13. Equipment deliveries and priorities.

14. CONTRACTOR's Quality Assurance Plan.

15. Safety procedures.

16. First Aid.

17. Security.

18. Housekeeping.

19. Working hours.

20. Stormwater Management and Soil Erosion Control Provisions.

21. Utility Contacts.

D. In addition to the Pre-Construction Conference, ENGINEER may also require a Pre-Excavation, Concrete Pre-Pour Conference, and/or other critical activity conference. CONTRACTOR and Subcontractors performing excavation work on site shall describe their plans for shoring, dewatering, disposal of spoils, and any other particulars of the excavation process, including the technical basis for their selection of the means and methods to be employed.

1.6 SITE MOBILIZATION MEETING

A. OWNER will schedule a conference at the project site prior to the CONTRACTOR's occupancy.

B. Attendance required by the OWNER, ENGINEER, CONTRACTOR's Superintendent, and the major subcontractors.

C. CONTRACTOR shall submit a site plan identifying the CONTRACTOR's limits of work, trailer and storage area locations, for coordination with other work.

D. Agenda:

1. Use of premises by OWNER and CONTRACTOR.

2. OWNER's requirements.

3. Construction facilities and controls.

4. Temporary utilities.

5. Survey.

6. Security and housekeeping procedures.

7. Schedules.

8. Procedures for maintaining record documents.

9. Inspection and acceptance of equipment put into service during the construction period.

1.7 SITE SAFETY MEETING

A. OWNER will schedule a conference at the project site prior to the CONTRACTOR's occupancy.

B. Attendance required by the OWNER, ENGINEER, CONTRACTOR's Superintendent, CONTRACTOR's Safety Officers, and all subcontractors.

C. Agenda:

1. Safety procedures.

2. First Aid.

3. Security.

1.8 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record and distribute the minutes.

C. Attendance Required: Job superintendent, major subcontractors and suppliers, OWNER, ENGINEER as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.

2. Review of Work progress.

3. Field observations, problems, and decisions.

4. Identification of problems that impede planned progress.

5. Review of submittals schedule and status of submittals.

6. Review of RFIs.

7. Review of off-site fabrication and delivery schedules.

8. Maintenance of progress schedule.

9. Corrective measures to regain projected schedules.

10. Planned progress during succeeding work period.

11. Coordination of projected progress.

12. Maintenance of quality and work standards.

13. Effect of proposed changes on progress schedule and coordination.

14. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with copies to ENGINEER, OWNER, participants, and those affected by decisions made.

F. Submit updated construction schedule to the OWNER/ENGINEER for review two days before each progress meeting. Revise construction schedule as needed after each progress meeting and resubmit to the OWNER/ENGINEER with the meeting minutes.

1.9 PREINSTALLATION OR SHUTDOWN COORDINATION MEETING

A. When required in individual specification sections, or as deemed necessary by the CONTRACTOR, ENGINEER or OWNER, convene a pre-installation or shutdown coordination meeting at the site prior to commencing work.

B. Require attendance of parties directly affecting, or affected by, Work of the specific section.

C. Notify OWNER/ENGINEER five working days in advance of meeting date.

D. Prepare agenda and preside at meeting:

1. Review conditions of shutdown, installation, preparation and installation procedures.

2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with copies to ENGINEER/OWNER participants, and those affected by decisions made.

1.10 FINAL INSPECTION MEETING

A. When the CONTRACTOR has provided written notice that the project is complete, a final inspection meeting shall be scheduled with the CONTRACTOR, ENGINEER, and OWNER.

B. ENGINEER will notify the CONTRACTOR in writing of all items which this inspection reveals are incomplete or defective.

C. CONTRACTOR shall immediately take all necessary measures to remedy such deficiencies. A written description of how each item has been addressed shall be submitted to the ENGINEER and OWNER.

1.11 CLOSEOUT/WARRANTY MEETING

A. Prior to final application for payment, a closeout/warranty meeting shall be scheduled with the CONTRACTOR, ENGINEER and OWNER.

B. Agenda:

1. Project record document review.

2. Verify receipt of spare parts and maintenance products.

3. Review preventative maintenance schedule.

4. Review submitted warranties and bonds.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-Construction Documentation

B. Photographic Progress Documentation

1.2 ELECTRONIC STORAGE

A. Maintain organized electronic storage of project pre-construction and progress photos and video until Final Payment.

1.3 PRE-CONSTRUCTION DOCUMENTATION

A. CONTRACTOR shall take a sufficient number of digital pre-construction photographs, minimum 100, so as to resolve any disputes, which may arise regarding the considerations prior to and subsequent to construction.

B. CONTRACTOR shall furnish one USB flash drive of the digital Pre-construction photographs to the ENGINEER, and shall make others available for review in settling any disputes.

C. In addition to photographs, the CONTRACTOR shall produce a high quality pre-construction video of the entire site on USB Flash Drive and submit it to the ENGINEER.

D. If a dispute arises where digital pre-construction photographs or video was not taken, the disputed area shall be restored to the extent directed by the ENGINEER and to the complete satisfaction of the ENGINEER.

1.3 PROGRESS PHOTOGRAPHS

A. CONTRACTOR shall take enough digital photographs to sufficiently record the construction progress of the project. All critical construction events shall be thoroughly recorded with photographs.

B. With the each application for payment, the CONTRACTOR shall submit all photos taken during the previous month on one USB flash drive.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHS

A. Digital.

B. Size: 10.0 Megapixel Minimum.

C. Format: JPEG.

2.2 IDENTIFICATION

A. Identify in file name of each print:

1. Description and location of view.

2. Time and date of exposure.

PART 3 - EXECUTION

3.1 TECHNIQUE

A. Factual presentation.

B. Correct exposure and focus.

1. High resolution and sharp.

2. Maximum depth-of-field.

3. Minimum distortion.

3.2 VIEWS REQUIRED

A. Consult with Engineer for instructions concerning views required.

B. Photograph from locations to adequately illustrate state of project, or condition of construction.

C. Take photographs from as close to the same position each time as practical.

D. Take two series of ground level photographs from each of the corners of the main site area on the first day of each month.

E. In addition, provide photographs prior to, at critical stages of, and at the end of construction, when they do not coincide with scheduled times.

3.3 DELIVERY OF PRINTS

A. Deliver digital copies of photos monthly to accompany each request for progress payment. Photos shall be submitted on one USB flash drive.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Submittal Procedures

B. Certifications

C Shop Drawings

D. Product Data

E. Samples

F. Manufacturers' Instructions

G. Manufacturers' Field Reports

H. Construction Schedule

I. Submittal Schedule

1.2 SUBMITTAL PROCEDURES

A. Package each submittal appropriately for shipping and handling. This shall include an index either on the transmittal or within the submittal itself. Transmit each submittal from CONTRACTOR to ENGINEER using a transmittal form. Submittals received from sources other than CONTRACTOR will be returned without action. Use separate transmittals for items from different specification sections. Number each submittal consecutively. Resubmittals should have the same number as the original, plus a letter designation for each Resubmittal (i.e. 7-A, 7-B, etc.)

B. Indicate on the transmittal relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include CONTRACTOR's certification that information complies with Contract Document requirements. On Resubmittal, all changes shall be clearly identified for ease of review. Resubmittals shall be reviewed for the clearly identified changes only. Any changes not clearly identified will not be reviewed and original submittal shall govern.

C. Include the following information on the label for processing and recording action taken.

1. Project name.

2. Date.

3. Name and address of ENGINEER.

4. Name and address of CONTRACTOR.

5. Name and address of subcontractor.

6. Name and address of supplier.

7. Name of manufacturer.

8. Number and title of appropriate specification sections.

9. Drawing number and detail references, as appropriate.

D. Schedule submittals to expedite the Project, and deliver to ENGINEER at business address. Coordinate submission of related items. Coordinate related activities that require sequential activity.

E. Submit a schedule of shop drawing submittals.

F. Review and approve shop drawings, project data, and samples before submitting them.

G. Verify field measurements, field construction criteria, catalog numbers, and similar data. Indicate on the submission exactly what was verified.

H. Any markings done by CONTRACTOR shall be done in a color other than red. Red is reserved for ENGINEER's marking.

I. The number of copies to be submitted will be determined at the pre-construction conference. Reproducible may be submitted and will be marked and returned to CONTRACTOR. Blue or black line prints shall be submitted in sufficient quantity for distribution to ENGINEER and OWNER recipients.

J. Coordinate each submittal with the requirements of the Contract Documents.

K. Provide space for CONTRACTOR and ENGINEER review stamps.

L. Apply CONTRACTOR's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

M. Submit the number of copies that the CONTRACTOR requires, plus four copies that will be retained by the OWNER and ENGINEER.

N. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

O. No claim will be allowed for damages or extension of time because of delays in the work resulting from rejection of material or from revision and resubmittal of shop drawings, project data, or samples.

P. No extension of contract time will be authorized because of failure to transmit submittals to ENGINEER sufficiently in advance of the work to permit processing.

Q. ENGINEER reserves the right to withhold action on a submittal required coordination with other submittals until related submittals are received.

R. Do not install materials or equipment which requires submittals until the submittals are returned with ENGINEER's/OWNER's stamp and initials or signature indicating approval. The OWNER shall have final approval authority.

S. CONTRACTOR's responsibility of errors, omissions, and deviations from requirements of Contract Documents in submittals is not relieved by the ENGINEER's review.

T. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with requirements.

U. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

V. Submittals not requested in conformance with this Specification will not be recognized or processed.

W. Revise and resubmit as required, identify all changes made since the previous submittal.

X. In the event that more than two (2) re-submittals of any submittal are necessary to achieve conformance to the contract requirements, CONTRACTOR shall be charged for excess engineering. The OWNER shall deduct these charges from the CONTRACTOR's final payment. Charges will be $135.00/hr. minimum 4 hours, for each additional submittal of an item. A tabulated record of such charges will be provided for the CONTRACTOR's review prior to the processing of the final payment.

Y. Submit new project data and samples when the initial submittal is returned disapproved.

Z. In addition to the hard copy submittals, electronic submittals shall be provided via email.

1.3 CERTIFICATIONS

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the CONTRACTOR to ENGINEER, in quantities specified for Product Data.

B. Indicate that the material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certifications may be recent or previous test results of the material or product, but must be acceptable to ENGINEER.

1.4 SHOP DRAWINGS

A. Shop Drawings: Submit to ENGINEER for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with Paragraph 1.2 - Submittal Procedures.

B. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of shop drawings. Standard information prepared without specific reference to the project is not considered shop drawings.

C. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Dimension.

2. Identification of products and materials included.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurements.

D. Nameplate data for equipment including electric motors shall be included on shop drawings. Electric motor data shall state the manufacturer, horsepower, service factor, voltage, enclosure type, oversize wiring box, etc.

E. Shop drawings shall indicate shop painting requirements to include type of paint and manufacturer.

F. Standard manufactured items in the form of catalog work sheets showing illustrated cuts of the items to be furnished, scale details, sizes, dimensions, quantity, and all other pertinent information should be submitted and approved in a similar manner.

G. Measurements given on shop drawings or standard catalog sheets, as established from contract drawings and as approved by ENGINEER, shall be followed. When it is necessary to verify field measurements, they shall be checked and established by CONTRACTOR. The field measurements so established shall be followed by CONTRACTOR and by all affected trades.

H. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.5 PRODUCT DATA

A. Product Data: Submit to ENGINEER for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with Paragraph 1.2 - Submittal Procedures.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1.6 SAMPLES

A. Submit full-size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers or materials, color range sets, and swatches showing color, texture, and pattern.

B. Mount, display, or package samples in the manner specified to facilitate review of qualities indicated. Prepare samples to match ENGINEER's sample. Include the following:

1. Generic description of the sample.

2. Sample source.

3. Product name or name of manufacturer.

4. Compliance with recognized standards.

5. Availability and delivery time.

C. Submit samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

D. Refer to other specification sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

E. Preliminary Submittals: Where samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

1. Preliminary Submittals will be reviewed and returned with ENGINEER's mark indicating selection and other action.

F. Except for samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

G. Maintain sets of samples, as returned, at the site, for quality comparisons throughout the course of construction.

H. Unless noncompliance with Contract Document provisions is observed the submittal may serve as the final submittal.

I. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.7 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to ENGINEER for delivery to OWNER in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.8 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the OWNER.

B. Submit report in duplicate, within 7 days of observation, to ENGINEER and OWNER for Information.

C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.9 CONSTRUCTION SCHEDULE

A. Bar Chart Schedule:

1. Prepare a fully developed, horizontal bar chart type construction schedule. Schedule shall be prepared electronically in Microsoft Project with critical path and links shown. Submit color copies of the schedule within 30 days of the date established for commencement of the work.

2. Provide a separate item bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated on schedule of values.

3. Prepare schedule of sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for entire construction period.

4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work.

5. Coordinate construction schedule with schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other schedules.

6. Indicate completion in advance of the date established for substantial completion. Indicate substantial completion of schedule to allow time for ENGINEER's procedures necessary for certification of substantial completion

B. Schedule Updating: Provide an updated construction schedule at each progress meeting. Color copies of the updated schedule shall be prepared for all attendees.

1.10 SUBMITTAL SCHEDULE

A. After development and acceptance of the construction schedule, prepare a complete schedule of submittals. Submit schedule within 10 days of the date required for establishment of construction schedule.

B. Coordinate submittal schedule with the list of subcontracts, schedule of values, and the list of products as well as construction schedule.

C. Prepare schedule in chronological order; include submittals required during the first 90 days. Provide the following information:

1. Scheduled date for the first submittal.

2. Related section number.

3. Submittal category.

4. Name of subcontractor.

5. Description of the part of the work covered.

6. Scheduled date for Resubmittal.

7. Scheduled date ENGINEER's final release or approval.

D. The submittal schedule shall reflect critical path shop drawings that must be expedited.

E. Following response to initial submittal, print and distribute copies to ENGINEER, OWNER, subcontractors, and other parities required to comply with submittal dates indicated. Post copies in the project meeting room and field office.

F. When revisions are made, distribute to the same parities and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.

G. Schedule Updating: Provide an updated submittal schedule at each progress meeting.

1.11 DIGITAL FILE MANAGEMENT

A. The CONTRACTOR shall setup a Sharepoint (or similar secure cloud location) to file all construction submittals including correspondence, meeting minutes, photos, shop drawings, etc. CONTRACTOR shall be responsible for keeping all documentation organized and readily available to the OWNER and ENGINEER. At project completion, all files shall be transferred to a USB drive and delivered to the OWNER.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, ENGINEER will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is CONTRACTOR's responsibility.

B. Action Stamp: ENGINEER will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken" that part of the work covered by the submittal may proceed provided it complies with the requirements of the Contract Documents; final acceptance will depend upon the compliance.

2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted" that part of the work covered by the submittal may proceed, provided it complies with notation or correction on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal: When submittal is marked "Rejected" or "Revise and

Resubmit" do not proceed with the part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at site, or elsewhere where work is in progress.

4. Additional Information Needed: When submittal is marked "Submit Specified Item" CONTRACTOR shall submit requested information.

5. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Acknowledge Receipt".

6. The approval of ENGINEER shall not relieve CONTRACTOR of responsibility for errors on drawings or submittals as ENGINEER's checking is intended to cover compliance with drawings and specifications and not enter into every detail of the shop work.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Reference Standards

B. Abbreviations and Acronyms

1.02 REFERENCE STANDARDS

A. Applicability of Standards: Except where the contract documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the contract documents. Such standards are made a part of the contract documents by reference.

B. For products or workmanship specified by association, trade, or Federal Standards; comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

1. Applicable Codes – Latest adopted editions of:

a. Michigan Building Code / International Building Code.

b. The National Electrical Code, NFPA 70, with amendments.

c. International Fire Code.

d. International Code Council (ICC) ANSI A117.

e. Michigan Mechanical and Plumbing Codes.

C. Conform to reference standard by date of issue current on date of Contract Documents.

D. Should specified reference standards conflict with Contract Documents, request clarification from ENGINEER before proceeding.

E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.03 ABBREVIATIONS AND ACRONYMS

A. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations as referenced in contract documents are defined to mean the associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of contract documents.

AA Aluminum Association
818 Connecticut Avenue, N.W.
Washington, DC 20006

AABC	Associated Air Balance Council 1518 K St. NW, Suite 503 Washington DC, 20005
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol St, NW, Suite 249 Washington DC, 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006
AISC	American Institute of Steel Construction 400 North Michigan Avenue Eighth Floor Chicago, IL 60611
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428
AWS	American Welding Society 550 LeJeune Road, N.W. Miami, FL 33135
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 11490 Commerce Park Drive Reston, VA 22091

CFR	Code of Federal Regulations Office of the Federal Register National Archives and Records Administration Washington, DC 20408
CRSI	Concrete Reinforcing Steel Institute 933 Plum Grove Road Schaumburg, IL 60195
DHI	Door and Hardware Institute 7711 Old Springhouse Road McLean, VA 22102
EJCDC	Engineers' Joint Contract Documents Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
FM	Factory Mutual System 1151 Boston-Providence Turnpike P.O. Box 688 Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
ICBO	International Conference of Building Officials 5360 S. Workman Mill Road Whittier, CA 90601
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 815 15th Street, N.W. Washington, DC 20005
ISA	The Instrumentation, Systems, and Automation Society 67 Alexander Drive P.O. Box 12277 Research Triangle Park North Carolina 27709
MBMA	Metal Building Manufacturers Association 1300 Summer Ave Cleveland, OH 44115-2851

NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NCMA	National Concrete Masonry Association P.O. Box 781 Herndon, VA 22070
NEMA	National Electrical Manufacturers' Association 2101 'L' Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
PCI	Prestressed Concrete Institute 201 North Wells Street Chicago, IL 60606
PS	Product Standard U. S. Department of Commerce Washington, DC 20203
SDI	Steel Deck Institute P.O. Box 9506 Canton, OH 44711
SDI	Steel Door Institute 712 Lakewood Center North 14600 Detroit Avenue Cleveland, OH 44107
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

B. Government Agencies: Names and titles of state and Federal government standard or specification producing agencies are frequently abbreviated. The following acronyms or abbreviations referenced in the contract documents indicate names of standard or specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the contract documents.

CE	Corps of Engineers (US Department of the Army) Chief of Engineers - Referral Washington, DC 20314

CFR	Code of Federal Regulations (Available from the Government Printing Office) N. Capitol Street between G and H St. NW
DOT	Department of Transportation 400 Seventh Street, SW Washington, DC 20590
EDA	Economic Development Administration US Department of Commerce 121 N Canal Street, Suite 855 Chicago, IL 60606
EPA	Environmental Protection Agency 401 M Street, SW Washington, DC 20460
EGLE	Michigan Department of Environment, Great Lakes and Energy
MDOT	Michigan Department of Transportation
MIOSHA	State of Michigan OSHA
OSHA	Occupational Safety and Health Administration (US Department of Labor) Government Printing Office Washington, DC 20402
WCHD	Washtenaw County Health Department 705 N Zeeb Road Ann Arbor, MI 48103

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Quality Control and Control of Installation

B. References

C. Testing and Inspection Services

D. Manufacturers' Field Services

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step-in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from ENGINEER before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. All materials and equipment shall be new, unless otherwise noted.

1.3 REFERENCES

A. Conform to reference standard by date of issue current on date of Contract Documents.

B. Should specified reference standards conflict with Contract Documents, request clarification from the ENGINEER before proceeding.

C. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the ENGINEER shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.4 TESTING AND INSPECTION SERVICES

A. CONTRACTOR shall be responsible for providing, paying for, coordinating and scheduling the services of an independent testing firm (acceptable to OWNER) to

perform all materials and compaction testing and related tasks.

B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the ENGINEER.

C. Acceptable testing companies for selection by the CONTRACTOR are:

1. CTI (Brighton, Michigan; Telephone: (248) 486-5100)

2. SME (Plymouth, Michigan; Telephone: (734) 454-9900)

3. PSI (Plymouth, Michigan; Telephone: (734) 453-7900)

4. Haengel and Associates (Canton, Michigan; Telephone: (734) 455-9771)

5. TEC (Ann Arbor, Michigan; Telephone: (734) 623-0400)

C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the ENGINEER or the OWNER.

D. Reports will be submitted by the independent firm to the ENGINEER and CONTRACTOR, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. CONTRACTOR shall coordinate with ENGINEER and/or OWNER; cooperate and coordinate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify ENGINEER and independent firm a minimum of 24 hours prior to expected time for operations requiring services.

2. Make arrangements with independent firm and pay for additional samples and tests required for CONTRACTOR's use.

F. Independent testing firm will provide the testing services listed below. Any additional required by the Contract Documents beyond what is listed, shall be provided by the CONTRACTOR.

1. Backfill

a. Sieve analysis per source.

b. Proctor per source.

c. Compaction testing at 400 SF intervals per lift, as required.

2. Aggregate Base

a. Sieve analysis per source.

b. Proctor per source.

c. Compaction testing once per 1,000 SF of placement.

3. Concrete

   a. All concrete tests shall be performed for each truck or fraction thereof, of each mix design of concrete placed in any day.

   b. Temperature

   c. Slump

   d. Air entrainment

   e. Comprehensive strength, per load. Four (4) cylinders each with laboratory testing.

4. Grout and Mortar

   a. Comprehensive strength, per load. Four (4) cylinders each with laboratory testing.

5. Painting

   a. Refer to specification Section 09 91 00.

G. CONTRACTOR shall not perform the work without the independent firm on site performing the required tests.

H. Testing and employment of testing agency or laboratory shall not relieve CONTRACTOR of obligation to perform Work in accordance with requirements of Contract Documents.

I. The independent firm on instructions by the ENGINEER shall perform re-testing or re-inspection required because of non-conformance to specified requirements. Payment for re-testing or re-inspection will be the responsibility of the CONTRACTOR.

J. Agency Responsibilities:

1. Test samples of mixes submitted by CONTRACTOR.

2. Provide qualified personnel at site. Cooperate with ENGINEER and CONTRACTOR in performance of services.

3. Perform specified sampling and testing of products in accordance with specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

5. Promptly notify ENGINEER and CONTRACTOR of observed irregularities or non-conformance of Work or products.

6. Perform additional tests required by ENGINEER.

K. Agency Reports: After each test, promptly submit two (2) copies of the report to the ENGINEER and to the CONTRACTOR. When requested by the ENGINEER, provide interpretation of test results. Include the following:

1. Date issued.

2. Project title and number.

3. Name of inspector.

4. Date and time of sampling or inspection.

5. Identification of product and specifications section.

6. Location in the Project.

7. Type of inspection or test.

8. Date of test.

9. Results of tests.

10. Conformance with Contract Documents.

L. Limits on Testing Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Agency or laboratory may not approve or accept any portion of the Work.

3. Agency or laboratory may not assume any duties of CONTRACTOR.

4. Agency or laboratory has no authority to stop the Work.

1.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Temporary Utilities.

1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Internet service.
4. Temporary water service.
5. Temporary sanitary facilities.

B. Construction Facilities.

1. Field offices and sheds.

C. Temporary Controls.

1. Dust Control.
2. Barriers.
3. Protection of the Work.
4. Security measures.
5. Water control.

D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from utility source as needed for construction operation.

B. Provide temporary electric feeder from electrical service at location as directed. Provide all necessary meters, disconnections and transformers. A separate meter shall be installed by the CONTRACTOR for the purpose of establishing compensation for electrical power usage.

C. Complement existing power service capacity and characteristics as required.

D. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

E. Provide main service disconnect and over-current protection at convenient location.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.4 INTERNET SERVICE

A. Provide, maintain, and pay for internet service to field office at time of project mobilization.

1.5 TEMPORARY WATER SERVICE

A. Water is available at the construction site. CONTRACTOR shall make arrangements with the OWNER to have water available.

B. CONTRACTOR shall install an approved backflow preventer at the source prior to use. A meter shall be installed by the CONTRACTOR for the purpose of establishing compensation for water use.

1.6 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide at the time of project mobilization. Provide chemical toilets and provisions for replacement of chemicals and disposal of wastes for the duration of the Contract.

1.7 FIELD OFFICES AND SHEDS

A. Prepare a drawing for submittal and approval showing construction facility layouts including temporary facilities, storage areas, parking, construction work and other related activities.

B. The ENGINEER does not require a field office.

C. Existing facilities shall not be used for field offices or for storage.

D. Locate offices and sheds a minimum distance of 30 feet (10m) from existing and new structures.

E. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.

1. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove when no longer needed.

2. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.

3. Exterior Materials: Weather resistant, finished in color acceptable to ENGINEER.

4. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

5. Lighting for Offices: 50 ft-C (538 lx) at desk top height, exterior lighting at entrance doors.

6. Fire Extinguishers: Appropriate type fire extinguisher at each office and each storage area.

7. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

F. Environmental Control:

1. Heating and Ventilating for Offices: Automatic equipment to maintain comfort conditions.

2. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; adequate lighting for maintenance and inspection of products.

G. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products.

H. Preparation: Fill and grade sites for temporary structures to provide drainage away from buildings.

I. Maintenance and Cleaning:

1. Periodic cleaning and maintenance for office and storage areas.

2. Maintain approach walks free of mud, water, and snow.

J. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.8 DUST CONTROL

A. No dust migration off site shall be permitted.

B. All haul roads, detour roads, and other public and private roads, driveways and parking lots used by the CONTRACTOR must be maintained in a dust free condition during the life of this Contract. The control of the dust shall be accomplished by the application of dust control materials and methods of application as approved and as directed by the ENGINEER. Such dust control materials shall be applied as often as is necessary to control the dust.

C. Should the CONTRACTOR be negligent of his duties in providing dust control, the OWNER may, with or without notice, cause the same to be done and deduct the cost of such work from any monies due or to become due the CONTRACTOR under this Contract, but the performance of such work by the OWNER, or at his insistence, shall service in no way to release the CONTRACTOR from his liability for dust control.

D. Dust Palliative may be any of the following:

1. Road oil of 30% asphalt base applied at the rate of 0.5 gallons per square yard.

2. Type 1-calcium chloride applied at the rate of 6 pounds per ton of aggregate.

3. Water, as required.

4. Other methods as approved by the ENGINEER.

E. Street Cleaning

1. CONTRACTOR shall provide street cleaning with water for City roads and parking areas affected by spillage of excavated material or other material associated with the work.

2. CONTRACTOR shall provide street cleaning by the end of each workday when spillage has occurred, and upon request by OWNER.

3. CONTRACTOR shall sweep and clean City streets adjacent to water plant site when there is visible dust or debris on the street surfaces that came from the construction site, from vehicles coming to or from the construction site, or is in any way associated with CONTRACTOR's work on this contract.

1.9 BARRIERS

A. Provide barriers to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide protection for plant life designated to remain. Replace damaged plants.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.10 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic from landscaped areas.

1.11 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water.

1.12 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Remove underground installations. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 55 00

VEHICULAR ACCESS AND PARKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vehicular Access

B. Security

C. Parking Areas

1.2 DESCRIPTION

A. CONTRACTOR shall provide temporary construction roads, walks, and appurtenances required during the Project for use by CONTRACTOR, OWNER's operations, deliveries, other CONTRACTORS working on the Project, and emergency vehicles. Temporary roads and parking areas shall be designed and maintained by CONTRACTOR and be fully usable in all weather conditions. Temporary roads that are used by the OWNER shall be designed and maintained to meet the loading requirements of AASHTO H-20-wheel loads.

B. Use of Existing Access Roads/Drives:

1. CONTRACTOR will be allowed to use OWNER's existing roads/drives upon obtaining OWNER's written permission.

2. Prevent interference with traffic on existing roads, drives and parking areas. At all times, keep access roads and entrances serving the site clear and available to OWNER, OWNER's employees, chemical deliveries, emergency vehicles, and other CONTRACTORS. Do not use these areas for parking or storage of materials.

3. CONTRACTOR shall indemnify and hold harmless OWNER from expenses caused by CONTRACTOR's operations over existing roads and parking areas.

4. Schedule deliveries to minimize use of driveways and entrances.

1.3 SECURITY

A. The CONTRACTOR shall abide by and implement all site security measures in use at the Ann Arbor Water Treatment Plant, whether in use at Bid time or subsequently implemented by the OWNER.

B. CONTRACTOR's security procedures shall include but shall not be limited to:

1. Maintain daily sign-in/sign-out log of personnel and visitors.

2. Maintain daily log of vehicle license plate numbers on site.

3. Provide and use photo ID's for all CONTRACTOR personnel. ID's shall identify the personnel's name, company, and role on the project.

4. Allow OWNER to conduct background checks on CONTRACTOR's personnel upon request.

C. Use of OWNER's security measures does not relieve CONTRACTOR of its responsibility to secure its own working spaces and materials.

1.4 CONTRACTOR PARKING

A. CONTRACTOR personnel and subcontractor personnel shall park without blocking access to deliveries through the gate.

B. CONTRACTOR may park a limited number of construction vehicles within the staging area, provided a suitable parking area is constructed.

C. CONTRACTOR shall provide an off-site parking and staging area for his employee vehicles, equipment and materials, and his subcontractor's workers as necessary, at no additional cost to OWNER.

D. Disruption to the neighborhood (idling engines, radios, lights, etc.) before or after approved construction hours is prohibited.

1.5 MAINTENANCE OF ACCESS

A. CONTRACTOR shall maintain gate, driveway and parking to continuously provide access for OWNER staff vehicles, deliveries for OWNER, emergency vehicles, and parking areas for OWNER's personnel.

B. Public roads shall be passable at all times and no parking which disrupts traffic is permitted.

D. When roads and parking without hard surfacing become contaminated with soil and create a nuisance, remove contaminated material and replace with clean aggregate as required.

E. Clean paved roads, driveways and parking areas over which CONTRACTOR's vehicles travel. Cleaning shall be done a minimum five times per week or more frequently as directed by ENGINEER, and shall be by mechanical sweeper and water trucks. Areas to be cleaned include:

1. Pavement, including driveways and parking areas, within the pump station site limits.

2. Public roads that require sweeping and cleaning due to CONTRACTOR's operations.

F. Dust resulting from CONTRACTOR's activities shall be controlled by CONTRACTOR to prevent nuisances at site and nearby areas. Apply water to minimize airborne dust. Do not use water when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.

G. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and similar buried facilities.

1.6 RESTORATION

A. Restore to pre-construction conditions existing roads, walks, and parking areas damaged by CONTRACTOR, subject to approval of owner of roads, walks, and parking areas.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 58 00

PROJECT IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Project Sign

1.2 PROJECT SIGN

A. The CONTRACTOR shall erect a sign at each Project site identifying the Project. The sign shall be erected prior to CONTRACTOR's mobilization on site, and shall be in accordance with the Specifications and details included in this Section. The project sign and sign panel shall be furnished, erected, and maintained by the CONTRACTOR at the location designated by the OWNER. Wording and colors shall be as shown on the detail in the Contract Drawings.

B. One project sign shall be provided at the Barton Pump Station.

1.3 PAYMENT PROCEDURES

A. The cost of the fabrication, erection, maintenance, and removal of the project sign, including all labor and materials, shall be included in the CONTRACTOR's Lump Sum Bid.

1.4 MAINTENANCE

A. The project sign shall be maintained by the CONTRACTOR, in good condition, at all times, for the duration of construction.

B. The removal of the project sign from the construction site by the CONTRACTOR shall be at the completion of construction, when ordered by the OWNER.

PART 2 - PRODUCTS

2.1 PROJECT SIGN

A. The project sign shall be fabricated, erected and maintained by the CONTRACTOR in accordance with the following requirements:

1. The sign panel shall be baked enamel aluminum sheet laminated onto two (2) sides of a truss type corrugate sheet of polymer core.

2. The sign shall be standard white with die cut black vinyl lettering laminated onto the panel. The vinyl lettering shall be suitable for exterior applications.

3. The City's logo shall be in color.

4. The supports for the project sign shall be at least two 4" by 4" treated wood posts. The sign panel shall be securely fastened to the sign supports with at least four (4) 3/8" galvanized bolts, nuts and washers. The positioning and alignment of the sign shall be as determined by the OWNER.

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Basic Product Requirements

B. Product Options

C. Product Substitution Procedures

D. Product Delivery Requirements

E. Product Storage and Handling Requirements

1.2 BASIC PRODUCT REQUIREMENTS

A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer for similar components.

D. All products in contact with water on this project must be certified in accordance with ANSI/NSF Standards 60 or 61 as appropriate.

1.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.4 PRODUCT SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify requirements for submitting requests for Substitutions during the bidding period. This section specifies procedures and requirements affecting substitutions proposed by the CONTRACTOR after the Contract Date.

B. Where the term "substitutions" is used in this section, it means materials, equipment, or methods of construction which differ from the requirements in the Contract Documents. The term "substitutions" does not include:

1. Requirements provided by Addenda issued prior to the Contract date.

2. Changes made at the direction of ENGINEER.

3. Changes ordered by governing authorities.

4. Options described in the Contract Documents.

C. Substitutions will be considered in the event that:

1. They are related to "or equal" or "or approved equal" provisions in the Contract Documents.

2. The specified requirements cannot be provided within the Contract Time due to causes beyond the Contractor's control.

3. The OWNER will gain a substantial advantage if substitutions are approved.

4. Substitutions will be considered when a product becomes unavailable through no fault of the CONTRACTOR.

D. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

E. A request constitutes a representation that the CONTRACTOR:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the Substitution as for the specified product.

3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to OWNER.

4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse OWNER and/or ENGINEER for review or redesign services associated with re-approval by authorities.

6. Will reimburse the OWNER and/or ENGINEER for any costs incurred in the evaluation of any “or equal” or substitution proposal. Such costs shall include, but are not limited to, related charges of the ENGINEER made necessary by the evaluation and acceptance or rejection, as the case may be, of the proposed “or equal” or substitute material or equipment.

F. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

G. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

2. Submit Shop Drawings, Product Data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.

3. Submit itemized comparison between the specified product and the substitution product demonstration equivalent.

4. The ENGINEER will notify CONTRACTOR, in writing, of decision to accept or reject request.

5. Such submittals do not relieve the CONTRACTOR of obligation to later furnish shop drawings, product data, samples, and other submittals required by the Contract Documents.

H. If any "or equal" or substitute material or equipment differs materially from the material or equipment named or specified, and that difference was not expressly identified in the CONTRACTOR's request, or results in changes in the work, the ENGINEER has authority to require removal and replacement of that "or equal" or substitute material or equipment. The CONTRACTOR shall bear the delay and costs resulting from (a) any such removal and replacement of "or equal" or substitute materials or equipment; (b) making "or equal" or substitute materials or equipment conform to the requirements of the Contract Documents; and (c) any changes in the work and/or in other work required to accommodate the "or equal" or substitute material or equipment, or both.

1.5 PRODUCT DELIVERY REQUIREMENTS

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

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

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

1.6 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

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

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

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of Products.

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

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained under acceptable condition.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Progress Cleaning

B. Final Cleaning

1.2 GENERAL

A. Execute cleaning, during progress of the Work, and at completion of the Work.

B. Adequate periodic cleaning will be a condition for recommendation of progress payments.

C. Waste Disposal

1. Properly dispose all waste materials, surplus materials, debris, and rubbish off the Project Site.

2. Provide suitable containers for storage of waste materials and debris.

3. Do not burn or bury rubbish and waste materials on the Project Site.

4. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

5. Do not discharge wastes into streams or waterways.

6. Comply with all federal, state, and local anti-pollution laws, ordinances, codes, and regulations when disposing waste materials, debris, and rubbish.

1.3 PROGRESS CLEANING

A. CONTRACTOR shall periodically clean the work site at least once weekly.

B. Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.

C. Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended.

D. Remove debris from concealed spaces before enclosing the space.

E. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials.

F. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration.

G. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

H. Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces and will not contaminate building systems or electrical or control panels.

1.4 FINAL CLEANING

A. Complete the following cleaning and waste-removal operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

1. Clean and remove from the Project rubbish, waste material, debris, and other foreign substances.

2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

3. Hose clean sidewalks and loading areas.

4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

5. Leave watercourses, gutters, and ditches open and clean.

6. Repair pavement, roads, sod, and all other areas affected by construction operations and restore them to original condition or to minimum condition specified.

7. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign substances.

8. Clean, wax and polish wood, vinyl, and painted floors.

9. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.

10. Sweep concrete floors broom clean in unoccupied spaces.

11. Clean transparent materials, including mirrors and glass in doors and windows. Windows on the new pump station and on the existing administration/lab building shall be cleaned by a professional window cleaner. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

12. Remove tags and labels that are not permanent.

13. Touch up and otherwise repair and restore chipped, scratched, dented, or otherwise marred surfaces to specified finish and match adjacent surfaces. 1) Do not paint over “UL” or similar labels, including mechanical and electrical nameplates.

14. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

15. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

16. Replace disposable air filters and clean permanent air filters. Clean the exposed surfaces of diffusers, registers, and grills.

17. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

B. Maintain the cleaning until OWNER occupies the Project or portion thereof.

C. Leave Project clean and in a neat and orderly condition satisfactory to ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Substantial Completion

B. Final Inspection

C. Request for Final Payment

1.2 SUBSTANTIAL COMPLETION

A. Before requesting inspection for Certification of Substantial completion, complete the following. List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the contract price.

2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.

3. Advise OWNER of pending insurance changeover requirements.

4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.

5. Obtain and submit releases enabling OWNER unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificate, and similar releases.

6. Complete final cleanup requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, ENGINEER will either proceed with inspection or advise CONTRACTOR of unfilled requirements.

1. ENGINEER will prepare the Certificate of Substantial Completion following inspection, or advise CONTRACTOR of construction that must be completed or corrected before the certificate will be issued.

2. ENGINEER will repeat inspection when requested and assured that the work has been substantially completed.

3. Results of completed inspection will form the basis of requirements for final acceptance.

4. Date of Substantial Completion will begin the warranty period unless noted otherwise.

1.3 FINAL ACCEPTANCE

A. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the contract price.

3. Submit a copy of ENGINEER's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance. The list shall be endorsed and dated by the ENGINEER.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion, or when OWNER took possession of and responsibility for corresponding elements of the work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement.

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

8. Submit record drawings, maintenance manuals, damage or settlement survey, property survey, and similar final record information.

9. Deliver tools, spare parts, extra stock, and similar items.

10. Make final changeover of permanent locks and transmit keys to OWNER. Advise OWNER's personnel of changeover in security provisions.

11. Complete commissioning and training of OWNER's personnel.

12. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

13. Complete final cleaning in accordance with Section 01 74 00 – Cleaning and Waste Management.

B. Reinspection Procedure: ENGINEER will inspect the work upon receipt of notice that work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the ENGINEER.

1. Upon completion of reinspection, ENGINEER will prepare a certificate of final acceptance, or advise CONTRACTOR of work that is incomplete or of obligations that have not been fulfilled bet are required for final acceptance.

2. If necessary, reinspection will be repeated.

1.4 REQUEST FOR FINAL PAYMENT

A. Submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions, using procedure specified in Section 01 29 00, Payment Procedures.

B. Request for final payment shall include:

1. Documents required for progress payments in Section 01 29 00, Payment Procedures.

2. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.

3. Releases or Waivers of Lien Rights:

   a. When submitting releases or waivers of Lien rights, provide release or waiver by CONTRACTOR and each Subcontractor and Supplier that provided CONTRACTOR with labor, material, or equipment.

   b. Provide list of Subcontractors and Suppliers for which release or waiver of Lien is required.

   c. Each release or waiver of Lien shall be signed by an authorized representative of entity submitting release or waiver to CONTRACTOR, and shall include Subcontractor's or Supplier's corporate seal if applicable.

   d. Release or waiver of Lien may be conditional upon receipt of final payment.

4. Consent of Surety.

5. Documentation that all punch list items are complete.

6. Warranties.

7. Operation and Maintenance Manuals.

8. Record Drawings being maintained by the CONTRACTOR.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 00

CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Project record documents.

B. Spare parts and maintenance products.

C. Preventative maintenance instructions.

D. Warranties and bonds.

1.2 PROJECT RECORD DOCUMENTS

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

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

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

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

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

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

D. Record information concurrent with construction progress, not less than weekly.

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

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

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

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

1. Measured depths of foundations in relation to finish floor datum.

2. Measured horizontal and vertical locations of all underground and exposed utilities and appurtenances, including thrust blocks, referenced to permanent surface improvements.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.

4. Measured horizontal and vertical locations of all concealed and exposed electrical conduits. Conduits shall be shown in plain view on the record drawings with their size and contents indicated.

5. Field changes of dimension and detail.

6. Details not on original Contract drawings.

G. Indicate the date of revisions to the plans in the appropriate box on the plans.

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

1.3 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections. All wearable items should be supplied to provide at least two years of operation and maintenance.

B. Deliver to project site and place in location as directed; obtain sign receipt from the City prior to final payment.

C. Cover and protect parts from moisture.

D. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers: wooded, cardboard, or palletized.

E. Stencil on containers:

1. Manufacturer/supplier name.

2. Unit name.

3. Spare part name.

4. Manufacturer catalogue number.

5. Other identifying information.

6. Precautionary information.

1.4 PREVENTATIVE MAINTENANCE SCHEDULE

A. Submit, in addition to the operation and maintenance data, an equipment maintenance schedule for each piece of equipment. Include the following:

1. Identity of Equipment.

2. Routine manufacturer recommended preventative maintenance

a. Daily

b. Weekly

c. Monthly

d. Quarterly

e. Semi-Annually

f. Annually

B. Equipment maintenance schedule in standard format for all equipment and arranged for simple input into the OWNER's Computerized Maintenance Management System.

1.5 WARRANTIES AND BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers. All warranties shall begin at the Date of Substantial Completion, or at the date of acceptance by the OWNER, whichever is later.

B. Execute and assemble all transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers into one binder.

C. Verify that documents are in proper form, contain full information, and are notarized. Manufacturer's warranties shall be in the name of the Owner.

D. Provide Table of Contents and assemble in three-ring binders with durable plastic cover.

E. Submit prior to final Application for Payment.

F. Time of submittals:

1. Make warranty submittal within ten days after Date of Substantial Completion, prior to final Application for Payment.

2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

G. Rejection of Warranties: OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Operation and maintenance data/manuals.

1.2 SUBMITTALS

A. Submit operations and maintenance data for the following equipment:

B. Quantity Required and Timing of Submittals:

1. Preliminary Submittal:

   a. Printed Copies: 4 copies, exclusive of copies required by CONTRACTOR.

   b. Electronic Copies: 1 copy.

   c. Submit to ENGINEER by the earlier of: ninety days following approval of Shop Drawings and product data submittals, or thirty days prior to starting training of operations and maintenance personnel, or ten days prior to field quality control testing at the Site.

   d. Furnish preliminary operation and maintenance data submittal in acceptable form and content, as determined by ENGINEER, before associated materials and equipment will be eligible for payment.

2. Final Submittal: Provide final submittal prior to Substantial Completion, unless submittal is specified as required prior to an interim Milestone.

   a. Printed Copies: 4 copies.

   b. Electronic Copies (Searchable PDF): 2 copies

1.3 OPERATION AND MAINTENANCE DATA/MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be minimum one-inch wide and maximum of three-inch wide. Binders for each copy of each volume shall be identical.

2. Binders shall be locking three-ring/"D"-ring type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front of each volume.

3. Do not overfill binders.

4. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.

5. Provide the following information on cover of each volume:

   a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".

   b. Name or type of material or equipment covered in the manual.

   c. Volume number, if more than one volume is required, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.

   d. Name of Project and, if applicable, Contract name and number.

   e. Name of building or structure, as applicable.

6. Provide the following information on spine of each volume:

   a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".

   b. Name or type of material or equipment covered in the manual.

   c. Volume number, if more than one volume is required, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.

   d. Project name and building or structure name.

7. The manuals' cover sheets and spines shall all be matching. The CONTRACTOR shall prepare a template for use by the various subcontractors.

B. Pages:

1. Print pages in manual on 30-pound (minimum) paper, 8.5 inches by 11 inches in size.

2. Provide each page with binding margin at least one inch wide. Punch each page with holes suitable for the associated binding.

C. Drawings:

1. Bind into the manual drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size, with reinforcing specified for pages.

2. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Include no more than three drawing sheets per pocket.

D. Copy Quality and Document Clarity:

1. Contents shall be original-quality copies. Documents in the manual shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals that contain copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable. Faxed copies are unacceptable.

2. Clearly mark in ink to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished or cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:

1. Table of Contents:

a. Provide table of contents in each volume of each operations and maintenance manual.

b. In table of contents and at least once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identification is unacceptable.

2. Use dividers and labeled index tabs between equipment items and between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

3. Each equipment item shall have an individual cover sheet with the following information:

a. Name or type of material or equipment.

b. Manufacturer's name, address, telephone number, fax number, and Internet website address.

c. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.

d. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.

e. City Equipment Number if applicable.

1.4 ELECTRONIC REQUIREMENTS

A. Electronic Copies of Operation and Maintenance Manuals:

1. Each electronic copy shall include all information included in printed copy.

2. Submit each electronic copy on a separate compact disc (CD), unless another electronic data transfer method or format is acceptable to ENGINEER.

3. File Format:

a. Files shall be in "portable document format (PDF)". Files shall be electronically searchable.

b. Submit separate file for each separate document in the printed copy.

c. Within each file, provide bookmarks for the following:

1) Each chapter and subsection listed in the printed copy document's table of contents.

2) Each figure.

3) Each table.

4) Each appendix.

4. Also provide drawings and figures in one of the following formats: ".bmp", ".tif", ".jpg", or ".gif". Submit files in a separate directory on the CD.

1.5 CONTENT

A. Submit complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.

B. Submit written explanations of all safety considerations relating to operation and maintenance procedures.

C. Submit complete, detailed, written preventive maintenance instructions including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:

1. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Include pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.

2. Recommended schedule for each preventive maintenance task.

3. Lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.

4. Table of alternative lubricants.

5. Troubleshooting instructions.

6. List of required maintenance tools and equipment.

D. Complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:

1. Manufacturer's name, address, telephone number, fax number, and Internet website address.

2. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail

addresses, when applicable.

3. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.

4. For each part or piece include the following information:

   a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.

   b. Part name or description.

   c. Manufacturer's part number.

   d. Quantity of each part used in each assembly.

   e. Current unit price of the part at the time the operations and maintenance manual is submitted. Price list shall be dated.

E. Compete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.

F. Manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.

G. Submit manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where materials pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.

H. Submit original-quality copies of each approved and accepted Shop Drawing, product data, and other submittal, updated to indicate as-installed condition. Reduced drawings are acceptable only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.

I. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.

J. Programmable Logic Controllers: If programmable logic controllers are furnished

1. Submit complete logic listings in one consistent format.

2. Format Requirements:

   a. For ladder diagram logic, include complete cross-referencing of all logic elements. Annotate all elements with clearly understandable tags or descriptive labels.

b. For function block diagram, label each function block with understandable tags or descriptive labels. Describe purpose and action of each function block.

c. For sequential function chart, include extensive comments for each step to describe program step function.

d. For instruction list and structured text, include extensive comments for each program line to describe program line function.

1. Submit complete programmable logic controller listing of all input/output address assignments, tag assignments, and pre-set constant values, with functional point descriptions.

2. Submit complete manufacturer's programming manuals.

K. Copy of warranty bond and service contract as applicable.

L. When copyrighted material is used in operations and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Instructor Manual

B. Trainee Manual

1.2 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00:

1. Submit two copies of the outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

2. Submit resumes, including three outside references, for each instructor proposed for training program. The qualifications of the instructor shall include the type of training instructor has received for the specific equipment and previous training work experience.

3. Submit two (2) electronic copies of each training module within seven (7) calendar days following the delivery of each training module.

4. On each copy of the training module, provide an applied label with the following information:

   a. Name of Project.
   b. Training Session Name.
   c. Name of ENGINEER.
   d. Name of Construction Manager.
   e. Name of CONTRACTOR.

5. At completion of training, submit complete training manual(s) for OWNER's use prepared and bound in format matching operation and maintenance manuals and in a PDF electronic file. Include a table of contents with links to corresponding training components.

   a. The PDF electronic file format shall be electronically searchable and shall adhere to the same requirements defined in Section 01 78 23, Paragraph 1.4.

1.3 COORDINATION

A. CONTRACTOR to coordinate instruction schedule with OWNER's operations. Adjust schedule as required to minimize disrupting OWNER's operations and to ensure availability of the OWNER's personnel.

B. CONTRACTOR shall provide a minimum of two (2) general training sessions covering all topics other than those under section 35 22 26 Cast Iron Sluice Gates and Section 40 05 00 Process Valves and Accessories. General training sessions shall be on non-consecutive days to accommodate shift changes at the plant.

C. CONTRACTOR to coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

D. CONTRACTOR to coordinate content of training modules with content of accepted emergency, operation, and maintenance manuals. Do not submit instruction program(s) for review until the operation and maintenance data required under Section 01 78 23 has been reviewed and accepted by ENGINEER.

PART 2 - PRODUCTS

2.1 INSTRUCTOR MANUAL

A. The CONTRACTOR shall prepare an Instructor Manual or each curriculum that includes all of the information specified below and written at the journeyman level for electrician specialists, mechanical specialists and instrument technicians, and for water treatment plant operators, or other disciplines, depending upon the target audience.

B. The Instructor Manual shall be consistent with the nomenclature and contents of the accepted CONTRACTOR's O&M Manuals required in Specification Section 01 78 23. The O&M Manuals cannot be substituted for the Instructor Manual.

C. The purpose of the Instructor Manual is to define the concepts and information that will be taught to each target audience and to describe the methods and materials to be used during the training. The Instructor Manual is designed to provide specific guidance to the Instructor regarding all aspects of the training program. The Instructor Manual shall include:

1. Description of the equipment.

2. Parts and equipment graphics.

3. Safety procedures.

5. Overview of routine operation, and operating parameters.

6. Routine, preventive, and corrective maintenance procedures.

7. Lubrication (schedule and type).

8. Assembly and disassembly procedures.

9. Troubleshooting procedures.

10. Parts list.

11. Special maintenance practices.

D. All manuals shall be presented in electronic format per the requirements of Specification Section 01 33 00. All equipment shall be cross-referenced to the equipment tag identification numbers.

E. Each Instructor Manual shall contain:

1. Instructor Manual cover page.

2. Instructor Manual table of contents.

3. Lesson Plan cover page.

4. Lesson Plan summary.

5. Lesson Plan text, including:

   a. Identity of the target audience (a separate Lesson Plan is required for each target audience, such as mechanical O&M personnel, electronic/electrical O&M personnel, etc.).

   b. Length of the training program and each topic to be covered.

   c. Performance and/or training objectives.

   d. Outline of the material to be covered.

   e. Training strategies to be used and interaction with the trainees.

   f. Audio visual and/or support materials required, and when used or referred to during instruction.

   g. A list of resource and/or reference materials.

6. A copy of all training aids, including electronic files.

7. A copy of trainee materials (handouts, reference materials, etc.) in electronic format.

F. The CONTRACTOR shall submit the equipment manufacturer's lesson plans for acceptance by the ENGINEER no less than ninety (90) days prior to the date that the training is to take place.

G. With the exception of cutaway models or other items expressly exempted by the ENGINEER, all training aids and trainee materials contained in the Instructor Manual or used in the delivery of training shall become the property of the OWNER and may be duplicated by the OWNER for its own use.

H. The CONTRACTOR shall provide required acceptance and/or copyright releases obtained from those who own proprietary and/or copyrighted materials provided by the CONTRACTOR so that the materials can be reproduced by the OWNER.

2.2 TRAINEE MANUAL

A. Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required in the individual Specification Sections.

B. The CONTRACTOR shall submit a Trainee Manual for each curriculum that includes all of the information specified below and written at the journeyman level for electrician specialists, mechanic specialists and instrument technicians, and for water treatment plant operators, or other disciplines, depending upon the target audience.

C. The Trainee Manual shall be consistent with the nomenclature and content of the accepted CONTRACTOR O&M Manuals required in Specification Section 01 78 23. The O&M Manual cannot be substituted for the Instructor Manual or Trainee Manual.

D. The purpose of the Trainee Manual is to provide an organized package of information for use by trainees during the training sessions and as reference Water Treatment Plant (New) material for operation and maintenance in the future. The Trainee Manual shall include:

1. Description of the equipment.

2. Parts and equipment graphics including "exploded" views.

3. Safety procedures.

4. Operation and monitoring procedures including normal operating parameters, and the operating limits of the equipment.

5. Troubleshooting procedures.

6. Non-routine emergency procedures.

7. Safety/Protective equipment required by Trainees.

E. All manuals shall be presented in electronic format per the requirements of Specification Section 01 33 00. All equipment shall be cross-referenced to the equipment tag identification numbers.

F. The CONTRACTOR shall provide at least one hard copy of each Trainee Manual for each trainee. Hard copies shall be on 8.5" x 11" paper in a 3-hole D-ring binder.

G. The CONTRACTOR will provide training videos for each trainee manual section.

PART 3 - EXECUTION

3.1 FACILITIES FOR TRAINING

A. Use OWNER's designated training facilities for specified field training programs. Facilities shall include the project site, which shall be used for hands-on training programs. Coordinate use of OWNER's facilities with OWNER.

3.2 SCHEDULE

A. The CONTRACTOR shall coordinate the manufacturer's training services with the OWNER and the ENGINEER, providing a minimum of thirty (30) days prior notice of training, subject to the acceptance of the ENGINEER and the OWNER.

END OF SECTION

SECTION 01 91 00

COMMISSIONING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Commissioning Plan

B. Functional Completion Testing

C. Startup

D. Commissioning

1.2 DEFINITIONS

A. Commissioning: Commissioning is the series of activities or processes necessary to ensure that equipment and systems are designed, installed, functionally tested, started up and capable of being operated and maintained to perform in conformity with the design intent for the facility improvements. Commissioning includes, but is not limited to factory testing, field testing, dry testing, wet testing with plant water, performance testing, Manufacturer's checkout, and operational demonstration.

B. Factory Testing: Factory testing is performance testing, operation testing, or documentation verification conducted in the production facility, specialized test facility, or by the equipment manufacturer or supplier. Such testing shall conform to the requirements of the individual sections of the Contract Documents. "Witnessed" factory testing shall mean that the testing is witnessed by the OWNER or his designated representative.

C. Field Testing: Field testing is performance testing, operation testing, or documentation verification conducted in the field after installation, to provide comparison with the results obtained in the factory testing.

D. Dry Testing: Dry testing is performed by the CONTRACTOR without introducing either process material or other test material into the component, system, or unit process.

E. Wet Testing: Wet testing is testing performed by the CONTRACTOR utilizing raw water in the component, system, or unit process.

F. Performance Testing: Performance Testing is testing performed by the CONTRACTOR to demonstrate the specified throughput of the equipment and unit process systems while maintaining regulatory compliance with Federal, State, and Local government regulations and minimum compliance with the equipment or unit process systems performance requirements and guarantees.

G. Manufacturer's Checkout: Manufacturer's checkout shall be performed directly by the manufacturer. Checkout by the local equipment representative or salesman is not permitted. Checkout shall include, but not be limited to, wiring and power supply, installation, tolerances, clearances, rotation, etc.

H. Startup: Startup shall be defined as the operation of equipment or unit process systems using clean water, air, or other fluids and gases as necessary to demonstrate the operation of the equipment or systems with other equipment that is a part of the Facility. Startup shall be performed by the CONTRACTOR, manufacturer, and local equipment representative.

I. Operational Demonstration: A commissioning activity performed by the CONTRACTOR wherein the CONTRACTOR operates and maintains a fully functional component system, unit process, or treatment train for a period of time after stable operation has been achieved. For purposes of this project, the period of time shall be 30 days, unless noted otherwise for specific pieces of equipment.

J. Commissioning Plan: The Commissioning Plan incorporates all aspects of functional completion testing, startup, commissioning, performance testing, training, and reliability tests to ensure the facility operates properly and meets design intent and performance.

1.3 QUALITY ASSURANCE

A. CONTRACTOR shall appoint a Performance Testing Manager who shall:

1. Manage, coordinate, and supervise CONTRACTOR's start-up, testing, and commissioning activities including but not limited to field testing, dry testing, wet testing with plant water, performance testing with process liquids and solids, manufacturer's checkout and the Operational Demonstration.

2. Assist in coordinating and documenting Site quality control Work specified in individual Specification Sections.

3. Prepare, or review and approve, all submittals for the Work under this Section and related Work contained within the Contract Documents.

4. Coordinate activities of subcontractors, manufacturers and suppliers relative to the start-up, testing, and commissioning activities.

B. Performance Testing Manager shall be at the Site a minimum of eight hours per day during all testing and be available at all times, 24 hours per day, seven days per week to perform these duties.

C. Performance Testing Manager shall supervise the CONTRACTOR's Operations ENGINEER and Operations Specialists who shall be dedicated to the start-up, testing, and commissioning Work.

1.4 SUBMITTALS

A. Field Installation Reports – Submit reports by Manufacturer's Representative in accordance with the Contract Documents.

B. Detailed Commissioning Plan – Submit detailed commissioning plan in accordance with the Contract Documents 90 days in advance of starting, testing and placing equipment into operation.

C. Start up and Testing Documentation: CONTRACTOR shall prepare and submit all documentation for review and approval. The documentation shall include, but not be limited to, the following:

1. Blank forms to be filled out during start-up and testing.

2. Field testing plans, dry testing plans and wet testing plans that describe in detail the proposed testing procedures that will show the equipment and systems performance is in accordance with the requirements of the Contract Documents.

3. Field testing, dry testing and wet testing reports including recorded test data, performance tolerances, observations, measurements taken, problems and modifications or corrective action taken for the equipment and systems to perform in accordance with the Contract Documents.

4. Certification by the preparer that he/she is the person responsible for the data, and that the data is authentic and accurate.

5. Certification by the CONTRACTOR or equipment or unit process systems supplier that the equipment or the unit process systems were operated continuously for the specified period and that the equipment or unit process systems operated in compliance with the specified operating conditions, parameters and performance, and that the equipment or unit process systems are suitable for Operational Demonstration in accordance with Section 01752.

1.5 COMMISSIONING PLAN

A. The CONTRACTOR shall be responsible for preparing, coordinating, and executing the Plan.

1. The CONTRACTOR shall use the resources of the equipment and unit process systems suppliers in this work, particularly for specific equipment and unit process systems.

2. An initial draft Plan for the Facility shall be completed and submitted by the CONTRACTOR to the ENGINEER for review at least 90 days prior to the expected commencement of commissioning. The ENGINEER will require 45 days to review the submittal and return with any exceptions noted. The CONTRACTOR shall incorporate the ENGINEER's comments into the revised Plan within 30 days of receiving comments, and reissue the Plan to the ENGINEER and OWNER.

B. The CONTRACTOR shall provide a dedicated field staff to support the Plan activities. A full-time Startup Manager shall be responsible for day to day activities and shall be the primary contact with the ENGINEER regarding Plan activities. Support staff shall include but not be limited to designated mechanical, electrical and instrumentation and control ENGINEERs and technicians, and operating staff.

1. The CONTRACTOR may require assistance from the OWNER's operating and maintenance staff in commissioning and performance testing activities specified herein. Activities requiring OWNER's staff shall be specifically noted in the Plan.

C. The Plan shall define:

1. A chronological schedule of all testing and inspection activities.

2. A checklist of all inspection and testing activities broken down by location, discipline, system, and device or item.

3. All blank forms proposed by the CONTRACTOR for verification or recording of the functional completion testing, startup, commissioning and performance testing.

4. An index which cross references the forms to their intended application(s).

5. A list of all supplier certifications, including those required by the applicable technical specifications. Provisions shall also be included for retesting, in the event it is required.

6. A list of participants in functional completion testing, startup, commissioning, and performance testing.

7. A list of special test equipment required for functional completion testing, startup, commissioning, and performance testing.

8. Sources of the test media (water, power, air.) for functional completion testing.

9. The proposed method of delivery of the media to the equipment to be tested during functional completion testing, startup, commissioning, and performance testing.

10. Temporary or interim connections for the sequencing of multiple units during functional completion testing, startup, commissioning, and performance testing.

D. The CONTRACTOR shall designate, in the Plan, a Testing and Checkout Coordinator, to coordinate and manage the activities defined in the Plan.

1.6 ROLES AND RESPONSIBILITIES

A. CONTRACTOR shall provide competent, qualified representatives of material, equipment, and system manufacturers to provide services specified, including supervising installation, adjusting, starting-up, and testing of materials and equipment.

B. The CONTRACTOR shall provide all outside services, materials, labor, supplies, test equipment and other items necessary to perform the Plant Testing, Startup and Commissioning specified herein. In addition, the CONTRACTOR shall arrange for and provide the participation or assistance of survey crews, quality control technicians, Supplier's representative(s), and required governmental agency representatives.

C. The CONTRACTOR shall provide the services of the Supplier's representative(s) as follows:

1. Assistance during installation as specified in Divisions 1 through 40 and as specified herein.

2. Field Testing as specified in Divisions 1 through 40 and as specified herein.

3. Startup as specified in Divisions 1 through 40 and as specified herein.

4. Commissioning as specified in Divisions 1 through 40 and as specified herein.

D. The Supplier's representative's activities required by this Section are in addition to the requirements for vendor training and other services specified elsewhere in the Contract Documents. Timing for the performance of these services is to be defined in the CONTRACTORS Checkout Plan, specified herein, and shall not be concurrent.

E. The ENGINEER will review and comment on the CONTRACTOR's deliverables, participate in the physical inspection activities, witness the shop and field testing, witness functional testing, maintain the permanent record of all testing results, and provide verification of conformance to the specifications. The ENGINEER's right to perform inspections, witness tests or monitor or assess the Work and activities does not relieve the CONTRACTOR of its obligation to comply with the requirements of the Contract Documents nor does it imply completion of the Work.

1.7 FUNCTIONAL COMPLETION TESTING

A. Functional Completion Testing shall be completed as construction and installation of equipment is completed to demonstrate that the equipment is ready for equipment and unit process systems startup.

B. Functional Completion Testing shall be done in a coordinated manner based on the Plan prepared by the CONTRACTOR.

C. The OWNER's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

D. Functional Completion Testing procedures and documentation forms shall be developed by the CONTRACTOR. The procedures shall include a listing of items inspected for Functional Completion Testing.

E. If any equipment or unit process systems do not meet Functional Completion Testing requirements, it shall be the responsibility of the CONTRACTOR and/or equipment suppliers to make the necessary corrections or replacements and repeat the test.

F. The equipment and unit process systems shall not be started up or put into service until the Functional Completion Testing is completed as evidenced by a completed Functional Completion Testing certificate for the equipment or subsystem.

G. Modifications to the equipment and unit process systems required to meet Functional Completion Testing requirements shall be provided, and all retesting shall be performed at no additional cost to the OWNER.

H. A Functional Completion Testing Certificate shall be prepared by the CONTRACTOR for each piece of equipment or unit process and submitted to the ENGINEER and OWNER for review.

1.8 COMMISSIONING

A. Commissioning activities for the Facility shall not be initiated until the requirements of Startup are completed for the equipment or unit process systems.

B. The requirements of this section shall be satisfactorily completed prior to beginning Performance Testing for equipment and unit process systems.

C. Commissioning shall be used by the CONTRACTOR and equipment or unit process suppliers to adjust, fine tune, modify and prepare the equipment or system for continuous operation and Performance Testing.

D. Equipment shall not be operated without the guidance of qualified personnel having the knowledge and experience necessary to conduct proper operation thereof and obtain valid results.

E. All required adjustments, tests, operation checks, and Startup and Commissioning activities shall be provided by qualified personnel.

F. CONTRACTOR shall be responsible for planning, supervising, and executing the Startup and Commissioning of the equipment and unit process systems with the assistance of equipment or unit process systems suppliers in accordance with the Plan.

G. The CONTRACTOR shall be responsible for commissioning under the direction of its Startup Manager.

H. The OWNER's operating and maintenance staff shall be allowed to observe for the purposes of familiarization and training.

I. For equipment or unit process systems that do not meet Commissioning requirements, it shall be the responsibility of the CONTRACTOR and/or equipment or unit process systems suppliers to make the necessary corrections or replacements and repeat Commissioning at no additional cost to the OWNER.

J. The equipment or unit process systems shall not be Performance Tested or otherwise placed into service until Commissioning is completed as evidenced by a completed Commissioning certificate for the equipment or unit process systems.

K. Commissioning Certificates for each piece of equipment or unit process shall be completed and submitted by the CONTRACTOR to the ENGINEER and OWNER for review.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 STARTUP

A. The CONTRACTOR's Performance Testing Manager and Manufacturer's Representative shall inspect equipment and systems prior to each start-up and verify their readiness for start-up. Conditions hazardous to equipment or personnel shall be corrected by the CONTRACTOR's Performance Testing Manager prior to start-up of equipment.

B. Start-up operations shall not precede using temporary power or temporary instrumentation and control wiring. All electrical and control connections shall be permanent and complete, and all such electrical components and equipment fully functional.

C. Use of repair parts during start-up operations shall not be permitted, except in such situations where the actual on-site verification of such repair parts' operability is specified.

D. The CONTRACTOR's Performance Testing Manager shall verify that all initial copies of the maintenance and operating instructions have received, from the ENGINEER, an acceptable disposition as defined in Section 01 33 00, Submittal Procedures, and the only outstanding item is the field verification of the maintenance and operating instructions.

E. CONTRACTOR's Performance Testing Manager shall compare, and make adjustments to conform to; the Manufacturer's recommendations for the following minimum start up requirements:

1. Bearings and Shafting:

   a. Inspect for cleanliness, and clean and remove foreign matter.

   b. Verify alignment.

   c. Replace defective bearings and those that operate rough or noisy.

   d. Grease as necessary, in accordance with Manufacturer's recommendations.

2. Motors:

   a. Check each motor for comparison to amperage nameplate value.

   b. Correct conditions that produce excessive current flow and conditions that exist due to equipment malfunction.

3. Pumps:

   a. Check glands and seals for cleanliness and adjustment before running pump.

   b. Inspect shaft sleeves for scoring.

   c. Inspect mechanical faces, chambers, and seal rings, and replace if defective.

   d. Verify that piping system is free of dirt and scale before circulating liquid through pump.

4. Valves:

   a. Inspect manual and automatic control valves, and clean bonnets and stems.

   b. Tighten packing glands to ensure no leakage, but allow valve stems to operate without galling.

   c. Replace packing in valves to retain maximum adjustment after system is determined to be complete.

   d. Replace packing on valves that continue to leak.

   e. Remove and repair bonnets that leak.

   f. After cleaning, coat packing gland threads and valve stems with surface preparation of "Molycote" or "Fel-Pro".

   g. Verify that control valve seats are free from foreign matter and are properly positioned for intended service.

5. Tighten flanges and other pipe joints after system has been placed in operation.

    a. Replace gaskets that show signs of leakage after tightening.

6. Inspect all joints for leakage:

    a. Promptly remake each joint that appears to be faulty; do not wait for rust or other corrosion to form.
    b. Clean threads on both parts, and apply compound and remake joints.

7. After system has been placed in operation, clean strainers, drives, pockets, orifices, valve seats, and headers in fluid system to ensure freedom from foreign matter.

8. Remove rust, scale, and foreign matter from equipment and renew defaced surfaces.

9. Inspect fan wheels for clearance and balance.

10. Check each electrical control circuit to ensure that operation complies with the Contract Documents.

11. Inspect each pressure gauge, thermometer, and other instruments for calibration.

    a. Replace items that are defaced, broken, or that read incorrectly.

12. Repair damaged insulation.

13. Vent gasses trapped in systems.

14. Verify that liquids are drained from all parts of gas or air systems.

3.2 COMMISSIONING

A. On successful completion of startup, the CONTRACTOR shall begin commissioning of the equipment and systems, wherein the equipment and systems are subjected to full operation. Adjustments shall be made as necessary and the equipment and system shall be optimized and brought into compliance with design criteria in preparation for performance testing and the Operational Demonstration specified within the Contract Documents.

B. The various vendors, equipment suppliers and manufacturers shall provide on-site supervision and assistance for Commissioning services for the new facility.

C. The CONTRACTOR shall coordinate all Commissioning activities for equipment and systems in accordance with the accepted commissioning plan.

D. Commissioning shall show that the equipment and unit process systems are capable of continuous operation using process liquids and solids, chemicals, and utilities; and that the flows, operating parameters and performance requirements have been demonstrated for a minimum of seven days of continuous operation, or the period required in the equipment specifications, whichever is longer.

E. If the commissioning fails, the CONTRACTOR will be responsible for redoing the commissioning at no additional costs to the OWNER.

F. Shutdowns that occur because of power outages, acts of God, or failure of support systems not part of this contract will not be a cause of failure of continuous operation during the Operational Demonstration.

END OF SECTION

SECTION 02 41 00

SITE DEMOLITION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Includes, but not limited to, all demolition and removals of existing materials, equipment, or work necessary to complete the Work as shown and specified. Items include all underground conduit, conductors, pavement, structural steel, storage building, concrete, poles, and all related items.

B. Demolitions and removals, which may be specified under other Sections, shall conform to requirements of this Section.

1.2 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 02 41 19 – Selective Demolition

C. Section 31 00 00 – Earthwork

1.3 REFERENCES

A. Comply with all applicable requirements of the following reference standards:

1. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .850 through .860.

2. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650.

3. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .62 – Lead Standard.

4. MDOT, 2012 Standard Specifications for Construction.

5. United States Environmental Protection Agency (USEPA) Publication SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, henceforth SW-846.

1.4 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Demolition Plan: Submit a comprehensive demolition plan describing the proposed sequence, methods and equipment for demolition, removal and disposal of structures, relocating and installing underground utilities, pavements, etc.

B. Do not proceed with demolition until the Owner has approved the demolition plan.

1.5 DELIVERY, STORAGE, AND HANDLING

A. CONTRACTOR is responsible for determining the applicability of disposal locations for debris generated throughout the course of Work.

B. CONTRACTOR is responsible for all analytical testing required by the disposal facilities that CONTRACTOR receives approval from for debris disposal.

1.6 PROJECT CONDITIONS

A. Unknown Conditions

1. Locations of existing utilities below grade are estimated from existing documents and from surface utilities such as manholes, valve boxes and catch basins.

2. CONTRACTOR is responsible for locating all utilities within the pump stations sites. Existing alignment, elevation, materials of construction and size shall be verified prior to beginning demolition.

3. Should unforeseen piping or other utilities be encountered during excavation, notify the ENGINEER immediately. Cooperate with utility Owner in keeping adjacent services and facilities in operations. Repair damaged utilities immediately.

B. Perform demolition and removal Work to prevent damage or injury to structures, occupants thereof, and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.

1. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials will not be permitted, and all operations shall be conducted with a minimum interference to traffic on these ways.

2. Erect and maintain barriers, lights, sidewalk sheds, and other necessary protective devices.

3. Repair damage to facilities to remain, or to property belonging to the OWNER or occupants of the facilities.

4. CONTRACTOR shall stop demolition work if demolition debris falls outside of the work limits and shall clear away the debris immediately. Demolition work may resume once debris outside of the work limits is removed. CONTRACTOR shall notify the ENGINEER of debris outside of the work limits.

1.7 SCHEDULING

A. Provide 30-days advanced notice before beginning demolition work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Concrete - Concrete required for plugging shall be as specified in Section 03300, Cast-in-Place Concrete.

B. Flowable Fill – Flowable Fill for the pressure grouting of existing utilities shall conform to the MDOT special provision for flowable fill. The compressive strength of the flowable fill must be a minimum of 50 psi at 3 days, and 75 to 150 psi at 28 days.

PART 3 – EXECUTION

3.1 GENERAL

A. All materials and equipment removed from existing work shall become the property of CONTRACTOR, except for those which OWNER has identified and marked for their use. All materials and equipment marked by the OWNER to remain the property of the OWNER shall be carefully removed by CONTRACTOR so as not to be damaged, and shall be cleaned and stored on or adjacent to the Site in a protected location specified by the ENGINEER or loaded onto trucks provided by the OWNER.

B. CONTRACTOR shall dispose all demolition materials, equipment, debris, and all other items not marked by the OWNER to remain, off the Site and in conformance with all existing applicable laws and regulations.

C. CONTRACTOR shall remove demolition materials from the site daily. CONTRACTOR shall not stockpile materials or equipment on-site.

D. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces shall be repaired and re-finished by CONTRACTOR with the same or matching materials as the existing adjacent surface or as may be otherwise approved by the ENGINEER.

E. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.

1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

2. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the Work.

3.2 PAVEMENT REMOVAL

A. Cut and remove from the work all pavement or sidewalk that would be damaged by the work. Cutting of concrete pavement, where permitted, shall be done with a concrete saw, in a manner meeting the approval of the ENGINEER. Asphalt pavements shall be cut by a tool leaving a square neat cut. Pavements shall be cut back so the pavement opening is 6 inches wider on each side than the width of the trench, and care shall be taken during construction operations so as not to cave the banks or undermine remaining pavement. Any reinforcement encountered shall not be cut out, but shall be left protruding at least two feet from the face of the cut and shall be bent out of the way to be replaced later and spliced to new reinforcement.

B. All strips of the existing pavement which are less than 2 ft. wide and which are between the cut pavement and the concrete gutter shall be removed and replaced.

C. In cutting through sidewalks, driveways, or curb and gutter, the CONTRACTOR shall remove full slabs of sidewalk or driveway or full lengths of curb and gutter to the nearest regular joint on each side of the excavation.

3.3 PIPING DEMOLITION

A. CONTRACTOR shall be responsible for the controlled removal of the water in the piping prior to demolition.

B. CONTRACTOR shall not begin removal or abandonment operations until replacement piping has been constructed, disinfected, tested and service lines have been transferred to replacement piping.

C. All existing piping designated for abandonment in place shall be plugged at each end with a cap constructed of concrete block and non-shrink grout. The pipe shall then be pressure grouted with flowable fill full leaving no voids or air spaces.

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Includes, but is not limited to, all demolition and removals of existing materials, equipment necessary to complete the work specified and as shown on the Contract Drawings. Items for removal include process piping, valves, concrete, resteel, walls, doors, windows, structural steel, metals, masonry, electrical equipment, mechanical equipment and all related items.

B. The process piping, valves, and related equipment in the existing pump room has lead paint. CONTRACTOR shall be responsible for all necessary procedures for removal, handling, transportation, and disposal of hazardous materials.

1.2 SECTION INCLUDES

A. Selective removal and off-site disposal of following:

1. Portions of building structure shown on Drawings or required to accommodate new construction.

2. Removal of all items marked “remove” or “demolish” on Drawings.

3. Removal and protection of existing fixtures and equipment items identified for salvage by the OWNER.

4. Removal, protection, and reinstallation of existing fixtures and equipment items shown or marked as “remove and reinstall.”

1.3 RELATED SECTIONS

A. Section 02 41 00 – Site Demolition.

B. Section 02 83 33.13 – Lead Based Paint Removal and Disposal

1.4 DEFINITIONS

A. Remove: Remove and dispose of items shown or scheduled. Discard demolished or removed items except for those shown to remain, those shown as reinstalled, those shown as salvaged, and historical items that are to remain OWNER’s property.

B. Remove and Salvage: The OWNER may elect to retain some equipment. Carefully remove and clean salvage items, pack or crate to protect against damage. Transport to a location identified by the OWNER.

C. Remove and Reinstall: Remove items shown; clean, service and otherwise prepare them for reuse; store and protect against damage. Reinstall items in same location or in location shown.

D. Existing to Remain: Protect construction or items shown to remain against damage during selective demolition operations. When permitted by ENGINEER, CONTRACTOR

may elect to remove items to suitable, protected storage location during selective demolition and properly clean and reinstall items in their original locations.

1.5 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Proposed dust-control measures.

2. Proposed noise-control measures.

3. Proposed haul routes between Site and disposal areas before commencing this Work.

B. Submit schedules listed below to ENGINEER and OWNER.

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.

2. Inventory list of removed existing equipment not reused in Contract Work. Submit lists to OWNER. OWNER to determine or select items for retention by OWNER.

3. Inventory list of removed and salvaged items.

4. Inventory list of OWNER-removed items.

5. Interruption of utility service.

6. Coordination for shutoff, capping, and continuation of utility service

7. Use of elevator and stairs.

8. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of OWNER's on-site operations.

9. Coordination of OWNER's continuing occupancy of portions of existing building and of OWNER's partial occupancy of completed work.

10. Locations of temporary partitions and means of egress.

C. Inventory list of existing equipment to be removed and not reused in Work. OWNER to determine or select items or retention by OWNER

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Demolition operations shall comply with OSHA and EPA requirements and EPA notification regulations insofar as they apply to demolition Work under this Contract.

2. Comply with hauling and disposal regulations of authorities having jurisdiction.

3. If hazardous materials are found during demolition operations, comply with all applicable local, state and national requirements for removal and disposal.

B. Facility Access:

1. Do not close, block or obstruct streets, walks or other occupied or used facilities without written permission from authorities having jurisdiction.

a. Use alternative routes around closed or obstructed routes if required by governing regulations.

2. Coordinate with OWNER's continuing occupation of portions of existing building, and OWNER's partial occupancy of completed new addition.

3. Plan and present the CONTRACTOR's plan for achieving the partial occupation by OWNER in a submittal and in a meeting with the OWNER and ENGINEER.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Disassemble or cut large equipment items into smaller pieces to promote safe removal and transportation

1. Transport and unload items requested by OWNER to a designated location at the project site.

2. Haul away and dispose of debris and materials neither retained by OWNER, nor reused or reinstalled.

3. Arrange for disposal areas.

4. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

B. Unloading Salvage Items: Where shown on Drawings as "Remove and Salvage," carefully remove shown items, clean, store and turn over to OWNER and obtain receipt. OWNER will designate site for receiving items.

C. Handling: CONTRACTOR shall take every precaution to prevent spillage of materials being hauled in public streets.

1. It shall be CONTRACTOR's responsibility to immediately clean spillage that may accidentally occur.

2. Do not burn removed material on or within Project Site.

1.6 PROJECT CONDITIONS

A. Materials Ownership:

1. Salvage Materials: Demolished materials shall become CONTRACTOR's property, except for items or materials shown as reused, salvaged, reinstalled, or otherwise shown to remain OWNER's property. Remove demolished material promptly from Site with further disposition at CONTRACTOR's option.

2. Historical artifacts, relics, and similar objects, including but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historical significance remain property of OWNER. Notify OWNER's Representative when these items are found and obtain method of removal and salvage from OWNER.

3. Transport items of salvageable value to CONTRACTOR to CONTRACTOR's area as they are removed.

B. Environmental Requirements: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practicable level. Comply with governing regulations relating to environmental protection. Do not use water when it may create hazardous or objectionable conditions including ice, flooding, and pollution.

1. Existing drains shall be protected from debris. Protect drains prior to beginning any demolition work.

C. Existing Conditions: OWNER will be continuously occupying building areas immediately adjacent to selective demolition areas.

D. OWNER assumes no responsibility for actual condition of items or structures scheduled for demolition.

E. OWNER will maintain conditions existing at Contract commencement insofar as practical. However, variations within structure may occur by OWNER's removal and salvage operation before selective demolition work begins.

1.8 SEQUENCING

A. Conduct selective demolition work in manner that minimizes need for disruption or interference of OWNER's normal on-Site operations.

B. Coordinate with OWNER's continuing occupation of portions of existing building, with OWNER's partial occupancy of completed new addition, and with sequencing and startup of the new addition.

C. Include coordination for shutoff, capping, and continuation of utility services, together with details for dust and noise control protection to ensure uninterrupted on-Site operations by OWNER.

1.9 SCHEDULING

A. Schedule: Submit schedule showing proposed methods and sequence of operations for selective demolition work to OWNER's representative for review before commencement of Work.

B. Arrange selective demolition schedule so as not to interfere with OWNER's on-site operations.

C. Give minimum of 15 days advance notice to OWNER of demolition activities, which affect OWNER's normal operations.

D. Give minimum of 15 days advance notice to OWNER if shutdown of service is necessary during changeover.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Before beginning selective demolition work inspect areas of Work. Survey existing conditions and correlate with requirements shown to determine extent of selective demolition required. Photograph existing structure surfaces, equipment, or surrounding properties, which could be misconstrued as damage resulting from selective demolition work. File with OWNER's representative before starting Work.

B. Inventory and record condition of items scheduled as "remove and reinstall or items scheduled as "remove and salvage."

C. Verify disconnection and capping of utilities within the affected area of Work.

D. If unanticipated mechanical, electrical, or structural elements conflict with intended function or design, investigate, and measure nature and extent of conflicts. Promptly submit detailed written reports to OWNER's Representative. Pending receipt of directive from OWNER's Representative, rearrange selective demolition schedule to continue general job progress without delay.

3.2 UTILITY SERVICES

A. Where utility services are scheduled for removal, relocation, or abandonment, install bypass connections and temporary service to maintain continuity of services to other building parts before proceeding with selective demolition.

B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.

C. Maintain existing utilities shown as remaining. Keep in service, and protect existing utilities against damage during selective demolition operations.

D. Locate, identify, stub off and disconnect utility services that are not to remain active.

1. OWNER will arrange to shut off designated utilities when requested by CONTRACTOR.

2. Arrange to shut off utilities with utility companies.

3. Provide a thrust block for disconnected and capped utilities.

E. Cut off pipe or conduit in walls or partitions scheduled for removal. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Drain, purge, or remove, collect and dispose of chemicals, gases, explosives, acids, flammable, or other dangerous material before proceeding with selective demolition operations.

B. Cover and protect furniture, equipment, and permanent fixtures from soiling or damage while demolition Work is done in rooms or areas where items remain in place.

C. Protect existing finish work that remains in place and becomes exposed during demolition operations.

D. Protect floors with suitable coverings when necessary.

E. Where selective demolition occurs immediately adjacent to occupied portions of building, or to separate areas of noisy or extensive dirt or dust operations, construct and maintain temporary, insulated, fire-rated solid dustproof partitions.

1. Construct dustproof partitions of minimum 4-inch studs, 5/8-inch-thick drywall (joints taped on occupied side), 1/2-inch fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.

2. Equip partitions with dustproof doors and security locks if required.

F. Provide weatherproof closures for exterior openings resulting from demolition Work. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

G. Provide and ensure free and safe passage of OWNER's personnel and general public to and from occupied portions of building around selective demolition areas.

1. Provide temporary barricades and other forms of protection to protect OWNER's personnel and general public from injury.

2. Build temporary covered passageways required by authorities having jurisdiction.

H. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of demolished structures or elements, or adjacent facilities or Work to remain.

I. Cease operations and notify OWNER's Representative immediately if safety of structure seems endangered. Take precautions to support structure until determination is made for continuing operations.

J. Remove protection at completion of Work.

3.4 DEMOLITION

A. Special Techniques: Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.

B. Demolish foundation walls to depth of not less than 48 inches below proposed ground surface. Demolish and remove below-grade wood or metal construction.

C. For interior slabs on grade, use power saw or removal methods that do not crack or structurally disturb adjacent slabs or partitions.

D. Completely fill below-grade areas and voids resulting from demolition Work. Either:

1. Provide fill consisting of approved earth, gravel, or sand.

2. Fill shall be free of trash, debris, stones over 6-inch diameter, roots, or other organic matter.

OR

3. Fill below-grade areas and voids with Flowable Fill.

E. Explosives: Use of explosives is not allowed.

F. Interface with Other Work: Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.

G. Site Tolerances: Provide services for effective air and water pollution controls required by local authorities having jurisdiction.

3.5 REPAIR/RESTORATION

A. Repair damages caused by demolition more extensive than required.

B. Return structures and surfaces to condition existing before commencing selective demolition Work.

C. Repair adjacent construction or surfaces soiled or damaged by selective demolition Work.

D. Promptly repair damages caused to adjacent facilities by demolition Work at no cost to OWNER.

3.6 CLEANING

A. CONTRACTOR shall maintain an order of neatness and good housekeeping comparable to that observed by OWNER.

B. Keep tools, scaffolding, and other demolition equipment in neat and orderly arrangement.

C. Remove dirt and debris resulting from CONTRACTOR's demolition operations from Site daily. Dirt and debris shall not collect or interfere with OWNER's facility operations.

D. Upon completion of demolition Work, remove tools, equipment, and demolished materials from Site. Remove protection and leave interior areas broom clean.

END OF SECTION

SECTION 02 83 33.13

LEAD BASED PAINT REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The scope of work for this project covers the supplying of all labor, tools, materials, equipment, services and appurtenances to accomplish the work described below and shown on the Drawings. The work shall be performed to the complete satisfaction of the Owner or the Engineer, in accordance with the current EPA and OSHA regulations, State Labor and Industry and Department of Environmental Resources regulations (if applicable) and any other applicable state and local government.

B. Work under this project includes but is not limited to the following:

1. Demolition and removal of the lead-based paint materials including the following:

   a. All items to be demolished or modified in the existing pump room, including process pumps, piping, valves, pipe supports, base plates, structural steel and all other related items.

   b. All items to be demolished or modified in the pump stations exterior yard piping, supports, valves, and other ancillary and related items.

2. The Contractor will be responsible for the abatement and demolition of any lead-based paint materials and any other painted surfaces in the locations identified above to the extent needed to properly remove and dispose of the items.

3. The Contractor will be responsible for the abatement of any other lead-based paint that is disturbed as part of any demolition work or new work included in this project.

4. The Contractor will be responsible for the removal, storage, transportation, and disposal of all lead-based paint and hazardous materials generated by this work.

5. Some existing paint has been determined to contain lead. Available lead testing results are provided in Appendix B for the process piping in the existing pump room.

6. Coordination of all lead-based paint abatement work with the Owner and the Contractor.

1.2 CONTROL OF WORK

A. All work which does not conform to the requirements of this Section will be considered unacceptable.

B. Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner.

C. If the Owner or Engineer finds the materials furnished or the work performed has resulted in an unacceptable finished product the affected work or material shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

1.3 STIPULATIONS

A. For bidding and project execution purposes, it shall be assumed that all existing surfaces in the locations identified in paragraph 1.1.B.1 are coated with lead-based paint (LBP).

B. The procedures specified in this section are guidelines for minimum performance. The Contractor is responsible for his own methods of operations and conformance to regulatory codes, rules and guidelines. The Contractor is required to obtain all permits, licenses and approvals (if required) to perform the work, including any rights to use patented systems.

1.4 QUALITY ASSURANCE

A. Compliance with Standards and Regulations

1. The Contractor is solely responsible for compliance with all Federal, State, and Local laws and regulations and all Industry Standard practices associated with the abatement, demolition, storage, transport, and disposal of Hazardous Wastes, as well as all general conditions, special conditions, and all other sections within the contract document.

2. Contractor shall demonstrate to the satisfaction of the Owner or Engineer that the project was completed in accordance with this Section and any applicable EPA arid MDEQ standards and regulations.

B. Worker Requirements

1. The Contractor shall furnish proof that each employee has had previous instruction on the hazards of lead exposure, on use and fitting of respirators, on protective dress, on use of decontamination procedures, on entry and exit from work areas, and on all aspects of work procedures and protective measures and all other requirements.

2. Submit verification, signed by an occupational health physician, that each employee has been recently examined as required by OSHA regulations. Medical examination will be required prior to entering the work area.

3. Submit names and training certificates of the superintendent and foreman who will be performing work related to this project.

4. Provide verification that the Contractor has provided the following information to the examining physician:

a. A copy of OSHA Standard (29 CFR 1910.1025)

b. A description of the affected employee's duties as they relate to the employee's exposure.

c. The employee's current or anticipated exposure level.

d. A description of any personal protective and respiratory equipment to be used.

e. Prior lead determination and information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

1.5 PLACEMENT OF WARNING SIGNS

A. Post warning signs in and around the work area. Locate signs at such a distance that personnel may read the sign and take necessary protective steps required before entering the work area.

B. Inform other employers on-site of the nature of the Contractor's work and requirements pertaining to regulated areas in order to comply with OSHA regulation 29 CFR 1910.120. Such notification shall be coordinated with, and approved by the Owner.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 LEAD ABATEMENT

A. All demolition and abatement work to be coordinated with Owner so as not to disrupt daily Water Treatment Plant operating procedures.

B. The Contractor shall protect all process equipment from lead dust during abatement.

C. The Contractor shall be responsible for the removal, storage, transportation, and dispose of all lead based paint materials.

3.2 REMOVAL

A. Removal work shall not commence until:

1. Work has been coordinated with the Owner.

2. Arrangements have been made for disposal of waste at an acceptable site.

3. Work areas and parts of the building required to remain in use are effectively segregated.

4. Tools, equipment, and material waste receptors are on hand.

5. Arrangements have been made for building security.

6. All preparatory steps have been taken and applicable notices posted and permits obtained (if required).

3.3 DAMAGES

A. The Contractor shall protect adjacent areas from contamination.

3.4 DAILY CLEANUP

A. A thorough cleanup of the entire area under active abatement shall occur daily during the entire abatement process.

3.5 STORAGE OF LIQUID AND SOLID WASTE

A. The Contractor must make provisions for the safe storage of waste on-site prior to disposal. For safety reasons, waste storage areas must be treated as abatement areas and access restricted.

3.6 CONTROLLING OFFSITE DISPERSAL

A. Basic control measures to minimize the dispersal of lead dust and debris from the work area are:

1. Control and limit access to the abatement work areas.

2. Limit tracking of dust and debris.

3. Implement a program of ongoing cleanup.

3.7 CLEANUP AND CLEARANCE TESTING

A. The Contractor shall perform air, wipe, water, and/or Toxicity Characteristics Leaching Procedure (TCLP) sample collection during the abatement under the supervision of the Owner or the Engineer.

B. Final cleanup shall proceed as follows:

1. The entire abatement area shall be washed down with a Tri-Sodium Phosphate (TSP) solution. To avoid recontaminating the cleaned area, this solution should be changed according to the manufacturer's recommendations. The dirty water from this operation is considered hazardous and shall be disposed of in watertight containers as required by Paragraph 3.8 below.

C. After this phase of the final cleanup is complete, a visual inspection will be performed by the Owner or the Engineer to ensure that all visible dust and debris have been removed from the work surfaces and the work area. Any unsatisfactory results will cause the Contractor to re-clean the affected surfaces until the inspector is satisfied with the results.

D. Clearance testing may now take place by taking wipe samples of the abated area. The clearance criterion is 200 micrograms per square foot. Clearance testing is the responsibility of the Contractor.

E. Any areas which do not meet these criteria shall be re-cleaned and retested until the standards are met.

3.8 DISPOSAL OF LEAD WASTE

A. The lead paint chips, all wastewater from cleaning operations, all plastic used for containment, and all rags, cloths or sponges used for cleaning shall be disposed of as hazardous waste. These materials shall be removed in sealed, labeled containers at an authorized disposal site in accordance with all applicable hazardous waste regulations.

B. The waste materials shall be handled as potentially hazardous waste in accordance with applicable sections of the Natural Resources and Environmental Protection Act, 1994 PA 451. No separate payment for disposal shall be made and the cost of this work is to be included in the work. The Contractor shall furnish to the Owner a certificate of disposal of this material at an appropriate disposal facility, issued by the office of the receiving disposal facility.

C. A waste manifest shall be forwarded to the Owner after the disposal.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 DESCRIPTION

A. Concrete work shall include the furnishing of all labor, materials, formwork, reinforcing, tools and equipment required to manufacture, transport, place, protect, repair, cure, and finish all concrete work for a complete and functioning installation in accordance with the Contract Documents.

B. The CONTRACTOR shall be responsible for all items (openings, rebar, sleeves, inserts, anchorages, etc.) shown on the Plans and those which may not be shown on the Plans but are required to be placed in the concrete work.

C. Progress of Work

1. If unacceptable concrete strength or air content occurs and additional testing or remedial actions or modifications are required, further concrete work will not be permitted until such testing has revealed the probable cause of the low strength or low air levels and a program of remedial actions or modifications has been implemented.

1.2 DEFINITIONS

A. The following supplemental definitions cover the meanings of certain words and terms as used in this Section.

1. Reviewed or Permitted: Reviewed by the OWNER and/or OWNER's REPRESENTATIVE.

2. Exposed Construction: Exposed to view. Situated so that it can be seen from eye level from any location after completion of the structure.

3. Normal Weight Concrete: Concrete for which density is not a controlling attribute, made with aggregates of the types covered by "Specification for Concrete Aggregates" (ASTM C-33), and having unit weights in the range of 135 to 160 lb/cu ft.

B. Other words and terms used in these specifications are defined in Cement and Concrete Terminology (ACI-SP-19).

1.3 STANDARDS

A. The latest edition of the standards from the American Society for Testing and Materials, American Concrete Institute, American Welding Society, and Concrete Reinforcing Steel Institute, referred to in these Specifications, are listed below with their serial designation and are declared to be a part of these Specifications, the same as if fully set forth herein, except as modified in this Specification.

1. American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103:

A 82-85	Standard Specification for Cold-Drawn Steel Wire for Concrete Reinforcement
A 184-86	Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
A 185-85	Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement
A 496-85	Standard Specification for Deformed Steel Wire for Concrete Reinforcement
A 497-86	Standard Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement
A 615-87	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 31-87a	(1980) Standard Method of Making and Curing Concrete Test Specimens in the Field
C 33-86	Standard Specification for Concrete Aggregates
C 39-86	Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens
C 42-84a	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C 94-86b	Standard Specification for Ready-Mixed Concrete
C 109-86	Standard Method of Test for Compressive Strength of Hydraulic Cement Mortars (using 2-inch (50-mm) cube specimens)
C 138-81	Standard Method of Test for Unit Weight Yield, and Air Content (Gravimetric) of Concrete
C 143-78	Standard Method of Test for Slump of Portland Cement Concrete
C 144-87	Standard Specification for Aggregate for Masonry Mortar
C 150-86	Standard Specification for Portland Cement
C 172-82	Standard Method of Sampling Fresh Concrete
C 173-78	Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
C 192-81	Standard Method of Making and Curing Concrete Test Specimens in the Laboratory
C 231-82	Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method
C 260-86	Standard Specification for Air-Entraining Admixtures for Concrete

C 309-81 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

C 387-87 Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete

C 494-86 Standard Specification for Chemical Admixtures for Concrete

D 994-71 Standard Specification for Preformed expansion Joint Filler for Concrete (Bituminous Type)

D 1751-83 Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

E 329-77 Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

2. American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48219

SP-1 5 Field Reference Manual: Specifications for Structural Concrete for Buildings ACI 301-89 with Selected ACI and ASTM References, 1989.

ACI 116 Cement and Concrete Terminology.

ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

ACI 212.3 Chemical Admixtures in Concrete

ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete (Reapproved for 1989)

ACI 302.1 Guide for Concrete Floor and Slab Construction

ACI 303 Guide to Cast-In-Place Architectural Concrete Practice

ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete (Revised 1982)

ACI 302 Placing Concrete by Pumping Methods

ACI 305 Hot Weather Concreting

ACI 306 Cold Weather Concreting

ACI 308 Standard Practice for Curing Concrete

ACI 309 Recommended Practice for Consolidation of Concrete

ACI 31 5 Details and Detailing of Concrete Reinforcement (Revised 1986)

ACI 318 Building Code Requirements for Reinforced Concrete (Revised 1987)

ACI 318.1 Building Code Requirements for Structural Plain Concrete

ACI 347 Recommended Practice for Concrete Formwork

ACI 350 Concrete Sanitary Engineering Structures

ACI 503 Use of Epoxy Compounds with Concrete

3. American Welding Society, 550 N.W. LeJenne Road, P.O. Box 351040, Miami, FL 33135; "Structural Welding Code - Reinforcing Steel" (AWS D1.4-79).

4. Concrete Plant Manufacturers Bureau, 900 Spring Street, Silver Spring, MD 20910: "Concrete Plant Mixer Standards of the Plant Mixer Manufacturer's Division".

5. National Ready Mix Concrete Association, 900 Spring Street, Silver Spring, MD 20910:
"Check List for Certification of Ready Mixed Concrete Production Facilities".

6. Concrete Reinforcing Steel Institute, 228 North LaSalle Street, Chicago, Illinois 60601: "Placing Reinforcing Bars," and "Reinforcement Anchorages and Splices," latest editions.

B. Field Reference Manual

1. The CONTRACTOR shall keep at least one copy of "Specifications for Structural Concrete for Buildings (ACI 301) with Selected ACI and ASTM References "ACI Field Reference Manual SP-15, in the field office at all times.

1.4 SUBMITTAL REQUIREMENTS

A. Shop Drawings: Submit in accordance with the General Conditions, covering the items included under this Section.

1. Shop Drawings of Reinforcement: Submit original Shop Drawings for fabrication, bending, and placement of concrete reinforcement. Comply with Reinforcement Shop Drawing Checklist below as applicable:

a. Reinforcement Shop Drawing Checklist:

1) Specify ASTM number and grade of reinforcing on submitted Shop Drawings (e.g., ASTM A 615, Grade 60).

2) Specify clear coverages and bar support spacing per Placing Reinforcement Specification in Article 2.09.

3) Specify lap lengths as shown on the Structural Drawings.

4) Submit Bar Bending Schedule.

5) Use closed stirrups and ties with 135-degree hooks, unless noted otherwise in Drawings.

6) Specify major Contract reference Drawings on submitted detail sheets. Use same section cut numbers and letters when practical.

7) Show stirrup spacing.

8) Show details for additional reinforcing items. Examples are reinforcing around openings, control joints, equipment pads, masonry reinforcement.

9) Show numeric elevation references on sections shown on submitted Shop Drawings.

10) Locate expansion and control joints.

11) Organize and present sheets in logical sequence.

12) Submit "small" submittal packages when practical.

13) Show inside and outside or near face and far face on walls.

14) Show bar spacings and quantities on Shop Drawing submittals.

15) Immediately contact OWNER and/or OWNER's REPRESENTATIVE if Contract Documents are unclear.

16) For epoxy coated reinforcement, coating applicator must furnish written certification that the coated reinforcing bars were cleaned, coated, and tested according to ASTM D3963.99.

b. Mix Designs: Submit the following for all concrete classes:

1) Water/cement ratio (total gallons of water per cubic yard)

2) Brand, type, and quantity of cement

3) Type and quantity of aggregates

4) Type and quantity of admixtures

5) Unit weight (wet density)

6) History of composition strength based on 28-day compression test. Test reports shall be current and within 90 days of submittal. Concrete supplier must demonstrate a familiarity with his supplied mix.

7) Submit laboratory test reports and certification letters for concrete mix design, cement, aggregates (particularly deleterious materials in coarse aggregate), four weeks before scheduled pouring.

B. Product Data: Submit data for proprietary materials and items, including admixtures, patching compounds, waterstops, joint systems, curing compounds, and other materials installed under this Section.

C. Submit samples of materials as requested by OWNER and/or OWNER's REPRESENTATIVE, including names, sources and descriptions.

D. Quality Assurance Submittals:

1. Submit written reports to ENGINEER documenting testing and inspection results.

2. Submit mill test reports on reinforcement.

3. Submit materials certificates in lieu of laboratory test reports on other materials. Manufacturer and CONTRACTOR shall sign material certificates certifying that each material item complies with, or exceeds, specified requirements. Submit certification from admixture manufacturers that chloride content complies with specification requirements.

4. CONTRACTOR shall be experienced with the placement, finishing, and curing of the specified concrete mixes and admixtures, and provide a minimum of five (5) reference projects.

1.5 PROJECT CONDITIONS

A. Protection against Freezing: Cover completed Work with sufficient temporary cover to protect against possibility of freezing. Provide supplemental heat and maintain cover for curing period or until temperatures cannot affect concrete.

B. Protect adjacent finish materials against spatter during concrete placement.

1.6 MANUFACTURERS

A. Subject to compliance with the specified requirements, manufacturers which may be incorporated in Work include:

1. Fiber Reinforcement:

    a. "Fiberstrand 100", Euclid Chemical Co.

    b. "Fibermesh", Fibermesh Co.

    c. "Forta", Forta Corporation

    d. "Grace Fibers", W.R. Grace & Co.

    e. “Fibrasol F”, Axim Technologies

2. Air-Entraining Admixture:

    a. AEA 15, Sika Corp.

3. Corrosion Inhibitor and Bonding Agent:

    a. Armatech 110-EpoCem, Sika Corporation

4. Water-Reducing Admixture:

    a. "Plastocrete 161", Sika Chemical Corporation

5. High-Range Water-Reducing Admixture:

    a. ViscoCrete 2100, Sika Corporation

6. Water Reducing, Non-Chloride Accelerator Admixture:

    a. Sika Corporation

7. Water-Reducing, Retarding Admixture:

    a. Sika Corporation

8. Expansion and Isolation Joint Filler (excluding pavements):

    a. "Sealtight Sponge Rubber", W.R. Meadows

    b. "1300 Series Sponge Rubber", Williams Products

9. Expansion and Isolation Joint Sealant, one part polyurethane:

    a. "Vulkem 45 or 116", Mameco International

    b. "Sonolastic NP1", Sonneborn-Contech

    c. "Dynaseal W-517 or 907", Williams Products

10. Non-Shrink Grout:

    a. Dayton-Superior

    b. Euclid Chemical Co.

    c. Master Builders

    d. U.S. Grout Corporation

11. Chemical Hardener:

    a. "Burk-O-Lith", The Burke Co.

    b. "Day-Chem Hardener", Dayton-Superior

    c. "Surfhard", Euclid Chemical Co.

    d. "Mastertop CST", Master Builders

    e. "Lapidolith", Sonneborne-Rexnord

12. Moisture-Retaining Cover:

    a. Polyethylene-coated burlap.

13. Epoxy Anchors:

    a. “HIT HY150”, Hilti Systems

PART 2 - PRODUCTS

2.1 CEMENT

A. Cement shall be Portland cement Types I or III, and shall conform to ASTM C150 and contain less than 0.60 percent alkalies. Different cements shall not be used interchangeably in the same element or portion of the work.

2.2 ADMIXTURES

A. The following admixtures will be permitted or required in the concrete as stated.

1. Air-entraining admixture conforming to ASTM C260.

2. Water reducing, retarding and accelerating admixtures conforming to ASTM C494 will be permitted in concrete made with Type I Cement. Water reducing admixture conforming to ASTM C494 will be permitted in concrete made with Type III Cement.

3. Fly Ash

a. Fly ash shall be Type Class C or F, meeting the requirements of ASTM C618 and the carbon content shall be less than one percent.

B. Admixtures used in the concrete shall be of the same composition as used in establishing the required concrete proportions (See paragraph 2.07 of this Section of the Specifications).

C. Calcium chloride or admixtures containing calcium chloride will not be permitted in the concrete work.

D. The name, manufacturer, and technical information for all admixtures shall be submitted for approval.

E. All admixtures shall be used in accordance with the manufacturer's instructions.

F. Admixtures shall be supplied by a single manufacturer to ensure compatibility.

2.3 WATER

A. Mixing water for concrete shall be fresh, clean, and free from injurious amounts of oil, acid, alkalies, salts, sewage, organic matter, or other deleterious substances and meet the requirements of ASTM C94.

2.4 AGGREGATES

A. Aggregates shall conform to ASTM C33. Coarse aggregates shall meet the grading requirements for size 67 for all concrete work unless noted otherwise.

B. Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as the combination of sizes when two or more are used, shall conform to the appropriate grading requirements of the applicable ASTM specifications.

C. Aggregates shall be tested for reactivity. To minimize alkali-silica reactions, high alkali content shall not be permitted.

2.5 FIBER REINFORCEMENT

A. Polypropylene fibers designed as secondary reinforcing. Fibers to comply with ASTM C1116, Type III, not less than ¾-inch long.

2.6 STORAGE OF MATERIALS

A. Cement shall be stored in weather-tight buildings, bins, or silos which will exclude moisture and contaminants.

B. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates. To ensure that this condition is met, any test for determining conformance to requirements for cleanness and grading shall be performed on samples secured from the aggregates at the point of batching. Frozen or partially frozen aggregates shall not be used.

C. Natural or manufactured sand shall be allowed to drain until it has reached relatively uniform moisture content before it is used.

D. To prevent excessive variations in moisture content, predampened aggregates must remain in the stockpiles for a minimum of 12 hours before use.

E. Admixtures shall be stored in such a manner as to avoid contamination, evaporation, or damage. For those used in the form of suspensions or non-stable solutions, agitating equipment shall be provided to assure thorough distribution of the ingredients. Liquid admixtures shall be protected from freezing and from temperature changes which would adversely affect their characteristics.

F. Moisture retaining covers shall be one of the following, complying with ASTM C17:

1. Waterproof Paper
2. Polyethylene Film, Burleen

2.7 PROPORTIONING

A. General

1. Concrete for all parts of the work shall be of the specified quality capable of being placed without excessive segregation. When hardened, concrete shall develop all characteristics required by these Specifications.

2. Use Portland Cement Type I or III.

3. Fly ash shall be used to partially supplant cement content in concrete. Replacement quantity shall be not less than 15%, nor more than 20% of cement content by weight.

4. Concrete shall not have less than one inch slump as determined by ASTM C143.

5. The nominal maximum size of the aggregate shall not be more than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between reinforcing bars.

B. Design Mixes

1. Locations for concrete classes are attached at the end of this section.

2. Properties for concrete classes are attached at end of this section.

3. Adjustment of Concrete Mixes: Mix designs may be adjusted when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, when approved by ENGINEER, at no additional cost to OWNER. Submit laboratory test data for revised mix design and strength results to ENGINEER before using in work.

4. Admixtures:

a. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete for placement and workability.

b. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F (10 degrees C).

c. Add air-entraining admixture at manufacturer's prescribed rate to result in placed concrete having total air content specified.

d. Refer to the mix designs attached at the end of this section for other specific admixture usage.

2.8 FORMWORK

A. General

1. Forms shall be used to confine the concrete and shape it to the required dimensions. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall have sufficient rigidity to maintain specified tolerances.

2. Formwork shall conform to ACI 347.

3. Earth cuts may be used to form footings, trench footings, and mass footings provided that the cut is clean, reasonably straight, and meets the tolerances of this Section. Review by the ENGINEER is required in order to use earthcuts. If the earth cannot hold the shapes required by the Drawings these items shall be formed.

B. Design and Installation of Formwork

1. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the CONTRACTOR.

2. The formwork shall be designed for the loads, lateral pressure, and allowable stresses outlined in ACI 347, Design of "Recommended Practice for Concrete Formwork" as well as for the design considerations, wind loads, allowable stresses, and other applicable requirements of the controlling local building code.

3. Requirements for facing materials are given in following items of this Section of the Specifications. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.

4. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Chamfer strips (1" x 1" x 1-1/2") shall be placed in the corners of forms to produce beveled edges on permanently exposed surfaces unless detailed otherwise. Interior corners on such surfaces and the edges of formed joints will not require beveling. Exposed surfaces include surfaces exposed to view or water in the finished construction.

5. Positive means of adjustment (wedge or jacks) of shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Forms shall be securely braced against lateral deflections. Formwork shall be cambered to compensate for anticipated deflections in the formwork prior to hardening of the concrete.

6. Temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

7. Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be of a commercially manufactured type. Non-fabricated wire shall not be used.

8. Form ties shall be constructed so that the end or end fasteners can be removed without causing appreciable spalling at the faces of the concrete. Form ties shall have cones on each end.

   a. Non-Exposed Concrete Work: After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not

less than 2 diameters or twice the minimum dimension of the tie from the formed faces of concrete and in no case shall this distance be less than 3/4 inch.

b. Exposed Concrete Work (this shall apply to areas where one or both faces of the work is exposed to view; i.e., retaining wall): Form, ties, assemblies for concrete exposed to water, influent, effluent, weather, freeze/thaw and similar exposures shall permit tightening of the forms and shall leave no metal or other material within 1-1/2 inch of the surface. The assembly should provide cone-shaped depressions at the form/concrete surface interface of at least one inch diameter and 1-1/2 inch deep to permit filling and patching. Tie shall be tight fitting or tie holes shall be sealed to prevent leakage. Single rod ties shall be equipped with a tightly fitted washer at midpoint when part of the tie is to remain in concrete exposed to liquids.

c. Tie systems shall provide positive pressure at all joints to preclude mortar/grout leakage.

9. At construction joints, contact surface of the form sheathing for flush surfaces shall overlap the hardened concrete in the previous placement by not more than 1 inch. The forms shall be held against the hardened concrete to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.

10. Wood forms for wall openings shall be constructed to facilitate loosening, if necessary, to counteract swelling of the forms.

11. Wedges used for final adjustment of the forms prior to concrete placement shall be fastened in position after the final check.

12. Formwork shall be so anchored to shores or other supporting surfaces or members that upward or lateral movement of any part of the formwork system during concrete placement will be prevented.

13. Runways for moving equipment shall be provided with struts or legs and shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

14. Provide temporary openings at base of wall and column forms and other interior areas of formwork where it is inaccessible for cleanout, for observation before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

15. Provisions for other trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing these items. Accurately place and securely support items built into forms.

C. Tolerances

1. The formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in Table 2.08.C.1.

Table 2.08.C.1
Tolerances for Formed Surfaces

(1) Variation from plumb:

a. In the lines and surfaces of columns, piers, walls, and in arises:

in any l0 ft of length	¼ - inch
maximum for entire length	1 inch

b. For exposed corner columns, control joint grooves and other conspicuous lines:

in any 20'- 0" length	¼ - inch
maximum for the entire length	½ - inch

(2) Variation from the level or from the grades specified in the Contract Documents:

a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores

in any 10 ft of length	¼ - inch
in any bay or any 20 ft length	⅜ - inch
maximum for entire length	¾ - inch

b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:

in any bay or in 20 ft length	¼ - inch
maximum for entire length	½ - inch

(3) Variation of the linear building lines from established position in plan and related position of columns, walls, & partitions:

in any bay	½ - inch
in any 20 ft of length	½ - inch
maximum for entire length	1 inch

(4) Variation in the sizes and location of sleeves, floor openings, & wall openings

± ¼ - inch

(5) Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls

minus	¼ - inch
plus	½ - inch

(6) Footings

a. Variations in dimensions in plan:

minus	½ - inch
plus	2 inches

b. Misplacement of eccentricity:

2% of footing width in direction of misplacement but no more than 2 inches

c. Thickness:

decrease in specified thickness	0 inch
increase in specified thickness	1 inch

(7) Variation in steps:

a. In a flight of stairs:

Rise	± ⅛ - inch
Tread	± ⅛ - inch

b. In consecutive steps:

Rise	± 1/16 - inch
Tread	± ⅛ - inch

2. The CONTRACTOR shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project sufficient control points and benchmarks to be used for reference purposes to check tolerances.

3. Regardless of the tolerances listed in Table 208.C.1, no portion of the building shall extend beyond the legal boundary of the project.

D. Preparation of Form Surfaces

1. All surfaces of forms and embedded materials shall be cleaned of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed in them. Local defects such as chipped plywood or kinks in steel forms will not be permitted.

2. Unless otherwise specified or approved, surfaces of forms shall be treated as follows:

a. Before placing of either the reinforcing steel or the concrete, the surfaces of the forms shall be covered with an approved coating material that will effectively prevent absorption of moisture and prevent bond with the concrete, and will not stain the concrete surfaces. A field applied form release agent or sealer of approved type or a factory applied non-absorptive liner may be used.

b. Excess form coating material shall not be allowed to stand in puddles in the forms nor shall such coating be allowed to come in contact with reinforcing steel or with hardened concrete against which fresh concrete is to be placed.

3. The CONTRACTOR shall submit the name of the form coating agent material proposed to be used with sufficient supportive documentation to the ENGINEER for review.

E. Removal of Forms

1. Forms shall be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations after review by the ENGINEER.

2. Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by specified curves.

3. Wood forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.

4. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

5. Forms and shoring in the formwork used to support the weight of concrete in beams, slabs, arches and other structural members shall remain in place until the concrete has reached 28-day compressive strength.

6. When shores and other vertical supports are so arranged that the non-load-carrying form facing material may be removed without loosening or disturbing the shores and supports, the facing material may be removed at an earlier age as permitted by the ENGINEER.

F. Removal Strength

1. When removal of formwork is based on the concrete reaching a specified strength, the concrete shall be presumed to have reached this strength when the following conditions have been met:

   a. When the concrete has been cured in accordance with the provisions of Article 3.06 for the same length of time as the age at test of laboratory-cured cylinders which reached the specified strength for form removal. The length of time the concrete has been cured in the structure shall be determined by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50˚F and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.

2.9 REINFORCEMENT

A. General

1. Shop Drawings, showing all fabrication dimensions and locations for placing of the reinforcing steel and accessories shall be submitted for review in accordance with provisions in Article 1.04. Review shall be obtained before fabrication.

2. Details of concrete reinforcement and accessories not covered herein shall be in accordance with ACI 315.

B. Reinforcing Steel

1. All reinforcement shall be Grade 60 (fy = 60,000 psi) and shall conform to the appropriate Specification listed below, except as follows:

a. Yield strength shall be determined by testing of full size bars.

b. For bars, wire, or wire fabric with a specified yield strength fy exceeding 60,000 psi, fy shall be the stress corresponding to a strain of 0.35 percent.

2. Reinforcing bars shall conform to ASTM A615 Grade 60 and the supplementary requirement S1 shall apply.

3. All cutting, bending, fabrication, and erection of reinforcing steel shall conform to the "Manual for Concrete Structures". (ACI 315 latest edition).

4. All splicing of reinforcing steel shall conform to "Reinforcing Bar Splices" latest edition by the Concrete Reinforcing Steel Institute and the "Building Code Requirements for Reinforced Concrete" (ACI 318-99).

5. Mats: Bar and rod mats for concrete reinforcement shall be of the clipped type conforming to "Specification for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement" (ASTM A 184).

6. The use of plain bars is not permitted.

7. Supports for reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar supports complying with CRSI specifications.

8. For slabs-on-grade, use supports with sand plates or horizontal runners where base material does not support chair legs.

9. For exposed-to-view concrete surfaces, where support legs are in contact with forms, use supports with legs which are plastic protected (CRSI, Class I) or stainless steel-protected (CRSI, Class 2).

C. Welding

1. When required or permitted, all welding of reinforcing bars shall conform to AWS D14. Unless otherwise accepted, welding of cross bars (tack welding) for assembly of reinforcement is prohibited. Reinforcing to be welded must be certified as weldable.

2. Welding of wire to wire, and of wire or welded wire fabric to reinforcing bars or structural steels, shall conform to applicable provisions of AWS D14 and supplementary requirements specified by the Architect/ENGINEER.

D. Fabricating and Placing Tolerances

1. Bars shall be fabricated in accordance with the tolerances given in ACI 315.

2. Reinforcement shall be placed to the following tolerances:

	Tolerances, In.
Clear distance	
To formed soffits	- ¼
To other formed surfaces	¼
Minimum spacing between bars	- ¼
Clear distances from unformed surface to top reinforcement	
Members 8 in. deep or less	¼
Members more than 8 in. deep but less than 24 in. deep	- ¼, + ½
Members 24 in. deep or greater	- ¼, + 1
Uniform spacing of bars, but the required number of bars shall not be reduced	2
Uniform spacing of stirrups and ties, but the required number of stirrups and ties shall not be reduced	1
Longitudinal locations of bends and ends of reinforcement	
General	2
Discontinuous ends of members	½ - 1½
Length of bar laps	- 1½
Embedded length	
For bar sizes No. 3 through 11	- 1
For bar sizes No. 14 and 18	- 2

3. Bars may be moved as necessary to avoid interference with other reinforcing steel, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, additional reinforcing as directed by the ENGINEER may be required.

E. Placing

1. Minimum concrete cover for reinforcement, except for extremely corrosive atmosphere, other severe exposures, or fire protection, shall be as follows unless shown otherwise on the Drawings:

	Minimum cover, in.
Concrete deposited against the ground	3
Formed surfaces exposed to weather or in contact with the ground	
For bar sizes No. 6 or larger	2
For bar sizes No. 5 and smaller, and W31 or D31 wire and smaller	1½
Formed surfaces not exposed to weather or not in contact with the ground	
Beams, girders, and columns	1½
Slabs, walls, and joists	
For bar sizes No. 11 or smaller	¾
For bar sizes No. 14 and 18	1½

2. All reinforcement, at the time concrete is placed, shall be free of mud, oil or other materials that may adversely affect or reduce the bond. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided the dimensions and weights, including heights of deformations, of a cleaned sample are not less than required by the applicable ASTM specification.

3. All reinforcement shall be supported and fastened together to prevent displacement by construction loads or the placing of concrete beyond the tolerances of paragraph 2.08.D. On ground, where necessary, supporting concrete blocks may be used. Over formwork, metal, plastic or other approved bar chairs and spacers shall be used. All accessories within ½ inch of the formed concrete surface shall be plastic coated.

4. Vertical bars in columns shall be offset at least one bar diameter at lapped splices. To insure proper placement, templates shall be furnished for all column dowels.

5. All splices not shown in the Contract Documents shall be subject to review by the ENGINEER.

   Splicing shall be a minimum of 48 bar diameters (typ uno)

6. Reinforcement shall not be bent after being embedded in hardened concrete.

2.10 JOINTS AND EMBEDDED ITEMS

A. Construction Joints

1. Joints not shown in the Contract Documents shall receive prior review by the ENGINEER and shall be so made and located at least to impair the strength of the structure. In general, they shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.

2. All reinforcement shall be continued across joints. Keys and inclined dowels shall be provided as directed by the ENGINEER. Longitudinal keys at least 1-1/2 in. deep shall be provided in all joints in walls and between walls and slabs or footings.

3. The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed prior to placing adjoining concrete.

4. Bond shall be obtained by roughening the surface of concrete in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface.

5. Construction joints shall be located as shown on the Contract Documents. In general, slab and wall pours shall not exceed 1200 sq ft surface area in one concrete placement between construction joints, the longer edge shall not be greater than twice the shorter edge for any one concrete pour between construction joints, and pour sequences shall be scheduled and located so that shrinkage and creep effects are minimized.

B. Expansion Joints

1. Reinforcement or other embedded metal items bonded to the concrete (except dowels in floors bonded on only one side of joints) shall not be permitted to extend continuously through any expansion joint.

2. Premolded expansion and isolation joint filler shall be of the type required and located by the Contract Documents and shall conform to the following specifications.

a. "Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)" (ASTM D 994), at intersections of walls and pavements unless otherwise shown.

b. "Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)" (ASTM D 1751), at pavements where pavement to pavement is jointed.

c. "Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction" (ASTM D1752 Type 1) at all expansion and isolation joints in structural concrete.

3. Expansion and Isolation Joint Sealant, one part polyurethane: Concrete gray color unless otherwise required by ENGINEER. Before applying, wipe surface clean with solvent supplied by manufacturer.

C. Other Embedded Items

1. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

D. Placing Embedded Items

1. Expansion joint material and other embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

2. Set and build into Work anchorage devices and other embedded items required for other work that are attached to, or supported by, cast-in-place concrete. Use setting Drawings, diagrams, instructions and directions provided by suppliers of attachment items.

3. Conduits and pipes of aluminum shall not be embedded in structural concrete unless they are effectively coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.

PART 3 - EXECUTION

3.1 PRODUCTION OF CONCRETE

A. Ready-Mixed Concrete

1. Except as otherwise provided in this Section, ready-mixed concrete shall be batched, mixed and transported in accordance with "Specification for Ready-Mixed Concrete" (ASTM C 94) and ACI 304. Plant equipment and facilities shall conform to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

2. Concrete produced by on-site volumetric batching and continuous mixing shall be batched and mixed in accordance with and shall conform to all requirements of ASTM C685.

B. Control of Admixtures

1. Air-entraining admixtures, and other chemical admixtures shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer.

2. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.

3. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first.

C. Tempering and Control of Mixing Water

1. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retempered, but shall be discarded.

2. The addition of water at the construction site will not be permitted.

D. Weather Conditions

1. Cold Weather - Ambient Temperature 45°F or below

a. In cold weather, the temperature of the concrete when delivered at the site of the work shall conform to the following temperature limitations:

Minimum Temperature (°F)	Minimum Concrete Temperature (°F)
30 to 45	60
15 to 30	65
below 15	no concreting permitted

b. If water or aggregate is heated above 100°F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 100°F.

c. When the temperature of the surrounding air is expected to be below 40°F during placing or within 24 hours thereafter, special precautions for concrete, placing, and protection shall be followed as required by "Recommended Practice for Cold Weather Concreting" ACI 306 and modifications herein, see Article 3.06.

d. The CONTRACTOR shall provide all labor, equipment, and materials to meet the above cold weather requirements.

2. Hot Weather Ambient Temperature 90°F or Above

a. The ingredients shall be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for

all or part of the mixing water if, due to high temperature, low slump, flash set or cold joints are encountered.

b. Concreting under hot weather conditions shall conform to "Recommended Practice for Hot Weather Concreting" ACI 305 and modifications herein. See Article 3.06. The use of an approved set retarder will be permitted under hot weather conditions.

3.2 PLACING

A. Preparation Before Placing

1. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.

2. Formwork shall have been completed; snow, ice and water shall have been removed; reinforcement shall have been secured in place; expansion joint material, anchors, and other embedded items shall have been positioned.

3. Semi-porous subgrades shall be sprinkled sufficiently to eliminate suction and porous subgrades shall be sealed in an approved manner. See paragraph 3.05.B.4.

4. Concrete shall not be placed on frozen ground.

B. Conveying

1. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

2. Conveying equipment shall be approved and shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or workday. Conveying equipment and operations shall conform to the following additional requirements:

a. Truck mixers, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of "Specification for Ready-Mixed Concrete" (ASTM C 94).

b. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An approved arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

c. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may not be used.

d. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity and shall conform to ACI committee report 304. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or

pneumatic conveying equipment shall not exceed 1-1/2 inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy.

C. Depositing

1. General: Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as shown in the Contract Documents or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained. Communication between the batching plant and the point of delivery shall be such that concrete placement can proceed without interruption and without trucks waiting more than 15 minutes to make delivery.

2. Placing: Placing of concrete in supported elements shall not be started until the concrete previously placed in columns and walls is no longer plastic and has been in place at least two hours. Wall and column placement and consolidation shall be in approximately horizontal layers not exceeding 2 feet in height. Concrete shall not be allowed to drop freely more than 4 ft or through a reinforcing steel cage. Sections of walls between joints shall be placed continuously to produce a monolithic unit. At least 48 hours shall elapse between casting of adjoining wall units.

3. Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation. Horizontal flow shall not exceed five feet. Where concrete placing operations involve dropping concrete freely more than 4 feet vertically, spouts or pipes shall be used. Such pipes or spouts shall be of suitable diameter for the large aggregate being used, shall be kept within 3 feet of the concrete, and shall have suitable hoppers on their upper ends. Temporary openings or portholes in wall or column forms may be used to limit concrete free-fall to less than 4 ft. The ports should be spaced no more than 6 to 8 ft apart to limit horizontal concrete flow.

4. Placement Time: Concrete shall be placed no more than 90 minutes after the cement is first introduced into the drum. The batch will be rejected and removed from the site if this limit is exceeded.

5. Consolidation: All concrete shall be consolidated by vibration, spading, rodding or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall have a minimum frequency of 8000 vibrations per min., and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 18 inches apart. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse

aggregate back from the formed surface. Consolidation shall conform to "Recommended Practice for Consolidation of Concrete" (ACI 309).

D. Protection

1. Adhere to the requirements of:

b. ACI 305 Hot Weather Concreting

c. ACI 306 cold Weather Concreting

2. Unless adequate protection is provided concrete shall not be placed during rain, sleet, or snow.

3. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.

4. Placing Temperature: When the temperature of the surrounding air is expected to be below 40°F during placing or within 24 hours thereafter, the temperature of the plastic concrete, as placed, shall be no lower than 55°F. The temperature of the concrete as placed shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints and shall not exceed 90°F.

E. Bonding

1. When specified, the surface of joints shall be prepared in accordance with one of the methods specified in paragraph 2.10.

2. The hardened concrete of wall construction joints and of construction joints between floor slabs shall be dampened (but not saturated) immediately prior to placing of fresh concrete.

3. The hardened concrete of joints in exposed work; joints in the middle of beams, girders, and joists; and horizontal joints in work designed to contain liquids shall be dampened (but not saturated) and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least one inch (1") thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial set.

3.3 REPAIR OF SURFACE DEFECTS

A. General

1. Surface defects, including tie holes, shall be repaired immediately after form removal.

B. Repair of Defective Areas

1. All honeycombed and other defective concrete shall be chipped down to sound concrete. The edges shall be perpendicular to the surface or slightly undercut. No feather edges will be permitted. The area to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately 1 part cement to 1 part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surface.

2. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted, and the mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing. Use of latex bonding agent is required.

3. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least 1 hour before being finally finished. The patched area shall be kept damp for 7 days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

C. Tie Holes

1. After being cleaned and thoroughly dampened, the tie holes shall be filled solid with a non-metallic non-shrink patching mortar. The layout of tie holes and exterior finish of the tie holes on surfaces permanently exposed to view on the outside shall be submitted to the ENGINEER for review.

D. Proprietary compounds for adhesion or as patching ingredients may be used in lieu of or in addition to the foregoing patching procedures providing that prior review is done by the ENGINEER. The ENGINEER may require such compounds in certain patching locations.

3.4 FINISHING OF FORMED SURFACES

A. Finish on all surfaces shall be as cast finish as follows:

1. Smooth Form Finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. It may be plywood, tempered concrete-form-grade hardboard, metal, plastic, paper, or other approved material capable of producing the desired finish. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used. Tie holes and defects shall be patched. All fins, projections, and seams shall be completely removed.

B. Related Unformed Surfaces

1. Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3.5 SLABS

A. General

1. Concrete work for slab construction shall conform to "Recommended Practice for Concrete Floor and Slab Construction (ACI-302).

B. Preparation of Subgrade for Slabs on Ground

1. The subgrade shall be well drained and of adequate and uniform load bearing nature. The in-place density of the subgrade soils shall be at least the minimum required in the Specifications.

2. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a structure where concrete is to be placed is below freezing it shall be raised and maintained above 50°F long enough to remove all frost from the subgrade.

3. The subgrade shall be moist at the time of concreting. If necessary, it shall be dampened with water in advance of concreting, but there shall be no free water standing on the subgrade nor any muddy or soft spots when the concrete is placed.

4. Floor slabs on granular fill shall be placed over a 6-mil polyethylene vapor barrier. Lap all joints of vapor barrier 12 inches minimum.

5. Soil Testing

a. The CONTRACTOR shall obtain and pay for, the services of a soils testing firm (acceptable to the ENGINEER) for the following:

1) Certify that materials proposed by CONTRACTOR meet specifications Certification test reports will be submitted by the CONTRACTOR.

2) Conduct compaction testing of engineered fill below footings and slabs and backfilling for utility trenches. The testing frequency shall be one test per lift per 400 square feet of fill.

3) Copies of test reports shall be furnished to the OWNER and distributed to parties designated by the OWNER, including the ENGINEER.

4) Any area falling compaction test shall be compacted and re-tested at the CONTRACTOR's expense.

C. Edge Forms and Screeds

1. Edge forms and intermediate screed strips shall be set accurately to produce the designated elevations and contours of the finished surface and shall be sufficiently strong to support vibration. The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates.

2. When formwork is cambered, screeds shall be set to a like camber to maintain the proper concrete thicknesses.

3. Screeds shall be removed before initial concrete set and depressions immediately filled to form a smooth monolithic surface.

D. Placement

1. Mixing and placing shall be carefully coordinated with finishing. Concrete shall not be placed on the subgrade or forms more rapidly than it can be spread, straightedged, and darbied or bullfloated. These operations must be performed before bleeding water has an opportunity to collect on the surface.

2. To obtain good surfaces and avoid cold joints, the size of finishing crews shall be planned with due regard for the effects of concrete temperature and atmospheric conditions on the rate of hardening of the concrete. If construction joints become necessary, they shall be constructed as required in subparagraph 2.10.A of this Section.

E. Jointing

1. Joints in slabs on grade shall be located and detailed as indicated in the Contract Documents. If saw-cut joints are required or permitted, cutting shall be timed properly with the set of the concrete: cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses become sufficient to produce cracking.

F. Consolidation

1. Concrete in slabs shall be thoroughly consolidated. Internal vibration shall be used in beams and girders of framed slabs and along the bulkheads of slabs on grade. Consolidation of slabs shall be obtained with internal vibrators.

G. Finishes (See paragraph 3.05.H for Finishing Tolerance)

1. All concrete flatwork such as slabs on grade inside and outside of the building and supported slabs shall at first receive a "floated finish". After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked by the CONTRACTOR with a 10-ft. straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to produce a surface within Class B tolerance throughout. The slab shall then be refloated immediately to a uniform sandy texture. Additional finishing shall be required. See G.2 or G.3.

2. Outside sidewalk, ramp slabs, loading dock and walkway top slabs shall receive a broom or belt finish. Immediately after concrete has received the "float finish" as specified in 3.05.G.1 above, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.

3. A "troweled finish" shall be used for all concrete flatwork which does not receive a broom finish or which does not receive a grout finish. The surface shall first be float-finished as specified in item 3.05.G.1 above. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects, but which may still show some trowel marks. Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of

trowel marks, uniform in texture and appearance and shall be plane to a Class A tolerance, except tolerance for concrete on metal deck shall be Class B. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.

H. Finishing Tolerances

1. Finishes with Class A tolerances shall be true planes within 1/8 inch in 10 ft as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

2. Finishes with Class B tolerances shall be true planes within 1/4-inch on 10 ft as determined by a 10-foot straightedge placed anywhere on the slab in any direction.

3. Finishes with Class C tolerances shall be true planes within 1/4 inch in 2 ft as determined by a 2-ft straightedge placed anywhere on the slab in any direction.

3.6 CURING AND PROTECTION

A. General

1. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be in accordance with ACI 308 and subject to review by the ENGINEER.

B. Preservation of Moisture

1. For concrete surfaces not in contact with forms, ponding or continuous sprinkling shall be applied immediately after completion of placement and finishing and be continued for a minimum of three (3) days. After the initial 3-day period, one of the following procedures shall be applied:

   a. Ponding or continuous sprinkling;

   b. Application of absorptive mats or fabric kept continuously wet;

   c. Continuous application of mist spray;

   e. Application of other moisture-retaining covering as approved.

   f. The use of curing compounds shall not be permitted.

2. Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal, the concrete shall be cured until the end of the time prescribed in 3.06.B.3 below by one of the methods of 3.06.B.1 above.

3. Curing in accordance with 3.06.B.1 and 2 above shall be continued for at least 14 days in the case of all concrete.

C. Temperature, Wind, and Humidity

1. Adhere to the requirements of:

   a. ACI 305 Hot Weather Concreting

b. ACI 306 Cold Weather Concreting

2. Cold Weather: When the mean daily outdoor temperature is less than 40˚F, the temperature of the concrete shall be maintained between 50˚F and 70˚F for 14 days. Arrangements for heating, covering, insulating, and housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases.

3. Hot Weather: When necessary, provision for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

4. Rate of Temperature Change: Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 5°F in any one hour or 50°F in any 24-hour period.

D. Protection from Mechanical Injury

1. During the curing period, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Structures shall not be loaded in such a way as to overstress the concrete.

3.7 TESTING

A. General

1. Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the ENGINEER for final review.

B. Testing Agencies

1. All testing agencies shall meet the requirements of "Inspection and Testing Agencies for Concrete and Steel as Used in Construction," (ASTM E329).

C. Testing Services

The following testing services shall be performed by the designated agency:

1. Review and test the CONTRACTOR's proposed materials for compliance with the Specifications.

2. Review and test the CONTRACTOR's proposed mix design as required by the ENGINEER.

3. Secure production samples of materials at plants or stockpiles during the course of the work and test for compliance with the Specifications.

4. Conduct strength tests of the concrete during construction in accordance with the following procedures:

   a. Secure composite samples in accordance with "Method of Sampling Fresh Concrete" (ASTM C 172). Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.

   b. Mold and cure four specimens from each sample in accordance with "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C 31). Any deviations from the requirements of this standard shall be recorded in the test report.

   c. Test specimens in accordance with "Method of Test for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C 39). Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The fourth cylinder shall be held as a spare specimen to be tested as directed by the ENGINEER. The acceptance "strength test" result shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the "strength test" result. Should both specimens in a test show any of the above defects, the entire test shall be discarded. When high early strength concrete is used, the specimens shall be tested with two specimens at 14 days and one specimen at 3 days. The acceptance will be based on the 14-day test.

   d. Make at least one "strength test" (mold four cylinders) for each 50 cubic yards, or fraction thereof, of each mix design of concrete placed in any 1 day.

5. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, using "Method of Test for Slump of Portland Cement Concrete: (ASTM C 143).

6. Determine air content of normal weight concrete sample for each strength test in accordance with the "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C 231), "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C 173) or "Method of Test for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete" (ASTM C 138).

7. Determine temperature of concrete sample for each strength test.

D. Additional Services When Required

The following services shall be performed by the designated agency when required by the ENGINEER:

1. Inspect concrete batching, mixing and delivery operations to the extent deemed necessary by the ENGINEER.

2. Sample concrete at point of placement and perform required tests.

3. Other testing or inspection services as required by the ENGINEER.

E. Other Services as Needed

The following services shall be performed by the designated agency when necessary and costs of said services shall be borne by the CONTRACTOR:

1. Additional testing and inspection required because of changes in materials or proportions requested by the CONTRACTOR.

2. Additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements. (See Article 3.08)

3. Testing to determine strength for early form removal. (See paragraph 2.08.E and F.)

F. Duties and Authorities of Designated Testing Agency

1. Representatives of the agency shall inspect, sample and test the materials and the production of concrete as specified herein. When it appears that any material furnished or work performed by the CONTRACTOR fails to fulfill specification requirements, the testing agency shall report such deficiency to the ENGINEER and the CONTRACTOR promptly.

2. The agency shall report all test and inspection results to the ENGINEER and CONTRACTOR immediately after they are performed. All test reports shall include the exact location in the work at which the batch represented by a test was deposited. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.

3. The testing agency or its representatives are not authorized to modify any requirement of the Contract Documents, nor to approve, accept, disapprove or reject any portion of the work.

G. Responsibilities and Duties of CONTRACTOR

1. The use of testing services shall in no way relieve the CONTRACTOR of the responsibility to furnish materials and construction in full compliance with the Contract Documents.

2. The CONTRACTOR shall submit to the ENGINEER the concrete materials and the concrete mix designs proposed for use with a written request for review. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. No concrete shall be placed in the work until the CONTRACTOR has received such approval in writing.

3. To facilitate testing and inspection, the CONTRACTOR shall provide and maintain for the use of the testing agency and ENGINEER adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hours as required by "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C 31). The CONTRACTOR shall provide labor, tools, and equipment to assist in the sampling and testing of concrete on the job. The CONTRACTOR shall advise the designated testing agency sufficiently in advance of operations to allow for completion of quality tests and assignment of personnel.

3.8 EVALUATION AND ACCEPTANCE OF CONCRETE

A. Evaluation of Test Results

1. Test results for standard molded and standard cured test cylinders shall be evaluated separately for each specified concrete mix design. Such evaluation shall be valid only if tests have been conducted in accordance with procedures specified in Article 3.07.

B. Acceptance of Concrete

1. The following conditions must be met:

a. The strength level of the concrete will be considered satisfactory and acceptable so long as the average of all sets of three consecutive "strength test" results equals or exceeds the specified 28-day strength f'c and no individual "strength test" result falls below the specified 28-day strength f'c by more than 500 psi. The strength level of the concrete shall be measured at 14 days for high-early strength concrete. High-early strength concrete shall achieve the specified 28-day f'c at the age of 14 days.

b. The requirements described by paragraphs 3.09 Acceptance of Structure, A, B, C and D.

C. Testing of Concrete in Place

1. This Work shall be at the CONTRACTOR's expense.

2. Testing by impact hammer, sonoscope, or other non-destructive device may be permitted or required by the ENGINEER to determine relative strengths at various locations in the structure as an aid in evaluating concrete strength in place and for selecting areas to be cored, if the strength level of the concrete is not satisfactory. Such tests shall not be used as a basis for acceptance or rejection.

3. Core Tests: Required when paragraph 3.08.B specifications are not met.

a. Cores at least 2 inches in diameter shall be obtained and tested in accordance with "Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C 42). Cores shall be taken as soon as practicable after determining that the concrete strength level is unsatisfactory in accordance with paragraph 3.08.B. If the concrete in the structure will be dry under service conditions, other cores shall be air dried (temperature 60° to 80°F, relative humidity less than 60 percent) for 7 days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C 42.

b. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location and number of cores shall be determined by the ENGINEER so as least to impair the strength of the structure and best represent the condition of the potentially deficient concrete. If, before testing, one or more of the cores shows evidence of having been damaged subsequent to or during removal from the structure, they shall be replaced.

c. Concrete in the area represented by the core test will be considered adequate and acceptable if the average strength of the cores is equal to at least 85 percent of, and if no single core is less than 75 percent of, the specified 28-day strength f'c. If the above strengths are not met, the CONTRACTOR shall remove the deficient concrete.

d. Core holes shall be filled by the CONTRACTOR with low slump concrete or mortar. See Article 3.03, Repair of Surface Defects.

3.9 ACCEPTANCE OF STRUCTURE

A. General

1. Completed concrete work which meets all applicable specification requirements will be accepted without qualification.

2. Completed concrete work which fails to meet one or more of the specified requirements but which has been repaired to bring it into compliance will be accepted without qualifications.

3. If any concrete does not meet the specified strength levels in paragraph 03.08.B, Acceptance of Concrete, the ENGINEER will require additional material and other tests to determine the probable cause of the low strength levels. This may result in remedial actions or modifications being required in the methods or materials being employed. Such actions or modifications shall be at the CONTRACTOR's expense.

4. Completed concrete work which fails to meet the requirements of paragraph 03.08.C.2.c. will be rejected and the CONTRACTOR will be required to remove and replace the defective concrete. In this event, modifications will be required to assure that remaining work complies with the requirements.

B. Dimensional Tolerances

1. Formed surfaces resulting in concrete outlines smaller than permitted by the tolerances of paragraph 2.08.C shall be considered potentially deficient in strength and subject to the provisions of paragraph 3.09.D.

2. Formed surfaces resulting in concrete outlines larger than permitted by the tolerances of paragraph 2.08.C may be rejected and the excess material shall be subject to removal. If removal of the excess material is required, it shall be accomplished in such a manner as to maintain the strength of the section and to meet all other applicable requirements of function and appearance.

3. Concrete members cast in the wrong location will be rejected.

4. Inaccurately formed concrete surfaces exceeding the limits of paragraph 02.08.C may be rejected and shall be repaired or removed and replaced as required by the ENGINEER.

5. Finished slabs exceeding the tolerances of paragraphs 03.05.H may be required to be repaired provided that strength or appearance is not adversely affected. High spots may be removed with a terrazzo grinder, low spots filled with a patching compound, or other remedial measures performed as reviewed by the ENGINEER.

C. Appearance

1. All concrete with defects which adversely affect the appearance or function of the specified finish may be repaired only by approved methods.

D. Strength of Structure

1. The strength of the structure in place will be considered deficient if it fails to comply with any requirements, which control the strength of the structure, including but not necessarily limited to the following conditions:

   a. Low concrete strength as designated in Article 03.08.

   b. Reinforcing steel size, quantity, strength, position, or arrangement at variance with the requirements of Article 02.09, Reinforcement, or the Contract Documents.

   c. Concrete which differs from the required dimensions or location in such a manner as to reduce the strength.

   d. Curing less than that specified.

   e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

   f. Mechanical injury as defined in paragraph 03.06.D, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

2. Additional testing will be required when the strength of the structure is considered potentially deficient. Cost of this testing will be borne by the CONTRACTOR.

3. Core tests in accordance with paragraph 03.08.C.2 will be required when ENGINEER determines that the strength of the concrete in place is considered potentially deficient. Cost of coring and testing will be borne by the CONTRACTOR.

4. Concrete work judged inadequate by failure to meet the requirements of paragraphs 03.08B and 03.08.C.2 shall be removed and replaced at the CONTRACTOR's expense.

5. The CONTRACTOR shall pay all costs incurred in providing the additional testing and/or analysis required by these Specifications, or the Contract Documents.

6. The OWNER will pay all costs of additional testing and/or analyses which are made at its request and which are not required by these Specifications, or the Contract Documents.

3.10 CLEANING UP

A. At the completion of the concrete work to the satisfaction of and review by the ENGINEER, all extraneous concrete debris, materials and equipment shall be removed from the job site and the concrete shall be left clean and in first class condition.

MIX DESIGN SCHEDULE

Concrete Class	A
Locations	Interior Slabs & Housekeeping Pads
28-day Compressive Strength (psi)	4,000
Cement Content (per CYD of concrete)	594 (6 sack equivalent)
Coarse Aggregate	6AA (¾")
Water/Cement Ratio by Weight (maximum)	0.43
Air Content (% by volume)	2% ±
Slump at point of placement (inches)	4" – 6" (will vary based on location)
Fiber Reinforcement	Yes
Fly Ash (% of cement content; maximum)	15 – 20%
Silica Fume	No

Concrete Class	B
Locations	Foundation
28-day Compressive Strength (psi)	4,000
Cement Content (per CYD of concrete)	594 (6 sack)
Coarse Aggregate	6AA (¾")
Water/Cement Ratio by Weight (maximum)	0.43
Air Content (% by volume)	6.0 +/- 1.0
Slump at point of placement (inches)	4" – 6" (will vary based on location)
Fiber Reinforcement	No
Fly Ash (% of cement content; maximum)	15 – 20%
Silica Fume	No

Concrete Class	C
Locations	Sidewalk, Pavements and Exterior Slabs
28-day Compressive Strength (psi)	4,000
Cement Content (per CYD of concrete)	594 (6 sack equivalent)
Coarse Aggregate	½ "
Water/Cement Ratio by Weight (maximum)	0.43
Air Content (% by volume)	6.0 +/- 1.0
Slump at point of placement (inches)	4" – 6" (will vary based on location)
Fiber Reinforcement	Yes
Fly Ash (% of cement content; maximum)	15 – 20%
Silica Fume	No

Concrete Class	D
Locations	Thrust Blocks
28-day Compressive Strength (psi)	3,000
Cement Content (per CYD of concrete)	470 (5 sack equivalent)
Coarse Aggregate	6AA (¾")
Water/Cement Ratio by Weight (maximum)	0.43
Air Content (% by volume)	6.0 +/- 1.0
Slump at point of placement (inches)	4" – 6" (will vary based on location)
Fiber Reinforcement	No
Fly Ash (% of cement content; maximum)	15 – 20%
Silica Fume	No

END OF SECTION

SECTION 03 60 00

GROUTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install grout.

B. Grout all materials and equipment as noted in the plans and specifications and pursuant to all manufacturer recommendations for installation.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

1.3 REFERENCES

A. ACI 211.1, Practice for Selecting Proportions for Normal, Heavy-Weight and Mass Concrete.

B. ACI 301, Specification for Structural Concrete (Includes ASTM Standards referred to herein).

C. ASTM C33, Specification for Concrete Aggregates.

D. ASTM C109, Test Method for Compressive Strength of Hydraulic Cement Mortars (using 2-in. or 50 mm. Cube Specimens).

E. ASTM C230, Specification for Flow Table for use in Tests of Hydraulic Cement.

F. ASTM C531, Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacing.

G. ASTM C579, Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.

H. ASTM C827, Test Method for Early Volume Change of Cementitious Mixtures.

I. ASTM C882, Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete.

J. ASTM C937, Specification for Grout Fluidifier for Preplaced-Aggregate Concrete.

K. ASTM C939, Text Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).

L. ASTM C1107, Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

M. ASTM C1181, Test Method for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.

1.4 PERFORMANCE REQUIREMENTS

A. Application: The following is a listing of typical applications and the corresponding type of grout which is to be used. Unless otherwise indicated, grouts shall be provided as listed below whether called for on the Drawings or not.

Beam and column (1 or 2 story) base plates and precast concrete bearing less than 16 inches in the least dimension.	Non-Shrink Grout
Column base plates and precast concrete bearing (greater than 2 story or larger than 16 inches in the least dimension).	Non-Shrink Grout
Base plates for storage tanks and other non-motorized equipment and machinery less than 50 horsepower.	Epoxy Grout
Machinery over 50 horsepower and equipment under 50 horsepower but subject to severe shock loads and high vibration.	Epoxy Base Plate Grout
Filling blackout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink Grout
Toppings and concrete fill greater than 4-inches thick.	Concrete in accordance with Section 03 30 00, Cast-In-Place Concrete.
Applications not listed above, where grout is called for on the Drawings.	Non-Shrink Grout, unless noted otherwise.

1.4 SUBMITTALS

A. Submit the following in accordance with Section 01330 for approval:

1. Submit copies of manufacturer's certification of compliance with the specified properties for Class I, II, and III grouts.

2. Submit certified testing lab reports for ASTM C 1107, Grade B and Grade C (as revised herein) requirements for Class I and II grouts tested at a fluid consistency for temperatures of 45, 73.4, 90°F with a pot life of 30 minutes at fluid consistency.

3. Submit certification that materials conform to the Specifications requirements for nonproprietary materials.

4. Submit certifications that all grouts used on the project are free of chlorides or other chemicals causing corrosion.

5. Manufacturer's specifications and installation instructions for all proprietary materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Grout materials from manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.

B. Store grout materials in a dry shelter and protect from moisture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement Grout

1. Cement grout shall be composed of Portland Cement and sand in the proportion specified in the Contract Documents and the minimum amount of water necessary to obtain the desired consistency. If no proportion is indicated, cement grout shall consist of one (1) part Portland Cement to three (3) parts sand. Water amount shall be as required to achieve desired consistency without compromising strength requirements. White Portland cement shall be mixed with the Portland Cement as required to match color of adjacent concrete.

2. The minimum compressive strength at 28 days shall be 4000 psi.

3. For beds thicker than 1-1/2 inch and/or where free passage of grout will not be obstructed by coarse aggregate, 1-1/2 parts of coarse aggregate having a top size of 3/8 inch should be added. This stipulation does not apply for grout being swept in by a mechanism. These applications shall use a plain cement grout without coarse aggregate regardless of bed thickness.

4. Sand shall conform to the requirements of ASTM C144.

B. Non-Shrink Grout

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall have a min. 28-day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "Sikagrout 212" by Sika Corporation, Conspec 100 Non-Shrink Non-Metallic Grout by Conspec.

C. Epoxy Grout

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452" by Euclid Chemical.

2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

D. Epoxy Base Plate Grout

1. Epoxy base plate grout shall be Sikadur 42, Grout-Pak by Sika Corporation.

2.2 MIXES

A. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the Project for grout required. Comply with ACI 211.1 and report to ENGINEER the following data:

1. Complete identification of aggregate source of supply.

2. Tests of aggregates for compliance with specified requirements.

3. Scale weight of each aggregate.

4. Absorbed water in each aggregate.

5. Brand, type and composition of cement.

6. Brand, type and amount of each admixture.

7. Amounts of water used in trial mixes.

8. Proportions of each material per cubic yard.

9. Gross weight and yield per cubic yard of trial mixtures.

10. Measured slump.

11. Measured air content.

12. Compressive strength developed at seven days and 28 days, from not less than three test specimens cast for each seven-day and 28-day test, and for each design mix.

B. Submit written reports to ENGINEER of proposed mix of grout at least 30 days prior to start of the Work. Do not begin grout production until mixes have been approved by ENGINEER.

C. Laboratory Trial Batches: When laboratory trial batches are used to select grout proportions, prepare test specimens and conduct strength tests as specified in ACI 301, Section 4 -Proportioning. However, mixes need not be designed for greater than 125 percent of specified strength, regardless of standard deviation of production facility.

D. Field Experience Method: When field experience methods are used to select grout proportions, establish proportions as specified in ACI 301, Section 4.

E. Admixtures: Use air-entraining admixture in all grout. Use amounts of admixtures as recommended by grout manufacturer for climate conditions prevailing at time of placing. Adjust quantities and types of admixtures as required to maintain quality. Do not use admixtures that have not been incorporated and tested in accepted design mix unless otherwise authorized in writing by ENGINEER.

2.2 CURING MATERIALS

A. Curing materials shall conform to Section 03 30 00, Cast-in-Place Concrete, and as recommended by manufacturer of prepackaged grouts.

2.3 CONSISTENCY

A. Consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that grout is plastic and moldable, but will not flow. Where “dry pack” is required per the Contract Documents, it shall mean a grout of that consistency; type of grout to be used shall be as specified in this Section for the application.

B. Slump for topping grout and grout fill shall be adjusted to match placement and finishing conditions, but shall not exceed four inches.

C. Slump for construction joint grout shall be seven inches (plus or minus 1 inch).

PART 3 - EXECUTION

3.1 EXAMINATION

A. CONTRACTOR shall examine substrate and conditions under which grout is to be placed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 INSTALLATION

A. Place grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Contract Documents, request clarification from ENGINEER and do not proceed until ENGINEER provides clarification.

B. Placing grout shall conform to temperature and weather limitations in Section 03 30 00, Cast-In-Place Concrete.

C. Cure grout per manufacturer’s instructions for prepackaged grout and the requirements of Section 03 30 00, Cast-In-Place Concrete, for grout fill and topping grout.

D. Columns, Beams and Equipment Bases:

1. Epoxy Grout: After shimming equipment to proper grade, securely tighten anchorages. Properly form around base plates, allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with epoxy grout.

2. Non-shrink Grout: After shimming columns, beams and equipment to proper grade, securely tighten anchorages. Properly form around base plates allowing sufficient room around edges for placing grout. Provide adequate depth between bottom of base plate and top of concrete base to assure that void is completely filled with non-shrink grout.

E. Handrails and Railings:

1. After posts have been properly inserted into holes or sleeves, fill annular space between posts and sleeve with non-shrink grout. Bevel grout at juncture with post so that moisture flows away from post.

3.3 FIELD QUALITY CONTROL

A. Compression test specimens shall be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the ENGINEER to ensure continued compliance with these Specifications.

B. Compression tests and fabrication of specimens for non-shrink grout will be performed as specified in ASTM C109 at intervals during construction as selected by the ENGINEER. A set of three specimens will be made for testing at seven days, 28 days, and each additional time period as appropriate.

C. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C579, Method B, at intervals during construction as selected by the ENGINEER. A set of three specimens will be made for testing at seven days, and each earlier time period as appropriate.

D. The cost of all laboratory tests on grout will be borne by the CONTRACTOR. CONTRACTOR shall pay for the cost of any additional tests and investigation on Work performed which does not conform to the requirements of the Specifications. CONTRACTOR shall supply all materials necessary for fabricating the test specimens.

END OF SECTION

SECTION 05 01 00

METAL MATERIALS

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Metal materials not otherwise specified shall conform to the requirements of this Section.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Materials for fasteners are included in Section 05 05 00, Metal Fastening.

B. Requirements for specific products made from the materials specified herein are included in other sections of the Specifications. See the section for the specific item in question.

1.3 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A.	ASTM A36	Standard Specification for Structural Steel
B.	ASTM A47	Standard Specification for Malleable Iron Castings
C.	ASTM A48	Standard Specification for Gray Iron Castings
D.	ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
E.	ASTM A167	Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
F.	ASTM A276	Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes
G.	ASTM A307	Standard Specification for Carbon Steel Externally Threaded Standard Fasteners
H.	ASTM A446	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) quality
I.	ASTM A500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
J.	ASTM A501	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
K.	ASTM A529	Standard Specification for Structural Steel with 42 000 psi (290 Mpa) Minimum Yield Point (1/2 in. (12.7 mm) Maximum Thickness)
L.	ASTM A536	Standard Specification for Ductile Iron Castings
M.	ASTM A570	Standard Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality
N.	ASTM A992	Standard Specification for Structural Steel Shapes

O. ASTM A666 Standard Specification for Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications

P. ASTM B26 Standard Specification for Aluminum-Alloy Sand Castings

Q. ASTM B85 Standard Specification for Aluminum-Alloy Die Castings

R. ASTM B108 Standard Specification for Aluminum-Alloy Permanent Mold Castings

S. ASTM B138 Standard Specification for Manganese Bronze Rod, Bar, and Shapes

T. ASTM B209 Standard Specification for Aluminum-Alloy Sheet and Plate

U. ASTM B221 Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

V. ASTM B308 Standard Specification for Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded

W. ASTM B574 Standard Specification for Nickel-Molybdenum-Chromium Alloy Rod

X. ASTM F468 Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

Y. ASTM F593 Standard Specification for Stainless Steel Fasteners

1.4 SUBMITTALS

A. Material certifications shall be submitted along with any shop drawings for metal products and fabrications required by other sections of the Specifications.

1.5 QUALITY ASSURANCE

A. Owner may engage the services of a testing agency to test any metal materials for conformance with the material requirements herein. If the material is found to be in conformance with Specifications the cost of testing will be borne by the Owner. If the material does not conform to the Specifications, the cost of testing shall be paid by the Contractor and all materials not in conformance as determined by the Engineer shall be replaced by the Contractor at no additional cost to the Owner. In lieu of replacing materials, the Contractor may request further testing to determine conformance, but any such testing shall be paid for by the Contractor regardless of outcome of such testing.

PART 2 – PRODUCTS

2.1 CARBON AND LOW ALLOY STEEL

A. Material types and ASTM designations shall be as listed below:

1.	Structural Fabrications	A992
2.	Sheet Steel	A 570 Grade C
3.	Steel Angles and Plates	A36
4.	Bars and Rods	A 36 or A307 Grade A
5.	Pipe - Structural Use	A53 Type E or S, Grade B
6.	Tubes	A500 Grade B or A501

2.2 STAINLESS STEEL

A. All stainless-steel fabrications exposed to underwater service shall be Type 316. All other stainless steel fabrications shall be Type 304, unless noted otherwise.

B. Material types and ASTM designations are listed below:

1.	Plates and Sheets	ASTM A167 or A666 Grade A
2.	Structural Shapes	ASTM A276
3.	Fasteners (Bolts, etc.)	ASTM F593

2.3 ALUMINUM

A. All aluminum shall be alloy 6061-T6, unless otherwise noted or specified herein.

B. Material types and ASTM designations are listed below:

1.	Structural Shapes	ASTM B308
2.	Castings	ASTM B26, B85, or B108
3.	Extruded Bars	ASTM B221 - Alloy 6061
4.	Extruded Rods, Shapes and Tubes	ASTM B221 - Alloy 6063
5.	Plates	ASTM B209 - Alloy 6061
6.	Sheets	ASTM B221 - Alloy 3003

C. All aluminum shall be provided with mill finish unless otherwise noted.

D. Where bolted connections are indicated, aluminum shall be fastened with stainless steel bolts.

E. Aluminum in contact with dissimilar materials and all concrete surfaces shall be insulated with an approved dielectric.

2.4 CAST IRON

A. Material types and ASTM designations are listed below:

1.	Gray	ASTM A48 Class 30B
2.	Malleable	ASTM A47
3.	Ductile	ASTM A536 Grade 60-40-18

2.5 BRONZE

A. Material types and ASTM designations are listed below:

1.	Rods, Bars and Sheets	ASTM B138 - Alloy B Soft

2.6 HASTELLOY

A. All Hastelloy shall be Alloy C-276.

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 05 03 05

GALVANIZING

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Where galvanizing is called for in the Contract Documents, the galvanizing shall be performed in accordance with the provisions of this Section unless otherwise noted.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Further requirements for galvanizing specific items may be included in other Sections of the Specifications. See section for the specific item in question.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Michigan Building Code

2. ASTM A123 - Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4. ASTM A386 - Standard Specification for Zinc Coating (Hot-Dip) on Assembled Steel Products

5. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

6. ASTM A780 - Standard Practice of Repair of Damaged Hot-Dip Galvanized Coatings

1.4 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Submittal Procedures.

1. Certification that the item(s) are galvanized in accordance with the applicable ASTM standards specified herein. This certification may be included as part of any material certification that may be required by other Sections of the Specifications.

PART 2 – PRODUCTS

2.1 GALVANIC COATING

A. Material composition of the galvanic coating shall be in accordance with the applicable ASTM standards specified herein.

PART 3 – EXECUTION

3.1 FABRICATED PRODUCTS

A. Products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips, 1/8 inch thick and heavier which are to be galvanized shall be galvanized in accordance with ASTM A123. Products shall be fabricated into the largest unit which is practicable to galvanize before the galvanizing is done. Fabrication shall include all operations necessary to complete the unit such as shearing, cutting, punching, forming, drilling, milling, bending, and welding. Components of bolted or riveted assemblies shall be galvanized separately before assembly. When it is necessary to straighten any sections after galvanizing, such work shall be performed without damage to the zinc coating. The galvanizer shall be a member of American Galvanizers Association.

B. Components with partial surface finishes shall be commercial blast cleaned prior to pickling.

C. Sampling and testing of each lot shall be performed prior to shipment from the galvanizer's facility per ASTM A123.

3.2 HARDWARE

A. Iron and steel hardware which is to be galvanized shall be galvanized in accordance with ASTM A153.

3.3 ASSEMBLED PRODUCTS

A. Assembled steel products which are to be galvanized shall be galvanized in accordance with ASTM A123 or ASTM A386. All edges of tightly contacting surfaces shall be completely sealed by welding before galvanizing.

3.4 SHEETS

A. Iron or steel sheets which are to be galvanized shall be galvanized in accordance with ASTM A924.

3.5 REPAIR OF GALVANIZING

A. Galvanized surfaces that are abraded or damaged at any time after the application of zinc coating shall be repaired by thoroughly wire brushing the damaged areas and removing all loose and cracked coating, after which the cleaned areas shall be painted with 2 coats of zinc rich paint meeting the requirements of Federal Specification DOD-P-21035A and shall be thoroughly mixed prior to application. Zinc rich paint shall not be tinted. The total thickness of the 2 coats shall not be less than 6 mils. In lieu of repairing by painting with zinc rich paint, other methods of repairing galvanized surfaces in accordance with ASTM A780 may be used provided the proposed method is acceptable to the Engineer.

END OF SECTION

SECTION 05 05 00

METAL FASTENING

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. Furnish all materials, labor, and equipment required to provide all metal welds and fasteners not otherwise specified, in accordance with the Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 05 01 00 - Metal Materials

B. Section 05 03 05 - Galvanizing

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1.	Michigan Building Code	
2.	AISC	Specification for Structural Joints Using ASTM A325 or A490 Bolts.
3.	AISC	Code of Standard Practice
4.	AWS D1.1	Structural Welding Code - Steel
5.	AWS D1.2	Structural Welding Code - Aluminum
6.	AWS D1.6	Structural Welding Code – Stainless Steel
7.	Aluminum Association	Specifications for Aluminum Structures
8.	ASTM A572/A572M-94C	Standard Specification for High Strength Low-Alloy Columbium-Vanadium Structural Steel Grade 50
9.	ASTM A307	Standard Specification for Carbon Steel Externally Threaded Standard Fasteners
10.	ASTM A325	Standard Specification for High-Strength Bolts for Structural Steel Joints
11.	ASTM A489	Standard Specification for Eyebolts
12.	ASTM A490	Standard Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints

13.	ASTM A563	Standard Specifications for Carbon and Alloy Steel Nuts
14.	ASTM F593	Standard Specification for Stainless Steel Bolts; Hex Cap Screws, and Studs
15.	ASTM F594	Standard Specification for Stainless Steel Nuts
16.	ASTM D1785	Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe
17.	ASTM F467	Standard Specification for Nonferrous Nuts for General Use

1.4 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Submittal Procedures.

1. Shop Drawings providing the fastener's manufacturer and type and certification of the fastener's material and capacity.

2. Copy of valid certification for each person who is to perform field welding.

3. Certified weld inspection reports, when required.

4. Welding procedures.

1.5 QUALITY ASSURANCE

A. Fasteners not manufactured in the United States shall be tested and certification provided with respect to specified quality and strength standards. Certifications of origin shall be submitted for all U.S. fasteners supplied on the project.

B. All steel welding shall be performed by welders certified in accordance with AWS D1.1. All aluminum welding shall be performed by welders certified in accordance with AWS D1.2. All stainless-steel welding shall be performed by welders certified in accordance with AWS D1.6. Certifications of field welders shall be submitted prior to performing any field welds.

C. Welds and high strength bolts used in connections of structural steel will be visually inspected in accordance with Article 3.04.

D. The Owner may engage an independent testing agency to perform testing of welded connections and to prepare test reports in accordance with AWS. Inadequate welds shall be corrected or redone and retested to the satisfaction of the Engineer, Owner, and/or an acceptable independent testing laboratory, at no additional cost to the Owner.

E. Provide a welding procedure for each type and thickness of weld. For welds that are not prequalified, include a Performance Qualification Report. The welding procedure shall be given to each welder performing the weld. The welding procedure shall follow the format in Annex E of AWS D1.1 with relevant information presented.

PART 2 – PRODUCTS

2.1 ANCHOR BOLTS

A. Anchor bolts shall conform to ASTM A36 or ASTM A307 Grade A except where stainless steel or other approved anchor bolts are shown on the Drawings. Anchor bolts shall have hexagonal heads and shall be supplied with hexagonal nuts meeting the requirements of ASTM A563 Grade A.

B. Where pipe sleeves around anchor bolts are shown on the Drawings, pipe sleeves shall be cut from Schedule 40 PVC plastic piping meeting the requirements of ASTM D1785.

2.2 HIGH STRENGTH BOLTS

A. High strength bolts and associated nuts and washers shall be in accordance with ASTM A325 or ASTM A490. Bolts, nuts and washers shall meet the requirements of AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

B. Where high strength bolts are used to connect galvanized steel or are otherwise specified to be galvanized, bolts, nuts, and washers shall be hot dip galvanized in accordance with ASTM A325.

2.3 STAINLESS STEEL BOLTS

A. Stainless steel bolts shall conform to ASTM F-593. All underwater fasteners, fasteners in confined areas containing fluid, and fasteners in corrosive environments shall be Type 316 stainless steel unless noted otherwise. Fasteners for aluminum and stainless-steel members not subject to the above conditions shall be Type 304 stainless steel unless otherwise noted.

B. Stainless steel bolts shall have hexagonal heads with a raised letter or symbol on the bolts indicating the manufacturer, and shall be supplied with hexagonal nuts meeting the requirements of ASTM F594. Nuts shall be of the same alloy as the bolts.

2.4 CONCRETE ANCHORS

A. All concrete anchors shall be adhesive anchors.

1. Adhesive anchors shall be two-part injection type.

B. Adhesive anchors shall consist of stainless steel threaded rods or bolts anchored with an adhesive system into hardened concrete or grout-filled masonry. The adhesive system shall use a two-component adhesive mix and shall be injected with a static mixing nozzle following manufacturer's instructions. Thoroughly clean drill holes of all debris and drill dust with wire brush prior to installation of adhesive and threaded rod/bolt. Wipe rod free from oil that may be present from shipping or handling. The embedment depth of the rod/bolt shall provide a minimum allowable bond strength that is equal to the allowable tensile capacity of the rod/bolt (see Table 1) unless noted otherwise on the Drawings. The adhesive system shall be “Epcon System A7, C6, or G5” as manufactured by ITW Ramset/Redhead, "HIT HY-150 or RE-500 Injection Adhesive Anchor System" as manufactured by Hilti, Inc.

C. Concrete anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater concrete anchors shall be Type 316 stainless steel.

TABLE 1
ALLOWABLE TENSILE CAPACITY (KIPS)

Size	A36 Threaded Rod/Bolt	SST Threaded Rod/Bolt
3/8"	2.1	1.9
1/2"	3.8	3.5
5/8"	5.9	5.6
3/4"	8.4	8.2
7/8"	11.5	11.4
1"	15.0	15.0

2.5 MASONRY ANCHORS

A. Anchors for fastening to solid or grout-filled masonry shall be stainless steel adhesive anchors as specified above for concrete anchors.

B. Anchors for fastening to hollow masonry or brick shall be adhesive anchors consisting of threaded rods or bolts anchored with an adhesive system dispensed into a screen tube inserted into the masonry. The adhesive system shall use a two-component adhesive mix and shall inject into the screen tube with a static mixing nozzle. Thoroughly clean drill holes of all debris and drill dust with nylon (not wire) brush prior to installation of adhesive and anchor. Contractor shall follow manufacturer's installation instructions. The adhesive system shall be "Epcon System A7, C6, or G5" as manufactured by ITW Ramset/Redhead, "HIT HY-20 System" as manufactured by Hilti, Inc., or "SET/ET Epoxy-Tie" or "AT Acrylic-Tie" as manufactured by Simpson Strong-Tie Co.

C. Masonry anchors used to anchor aluminum, FRP, or stainless steel shall be Type 304 stainless steel unless noted otherwise. All underwater anchors shall be Type 316 stainless steel.

2.6 WELDS

A. Electrodes for welding structural steel and all ferrous steel shall comply with AWS Code, using E70 series electrodes for shielded metal arc welding (SMAW), or F7 series electrodes for submerged arc welding (SAW).

B. Electrodes for welding aluminum shall comply with the Aluminum Association Specifications and AWS D1.2.

C. Electrodes for welding stainless steel and other metals shall comply with AWS D1.6.

2.7 WELDED STUD CONNECTORS

A. Welded stud connectors shall conform to the requirements of AWS D1.1 Type C.

2.8 EYEBOLTS

A. Eyebolts shall conform to ASTM A489 unless noted otherwise.

2.9 HASTELLOY FASTENERS

A. Hastelloy fasteners and nuts shall be constructed of Hastelloy C-276.

2.10 ANTISEIZE LUBRICANT

A. Antiseize lubricant shall be Graphite 50 Anti-Seize by Loctite Corporation, 1000 Anti-Seize Paste by Dow Corning, 3M Lube and Anti-Seize by 3M, or equal as approved by Engineer and Owner.

PART 3 – EXECUTION

3.1 MEASUREMENTS

A. The Contractor shall verify all dimensions and review the Drawings and shall report any discrepancies to the Engineer for clarification prior to starting fabrication.

3.2 BOLT INSTALLATION

A. Anchor Bolts, Concrete Anchors, and Masonry Anchors

1. Anchor bolts shall be installed in accordance with AISC "Code of Standard Practice" by setting in concrete while it is being placed and positioned by means of a rigidly held template.

2. The Contractor shall verify that all concrete and masonry anchors have been installed in accordance with the manufacturer's recommendations and that the capacity of the installed anchor meets or exceeds the specified safe holding capacity.

3. Concrete anchors shall not be used in place of anchor bolts without Engineer's approval.

4. All stainless-steel threads shall be coated with antiseize lubricant.

B. High Strength Bolts

1. All bolted connections for structural steel shall use high strength bolts. High strength bolts shall be installed in accordance with AISC "Specification for Structural Joints, using A325 or A490 Bolts." All bolted joints shall be Type N, snug-tight, bearing connections in accordance with AISC Specifications unless noted otherwise on the Drawings.

C. Other Bolts

1. All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal.

2. All stainless-steel bolts shall be coated with antiseize lubricant.

3.3 WELDING

A. All welding shall comply with AWS Code for procedures, appearance, quality of welds, qualifications of welders and methods used in correcting welded work.

B. Welded stud connectors shall be installed in accordance with AWS D1.1.

3.4 INSPECTION

A. High strength bolting will be visually inspected in accordance with AISC "Specification for Structural Joints Using A325 or A490 Bolts." Rejected bolts shall be either replaced or retightened as required.

B. Field welds will be visually inspected in accordance with AWS Codes. Inadequate welds shall be corrected or redone as required in accordance with AWS Codes.

END OF SECTION

SECTION 06 60 00

FIBERGLASS REINFORCED PLASTIC GRATING AND STRUCTURAL FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section includes:

1. FRP Grating

1.2 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals as required to properly install all of the FRP Products specified herein.

1.3 QUALITY ASSURANCE

A. All FRP Products and Fabrications shall be supplied by an experienced firm who has continually engaged in the manufacture and/or fabrication or fiberglass reinforced plastic. Any firm not listed in this specification must clearly document a minimum of five years' experience with similar projects with equal scope or design.

B. The Installing Contractor shall; assure that all field dimensions are taken accurately and communicated properly to the FRP Fabricator, that other trades will not affect a proper installation of the FRP, and that all manufacturer's instruction and recommendations are followed.

C. No substitution of materials will be accepted unless they are submitted for review and the Engineer approves their use.

1.4 DESIGN REQUIREMENTS

A. OSHA – 29 CFR as it pertains to worker safety and walking-working surfaces for stairs, ladders, handrail, and platforms.

B. FRP Grating shall designed to support 250 lbs., per square foot uniform load or loads as shown on the drawings. Deflection shall not exceed .25 inch.

C. FRP Structural Shapes shall be designed into structures that will support all applicable loads. Deflection shall not exceed L/D of 180.

1.5 SUBMITTALS

A. Submit complete shop drawings and engineering data for all FRP materials and fabrications as required by this scope of work.

B. Product data:

1. Manufacturers catalog data with load charts for all FRP Gratings.

2. Manufacturers catalog data for all FRP Structural Shapes.

C. Shop drawings:

1. Shop drawings shall show all FRP materials as required and include all dimensions, connections, fasteners, tolerances, assembly and installation details as required.

2. Provide Computations and Drawings stamped by a Licensed Professional Engineer in the State of Michigan.

PART 2 – PRODUCTS

2.1 GENERAL

A. All FRP materials shall be manufactured with Vinylester resins.

B. All pultruded grating and structural shapes shall be constructed of strand roving, transverse mat, and a synthetic surface veil. Including ultraviolet (UV) light inhibitors.

C. All pultruded grating and structural shapes shall be flame retardant per ASTM E-84 Class 1 Flame Spread of less than 25.

D. After fabrication of FRP, all cuts, holes, and abrasion shall be sealed to prevent corrosion.

2.2 FRP GRATING

A. FRP grating to be Vinylester pultruded and shall meet ASTM E-84 Class 1 Flame Spread of less than 25 and ASTM D-635 self-extinguishing.

B. Grating shall be GatorDeck as shown on contract drawings.

C. Color shall be Gray.

D. Grating and Stair Treads shall be made from pultruded bearing bars and cross rods.

E. Grating shall be assembled using a locking cross-rod design that makes a permanent connection between the cross-rod and bearing bar, and shall completely bonded into a one-piece panel.

F. Stair Treads shall have a square tube nosing.

G. Grating shall have a slip resistant epoxy grit surface.

H. Grating clips shall be 316 stainless steel. Minimum of 4 clips per piece.

I. Manufacturers

Seasafe Inc. Gator Deck, Lafayette LA, (800) 326-8842 or approved equal

PART 3 – EXECUTION

3.1 INSPECTION

A. Upon receipt of material at job site, the Contractor shall inspect all materials for shipping damage.

3.2 HANDLING AND STORAGE

A. Handle all FRP materials with reasonable care to prevent damage. Use shipping pallets to move material. Do not drag FRP material.

B. If FRP materials are not to be installed immediately, then store to prevent twisting, bending, breaking, or damage of any kind. Keep material covered to prevent unnecessary exposure to UV.

3.3 INSTALLATION

A. Installing Contractor to coordinate and verify that other construction trades and materials have been installed per the contract drawings, and, that they are accurate in location, alignment, elevation, and are plumb and level.

B. Install FRP materials in accordance with the installation drawings supplied by the FRP Supplier.

C. Install materials accurately in location and elevation, level, and plumb. Field fabricate as necessary for accurate fit.

D. All field cuts, holes or abrasions must be sealed with sealing resin to prevent corrosion.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. It is the intent of this Section that all painting necessary to result in a complete, finished appearing facility be accomplished. As part of the work of this Section, prepare surfaces that are to be painted and furnish and apply paint materials. Paint schedules follow the text of this Section and define the surface preparation and coating systems required to paint the various types of surfaces that are to be painted. The Paint Application Table below identifies the areas to receive the paint systems specified in the paint schedules. For items or areas not listed in the Paint Application Table, consult the Engineer for the proper system to be used. Exclusion from the Paint Application table does not necessarily indicate that an item or area does not require painting.

B. Acceptable manufacturers shall be Tnemec and Carboline.

1. The paint schedules that follow this specification have been developed for Tnemec products. If Carboline products are to be used, submit schedules describing Carboline's equal products and colors for review and approval.

C. Barton Pump Station – Paint Application Table

Schedule C1: Interior Concrete

Paint all interior concrete building walls, ceilings and beams that are exposed to view within the lower level pump room.

Choice of color required. Number of colors: One per room.

Schedule M1: Interior Metal

Paint the following interior metal items: all process piping in the lower level pump room including existing and new piping and valves.

Colors per Standard Piping Color Schedule. Valve handwheels shall be painted a differing color.

D. In addition to the painting indicated in the above Paint Application Table, paint all aluminum surfaces that will be in contact with concrete or dissimilar metals using two coats of the prime coat specified for Exterior Metal. Coordinate painting with the fabrication of components and with the work of other trades so as to ensure the full and correct application of paint materials.

E. In addition to the painting indicated in the above Paint Application Table, apply touch-up paint to finish defects and field cuts, welds, and penetrations of galvanized metal. Prepare and pretreat surfaces in accordance with Schedule M3 above and finish paint according to the appropriate paint schedule.

F. Prime and finish painting, regardless of the location in which the work is performed, shall conform to all requirements of this Section. Coordinate painting with the fabrication of components and with the work of other trades so as to ensure the full and correct application of paint materials.

1.2 DEFINITIONS

A. For the purposes of this Section, the following definitions apply: "Exposed to View" means all surfaces in the final work that could be seen from any vantage point from any height. "Paint" means all pretreatment, prime, intermediate and final coatings specified herein including clear, translucent and opaque materials.

1.3 QUALITY ASSURANCE

A. Applicator's Quality Assurance: Submit list of a minimum of 3 completed projects of similar size and complexity to this Work completed within the last 5 years. Projects shall demonstrate experience working on comparable structures. Include for each project:

1. Project name and location.

2. Name of project Owner, include a contact name and phone number.

3. Name of General Contractor is different than Contractor holding this contract.

4. Name of Engineer, include a contact name and phone number.

5. Name of coating manufacturer.

6. Approximate area of coatings applied.

7. Date of completion.

B. Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. In the acceptance or rejection of installed painting, no allowance will be made for lack of skill on the part of painters.

C. Apply paints following the recommendations in the "Applications Manual for Paint and Protective Coatings" published by McGraw-Hill.

1.4 FIELD QUALITY CONTROL

A. Inspector's Services: The Contractor shall hire Dixon Engineering or Nelson Tank (third party satisfactory to the Owner), at no additional expense to the Owner, to perform field inspections of items 1-4 below and prepare the field inspection reports described in item 5 below:

1. Verify coatings and other materials are as specified.

2. Verify surface preparation and applications are as specified.

3. Verify proper environmental conditions (i.e. humidity, dew point, ambient temperature, surface temperature, etc.)

4. Verify DFT of each coat and total DFT of each coating systems are as specified using wet film and dry film gauges.

5. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.

6. Report:

a. Submit written reports describing inspections made and actions taken to correct nonconforming work.

b. Report nonconforming work no corrected.

c. Submit copies of report to Owner and Contractor.

1.5 SUBMITTALS

A. Provide submittals in accordance with Division 1 of the Specifications. Prior to ordering and delivering paint materials to the project site, submit the following:

1. Manufacturer literature demonstrating compliance with these Specifications and indicating paint formulation, rate of coverage, recommended uses and recommended application method.

2. Color chips for the full range of colors available in each product.

B. The paint products indicated in these Specifications establish the required standard of paint quality. Requests for substitution will not be considered.

1.6 PRODUCT HANDLING

A. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use. Store only the approved materials at the job site. Store them in a suitable and designated area restricted to the storage of paint materials and related equipment. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste. Store volatile solvents, rags and cleaning materials in a well-ventilated area.

B. Use all means necessary to protect paint materials before, during, and after application and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

1.7 EXTRA STOCK

A. Upon completion of the work of this Section, deliver to the Owner an extra stock of paint equaling approximately 2% of each color and gloss used in each coating material with all such extra stock tightly sealed in clearly labeled containers that have not been previously opened.

1.8 GUARANTEE

A. Furnish a 1-year warranty from the date of substantial completion on workmanship. Manufacturer to provide an unlimited warranty on the materials.

2.0 PRODUCTS

2.1 PAINT MATERIALS

A. Provide paint materials in accordance with the paint schedules that follow the text of this Section.

B. All paint materials for each paint system shall be the products of a single manufacturer. All paint materials and equipment shall be compatible in use: finish coats shall be compatible with prime coats, prime coats shall be compatible with the surface to be coated, and all tools and equipment shall be compatible with the coating to be applied. Thinners, when used, shall be only those thinners specifically recommended for that purpose by the manufacturer of the material to be thinned.

C. Furnish finish paint in the colors selected by the Owner from the manufacturer's standard available colors (a minimum of 12 colors must be available for each finish paint requiring color choice). Specially mixed colors may be required to achieve OSHA approved safety colors and to provide the piping and plumbing line colors to meet the Owner's color scheme. The City of Ann Arbor Color Coding of Piping schedule is appended to this specification for reference.

3.0 EXECUTION

3.1 SURFACE CONDITIONS

A. Prior to beginning the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this application may properly commence. Verify that paint finishes may be applied in strict accordance with all pertinent codes and regulations and the requirements of these Specifications. In the event of discrepancy, immediately notify the Engineer. Do not proceed with application in areas of discrepancy until all such discrepancies have been fully resolved. Application of paint materials shall be deemed to indicate acceptability of the existing surface conditions.

3.2 SURFACE PREPARATION

A. General

1. Prior to beginning surface preparation and painting operations, completely mask, remove, or otherwise adequately protect all hardware, accessories, machined surfaces, plates, equipment identification tags/nameplates, lighting fixtures, and all work of other trades that are not to receive the paint coating. Before applying paint, thoroughly clean and prepare all surfaces according to the specified surface preparation method. Schedule all cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

2. Contractor shall provide 100% containment for sandblasting media to prevent the media from damaging existing equipment in the pump station. Contractor shall replace all equipment damaged from sandblasting at no additional cost to the Owner.

3. Spot prime all necessary areas prior to beginning field painting.

B. Preparation of Concrete and Masonry Surfaces

1. The surface finishing of concrete is specified in Division 3.00 of these Specifications. Do not begin paint application until these requirements have been met and concrete has cured for at least 28 days.

2. Prior to painting, grind or scrape off all surface defects such as fins, protrusions, bulges, and mortar spatter. On concrete surfaces, remove non-degraded release agents, oil, wax and grease by scraping off heavy deposits and washing with hot trisodium phosphate solution (2 pounds trisodium phosphate per gallon 160°F water). After cleaning flush with warm water to remove residual cleaning solution.

3. Where the paint schedule calls for brush-off blast cleaning, dry sandblast concrete using silica sand passing a 16-mesh screen. Sandblast until the surface has been lightly abraded without entirely removing the surface or exposing underlying aggregate. After sandblasting, remove dust, sand and loose particles by vacuuming or blowing off with high pressure air.

C. Preparation of Metal Surfaces

1. Prepare metal surfaces for painting by following the method indicated on the appropriate paint schedule. Preparation methods are referenced to the Steel Structures Painting Council (SSPC) Specifications. Do not prepare metal for painting when the relative humidity is higher than 85% or the metal is less than 5°F above the dew point. After surface preparation, thoroughly clean all surfaces of any remaining dirt, oil and grease and leave it ready to receive prime paint.

D. Preparation of Plastic Surfaces

1. Clean plastic surfaces of all dirt, oil and foreign substances using a mild solvent cleaner.

3.3 PAINT APPLICATION

A. Apply paint in accordance with paint schedule requirements, the cited reference, all codes and regulations, and the recommendations of the paint manufacturer. Apply prime paint to metal surfaces within 24 hours after surface preparation. Do not apply paint in areas where dust is being generated.

B. Do not apply paint when the surrounding air temperature as measured in the shade is below 40°F or when the temperature of the surface to be painted is below 35°F. Do not apply paint when it is expected that the relative humidity will exceed 85% or that the air temperature will drop below 40°F within 18 hours after the application of paint. Dew or moisture condensation should be anticipated and if such conditions are prevalent, delay painting until certain that the surfaces can be kept above the dew point. Follow all additional environmental limitation requirements of the paint manufacturer.

C. Paint material mil thicknesses and numbers of coats that are indicated in the paint schedules are based on brush or roller application. Spray application of paint materials will be allowed in the field only for areas or surfaces that are very difficult to paint with brush or roller. Field spray application must be approved by the Engineer before its initiation. For areas that are spray painted, apply as many coats as necessary to achieve specified mil thicknesses.

D. Allow sufficient drying time between coats of paint. During adverse weather, extend length of drying time as recommended by the paint manufacturer.

E. Prior to applying each paint coating after the first, check mil thickness of previously applied coating(s). Correct for insufficient paint thickness by increasing the mil thickness of subsequent applications, if allowed by the paint manufacturer or by applying additional coatings to provide the specified paint thickness.

F. Spot sand between coatings to remove paint defects visible to the unaided eye from a distance of five feet.

G. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWAD 102.

H. Paint system for the concrete floors shall not be applied until all other work by other trades is complete.

3.4 CLEAN UP

A. During the progress of the work, do not allow the accumulation of empty containers or other excess items except in areas specifically set aside for that purpose. Following completion of painting in each area, promptly remove all masking and temporary protection. After paint has dried, reinstall all items removed for painting. Upon completion of this portion of the work, visually inspect all surfaces and remove paint and traces of paint from surfaces not scheduled to be painted.

SCHEDULES FOLLOW

SERVICE: INTERIOR CONCRETE WALLS AND CEILING

Surface Preparation: **Surface must be dry, clean, and free from contaminants. On concrete, remove non-degraded release agents, oil, wax, and grease by washing with a hot trisodium phosphate solution. Brush off blast cleaning (concrete) SSPC SP13/ICRI CSP 2 – 4 Surface Preparation of Concrete**

Paint Manufacturer	Application	Product Name	Generic Type	No. of Coats	Dry Mils/ Coat	Sq Ft Covered/ Gallon	Comments
Tnemec	Finish	H.B. Tneme-Tufcoat Series 114	Waterborne Acrylic Epoxy	two	4-6	-	Gloss

Note: Product is self-priming on concrete

Surface Preparation: **SSPC-SP6 Commercial Blast Cleaning**

Paint Manufacturer	Application	Product Name	Generic Type	No. of Coats	Dry Mils/ Coat	Sq Ft Covered/ Gallon	Comments
Tnemec	Shop Primer	F.C. Typoxy Series 27	Polyamide Epoxy	one	4-6		
Tnemec	Field Primer	F.C. Typoxy Series 27	Polyamide Epoxy	touch-up	4-6		
Tnemec	Finish	H.B. Tneme-Tufcoat Series 114	Waterborne Acrylic Epoxy	one	4-6		Series 114 - Gloss

CITY OF ANN ARBOR WTP
STANDARD PAINT SCHEDULE

COLOR CODING OF PIPING

Potable Water: High Service, Transfer, & Wash Water (includes manhole covers)	Clear Sky en17 (tnemec)
Plant Pressure	PL12 (tnemec)
Non-Potable Water: River, Filter Infl. & Effl. (Includes manhole covers)	Frosted mint GB48 (tnemec)
Sludge (includes pipes, equipment and manhole covers)	Chipmunk yb23 (tnemec)
Natural Gas	Safety Yellow SC01 (tnemec)
Fire Service Water	Safety Red sc09 (Tnemec)
Compressed Air	Safety Green sc07 (tnemec)
Steam	Safety Purple sc08 (tnemec)
Used Wash Water	Light gray IN01 (tnemec)
Carbon Dioxide	White wh01 (tnemec)
valve handles and handrails indoors	Safety Orange sc03 (tnemec)
Fluoride	Hunter Green pl20 (tnemec)
Ammonia	lemonade yb16 (tnemec)
Sodium Hydroxide	Kastrel blue gr18 (tnemec)
Handrails and Platforms outside	beige yb38 (tnemec)
shafts for basins and flocs	pota-pox series beige yb38 (tnemec)
exterior tanks, containments, reservoir vents, fence	foliage en08 (tnemec)
new door frames	terra cotta en13 (tnemec)
new black doors	black IN06 (tnemec)
hot water	mountain shadow gb07 (tnemec)
	blue summit pl11 (tnemec)

NOTE: If existing field conditions show a different color than listed above, contact the Owner/Engineer for clarification.

END OF SECTION

SECTION 15 07 50

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work includes identification of all process piping, and valves.

1.2 RELATED DOCUMENTS

A. General and Supplementary Conditions and requirements of Division 1 apply to work of this Section.

B. Related work specified in other Sections:

1. Section 40 05 00 – Process Valves and Accessories

1.3 SUBMITTALS

A. Submit shop drawings in accordance with Division 1 of these Specifications.

B. Submit product data information including a description of all markers, paint and tags.

1.4 QUALITY ASSURANCE

A. All identification markers shall comply with ANSI A13.1.

PART 2 - PRODUCTS

2.1 PIPE MARKERS

(NOT USED)

2.3 EQUIPMENT MARKERS

(NOT USED)

2.4 VALVE IDENTIFICATION

A. Mechanical CONTRACTORs shall tag all valves with brass tags having incised painted black numbers and attach securely to valve by brass chain. Include valve tag charts bound in operating manuals and submit one sit of charts, under glass, in metal frames to OWNER.

B. All main and branch line valves are to be tagged in accordance with the Owner's numbering system.

C. Contact OWNER for next available valve number where adding valves to existing buildings.

2.5 ACCEPTABLE MANUFACTURERS

A. Identification Labels:

1. Seton
2. Brady
3. Bramer
4. Markcraft

PART 3 - EXECUTION

3.1 LOCATION OF MARKERS

A. Arrows and markers shall be mounted to provide unobstructed visibility from floor level.

B. Locations for pipe and duct markers in equipment rooms, chases, tunnels and shafts shall be as follows:

1. Adjacent to each valve and fitting (except on plumbing fixtures and equipment).

C. Locations for pipe and duct markers above ceilings in finished areas:

1. Adjacent to each valve.

END OF SECTION

SECTION 26 05 00

ELECTRICAL SYSTEM GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work Included

B. Codes and Standards

C. Drawings

D. Record Drawings

E. Operation and Maintenance Manuals

F. Site Examination

G. Utilities

H. Temporary Power

I. Storage at Site

J. Equipment and Materials

K. Workmanship and Completion of Installation

L. Cutting and Patching

M. Coordination

N. Sanitary Lift Station Equipment Wiring and Control

O. Miscellaneous

1.2 RELATED SECTIONS

A. The requirements set out in the contract documents, contract forms, general conditions, supplementary general conditions and general requirements apply to all work specified herein.

1.3 WORK INCLUDED

A. Refer to the entire set of contract documents to become familiar with the project. Contractor is responsible for all equipment mounting, conduit routing and incidental work which may be necessary because of construction requirements, whether or not they are shown on the electrical drawings.

B. The Contractor shall furnish all materials, labor, transportation, tools, permits, fees and incidentals necessary for the installation of a complete electrical system.

C. It is the intent of the contract documents to provide an installation complete in every respect. In the event that additional details or special construction are required for work indicated or specified, it shall be the responsibility of the Contractor to provide all materials and equipment which are usually furnished with such systems in order to complete the installation, whether mentioned or not.

1.4 PAYMENT RESTRICTIONS

A. Electrical equipment included in Division 26 shall be paid for in the following payment sequence:

1. Upon equipment delivery – 30% of the contract amount.

2. Upon completion of equipment installation – 30% of the contract amount.

3. Upon successful startup and testing – 30% of the contract amount.

4. Upon completion of system validation – 10% of the contract amount.

B. Retainage shall apply to the payment sequence.

1.5 CODES AND STANDARDS

A. All work shall be in compliance with all applicable portions of the edition recognized by the Authority Having Jurisdiction (AHJ) of the National Electrical Code (NEC), the National Electrical Safety Code (NESC) and all city and county codes and ordinances, which may or may not be specifically referenced in these contract documents. None of the terms or provisions of these contract documents shall be construed as waiving any of the rules, regulations or requirements of these authorities.

B. In any instance where these contract documents call for construction materials of a better quality or larger size than required by the codes, the provisions of the contract documents shall take precedence. The codes shall govern where violations are indicated in the construction documents. In any instance where there is a conflict between the drawings and specifications, the larger size, higher quantity or better quality shall be provided, unless the Owner's Representative directs otherwise.

1.6 DRAWINGS

A. The accompanying drawings are intended to show the general arrangement and extent of the work. The exact location and arrangement of all parts shall be determined as the work progresses to conform in the best possible manner with the surroundings and as directed by the Owner and/or Engineer.

B. If any departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Owner's Representative for review. No departures shall be made without prior written acceptance of the Owner and/or Engineer.

C. Figured dimensions shall be followed without reference to scale. Where dimensions are not shown, measurements shall be scaled.

1.7 RECORD DRAWINGS

A. The Contractor shall maintain a set of electrical drawings at the job site neatly marked with all changes from the original contract drawings. This set of drawings shall not be used for construction purposes and shall be available to the Owner and/or Engineer at all times. Drawings shall be kept up to date as the job progresses and shall be delivered to the Owner and Engineer at the completion of the contract.

B. The Contract shall maintain record drawing per the requirements of Division 1.

1.8 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall furnish of operation and maintenance manuals to the Owner and and/or Engineer per the requirements of Division 1.

1.9 SITE EXAMINATION

A. The Contractor shall be responsible for the coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with all details of the work and working conditions, and verify all dimensions in the field. The Contractor shall advise the Owner's Representative of any discrepancy at least seven days prior to bidding. The submission of bids shall be deemed evidence of the Contractor's site visit, the coordination of all existing conditions and the inclusion of all considerations for existing conditions.

1.10 UTILITIES

A. The contract documents reflect the general location, voltage, capacity, size and manner of routing for all utilities known to be required on this project. It shall be the responsibility of the Contractor to visit the site and to meet with the local utility companies in order to coordinate and confirm the exact requirements for all electrical utilities, including, but not limited to, all facilities required to provide complete and operative electrical power and telephone services. The bid submitted by the Contractor shall include costs for all such coordinative work as well as any and all utility company charges and/or fees.

1.11 TEMPORARY POWER

A. The Contractor shall coordinate with the Owner, and other trades involved to determine requirements for temporary power on this project. No additional charges shall be made to the Owner for wiring, connections, poles, fixtures or devices required to facilitate construction.

B. The Contractor shall provide the necessary wiring, connections, service switches, poles, wiring protective devices, lighting fixtures, lamps, outlet devices, disconnect switches, etc., as required for temporary lighting. In addition, a similar system shall be provided for the distribution of single- and three-phase power of voltage levels and adequate ampacity as required to facilitate the construction of the project. These services shall be installed in accordance with requirements of the NEC and OSHA.

1.12 STORAGE AT SITE

A. The Contractor shall not receive material or equipment at the job site until ready for installation or until there is suitable space provided to properly protect equipment from rust, weather, humidity, dust and physical damage.

B. Store major electrical equipment (switchboards, panelboards, lighting fixtures, dry type transformers, VFDs, etc.) sealed in original factory wrapping in a clean, dry and conditioned environment protected from the weather. Storage outdoors is not acceptable.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL

A. All materials shall be new and of high quality. All materials of a type for which the Underwriters' Laboratories, Inc. (UL) has established a standard shall be listed by UL and shall bear the UL label.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND COMPLETION OF INSTALLATION

A. All work shall be performed by competent electricians, skilled in their trade, and shall be executed in a thorough and substantial manner.

B. The Contractor shall be held responsible for transportation of his materials to and on the job, and for their storage and protection until the final acceptance of the job.

C. The Contractor shall be held responsible for timely placing of all conduit and outlet boxes, cabinets and other wiring devices in the walls, ceilings, slabs, beams, etc., as construction progresses.

D. Contractor shall furnish all necessary scaffolding, tackle, tools and appurtenances of all kinds, and all labor required for the safe and expeditious execution of his contract.

E. All equipment shall be installed in a manner to permit access to parts requiring service. All electrical equipment shall be installed in such a manner as to allow removal for service without disassembly of other equipment, and shall have working clearances as required by NEC. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to fit through finished openings, shall be placed before enclosing structure is completed. Following placement, such apparatus shall be completely protected from damage.

F. The Contractor shall, at all times, keep the premises free from accumulations of waste material and packaging debris. This debris shall be removed daily from the construction site.

3.2 CUTTING AND PATCHING

A. Where it becomes necessary to drill or cut through any floors, walls or ceilings to permit the installation of any work under this contract, or to repair any defects that may appear prior to the expiration of the warranty, such cutting shall be done under the supervision of the

Owner's Representative by the Contractor. After the necessary work has been completed, the damage shall be repaired by the Contractor, who shall pay all costs of such cutting and repairing.

B. No joists, beams, girders or columns shall be cut by the Contractor without first obtaining written permission from the Owner's Representative.

C. All drilling for expansion bolts, hangers and other supports shall be done by the Contractor, subject to the approval of the Owner's Representative. Labor and materials required to replace or rebuild parts cut or injured shall be furnished at the Contractor's expense, subject to the satisfaction of the Owner's Representative.

D. All openings made in fire-rated walls, floors and ceilings shall be patched by the electrical contractor in a manner maintaining the original fire rating.

3.3 COORDINATION

A. The Contractor shall coordinate the work of the different trades so that interferences between piping, equipment, structural and architectural work shall be avoided.

B. The Contractor is responsible for ensuring that all conduit sleeves are timely installed and are sealed, flashed or caulked to the satisfaction of the Owner's Representative.

3.4 SANITARY LIFT STATION EQUIPMENT WIRING AND CONTROL

A. In general, the Contractor shall provide the control wiring from the pre-packaged to the mechanical furnished devices (pump, front, etc.). The electrical drawings will indicate only branch circuit power supplies to serve the station equipment.

B. If substitution of controls or mechanical equipment for that specified requires any changes in the electrical work, any extra cost of the equipment or electrical work will be the responsibility of the Contractor.

3.5 MISCELLANEOUS

A. Each piece of floor-mounted equipment, such as control panels, etc., shall be set on a concrete base. Bases shall not be less than 4 inches high and shall be pinned to the floor.

B. The Contractor shall furnish and install vibration isolation means for all equipment and materials furnished under this contract which may transmit perceptible noise or vibration, structure borne or air borne, to occupied areas.

C. All transformers and other equipment indicated shall be mounted on 1-inch-thick cork rib or rubber pads or steel spring isolator units properly sized, spaced and loaded, as specified herein, which in turn shall rest on a 4-inch minimum concrete base.

D. Electrical conduit shall be isolated from all dry type transformers and rotating or reciprocating machinery with flexible metal conduit. Use lengths approximately 10 diameters in length.

END OF SECTION

SECTION 26 05 03

EQUIPMENT INSTALLATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies receiving, unloading, storing, installing, connecting electrical circuits, and placing in operation all electrical equipment, including but not limited to the following:

1. Disconnect switches.
2. Pump Station Controller.
3. Underground Conduits.
4. Above Grade Conduits.
5. Inter Connections.

1.2 RECEIVING, STORAGE, AND HANDLING

A. Receiving: Receive, uncrate, and inspect equipment for defects or damage. If defective or damaged equipment is discovered take necessary action to repair or replace equipment. Notify Owner/Engineer if project schedule will be affected.

B. Storage: Store equipment in dry, clean, and secure area until time of installation.

C. Handling: Handle equipment in accordance with manufacturer's instructions. Use lifting points where provided to move equipment. Protect painted and machined surfaces where exposed.

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Grounding: Comply with Section 26 05 26 for grounding requirements in addition to specific grounding methods covered in the following articles.

B. Identification: Comply with Section 26 05 50.

C. Cleaning: Clean interior of enclosures prior to installation of components or pulling conductors.

D. Supports and Fastenings: Comply with Section 26 05 29.

E. Enclosure Application:

1. NEMA 12 for indoor locations unless indicated otherwise on Drawings.

2. Alum NEMA 3R or stainless steel NEMA 4X for outdoor installations.

3.2 FLOOR OR PAD MOUNTED EQUIPMENT

A. General: Install floor sills, anchor bolts, shims, and hardware required to level, align, secure, and connect equipment components in accordance with manufacturer's instructions. Make electrical connections in accordance with Section 26 05 19 for supply and load circuits and leave items in operating condition.

3.3 WALL MOUNTED EQUIPMENT

A. General:

1. Enclosures:

a. Mount enclosures plumb, level, and rigidly attached to structure.

b. Mount 1 inch off structure with top 6'-6" above finished floor.

c. Install supports in a manner to permit vertical flow of air behind enclosure.

d. Use steel supports fabricated from standard rolled structural steel shapes specified in Section 26 05 29.

2. Wiring: Make electrical connections in accordance with Section 26 05 19 for supply and load circuits.

B. Disconnect Switches: Install properly rated fuses.

C. Dry-Type Transformers:

1. Mounting: Refer to Section 26 05 29 for proper support and anchorage.

2. Raceway Connections: Connect raceways to transformer enclosure using flexible conduit specified in Section 26 05 33.13. Use lengths of flex approximately 10 diameters in length.

D. Panelboards:

1. Enclosure: Close unused circuit positions with blanking plates.

2. Wiring: Check buses for proper insulation resistance prior to energizing.

3. Circuit Breakers: Set circuit breaker instantaneous trip adjustments to minimum setting unless designated otherwise on Drawings.

4. Fusible Units: See section 26 22 00 for fuse requirements.

5. Flush Mounted Panelboards: From each flush mounted panelboard extends into an accessible location a 3/4-inch empty conduit for every three spare branch circuits and spaces or as shown on Drawings.

6. Application:

   a. Power and Lighting and Receptacle Type Panelboards: As designated by Panelboard Schedules on Drawings.

   b. Ground Fault Circuit Interrupters: Provide for 120-volt circuits supplying 15 and 20 ampere receptacles installed outdoors or as shown on Drawings.

E. Molded Case Circuit Breakers: Set adjustable instantaneous trips to minimum, unless indicated otherwise on Drawings. On magnetic breakers in combination with starters, set trips at lowest value that will permit motor starting, but not higher than 13 times motor nameplate full-load current.

F. Low Voltage Motor Controllers and Contactors in Individual Enclosures:

1. On motor circuits, connect power circuits for proper phase rotation.

2. Set circuit breaker instantaneous trips at proper value and install correct size fuses and thermal overload heater elements.

3. Check interconnection and operation of control devices, interlocks, indicating lights, and control relays. Set timers and time delay relays for correct intervals. Check controller-operating coil for correct voltage rating. Program relay settings for exterior lighting controls per manufacturer's specification and coordinate time schedules with owner.

4. See Specification Section 26 29 13 – Motor Starters

G. Self-Contained Emergency Power Pack: Connect each unit to equipment ground conductor by means of a crimped ring-type terminal connector secured to housing with a self-tapping screw.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE COPPER WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies copper wire, cable, associated connectors, and termination hardware used on systems operating at 600 volts or less.

1.2 QUALITY ASSURANCE

A. Furnish wire, cable, associated connectors, and termination hardware bearing UL label.

B. Furnish wire, cable, associated connectors, and termination hardware bearing the label of, or listed by a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Soft drawn, annealed copper, Class "B" stranding.

2.2 POWER WIRE AND CABLE

A. Acceptable Manufacturers: Single source manufacture is required for power wire and cable specified in this Section.

B. General: Conform to UL 83 and NEMA WC 5.

1. Single Conductor: Type THWN-THHN (75°C wet/90°C dry) or XHHW (75°C wet/90°C dry) cable rated 600 volts.

2.3 SIGNAL CABLE

A. Type PLCC (Power Limited Control Cable):

1. General: Rated 300 volts, 90 deg. C, single pair (Pr.), triad (Tri.) or quad (Qd.).

2. Single Pr., Tri. Or Qd.: No. 16 AWG, stranded copper conductors, twisted and covered with a 100% aluminum-mylar shield, with drain wire and overall PVC jacket.

3. Multiple Pr., Tri. Or Qd.: Same as single construction except No. 20 AWG conductors and an overall aluminum-mylar shield in addition to individual shields.

4. Direct Burial Cable: Same as single or multiple constructions with addition of aluminum sheath and weatherproof outer jacket.

2.4 CONNECTORS AND TERMINALS

A. Insulated Crimp Type Connectors and Terminals: Nylon insulated, Burndy "INSULINK" and "INSULUG," or Thomas & Betts "Sta-Kon."

B. Split Bolts: High-conductivity copper alloy, Burndy "SERVIT" or Thomas & Betts "Split-Bolt."

C. Compression Terminals: Copper long barrel, Burndy "HYLUG" or Thomas & Betts "Color-Keyed," or aluminum alloy Buchanan "Cytolok CL500" series.

D. Bolted Terminals: Cast copper alloy, Burndy "QIKLUG" or Thomas & Betts "Locktite."

2.5 MISCELLANEOUS COMPONENTS

A. Tape:

1. Vinyl Plastic: 3M "Scotch 33+" or "Scotch 88."

2. Varnished Cambric (VC): 3M "Irvington 2920."

3. Friction: Black friction tape.

4. Color Coding: 3M "Scotch 35."

5. Fireproofing: 3M "Scotch 77."

6. High Temperature Glass Cloth: 3M "Scotch 69" (180ºC).

7. Electrical Insulation Putty: 3M "Scotchfil."

B. Splice Kits: 3M "Scotchcast 82 Series".

C. Pulling Lubricants: Ideal "Yellow 77" or Polywater "Type J."

D. Wire Markers:

1. Individual Wires: Write-on type with self-laminating vinyl overwrap, 3M "ScotchCode," Ideal "Write-On," or Thomas & Betts "WSL."

2. Multi-Conductor Cables or Groups of Wires as a Cable: Nylon tie on marker, Thomas & Betts "Nylon I.D. Ties Ty-Raps."

E. Wire and Cable Ties: Thomas & Betts "Ty-Raps."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Wire and Cable:

1. General:

a. Limit pulling tension to maximum values recommended by manufacturer.

b. Do not pull through boxes, fittings, or enclosures where a change of raceway alignment or direction occurs. Use of shieves is acceptable.

c. Do not cut strands from conductors to fit lugs or terminals.

d. Do not splice control or signal wiring.

B. Compression Connectors and Terminals: Install on wire and cable with approved tool and die to recommended compression pressure.

C. Bolted Connectors and Terminals:

1. Torque to manufacturer's recommended foot-pounds for size and class of connector.
2. Where manufacturer's published torquing requirements are not indicated, tighten connectors and terminals to comply with UL 486A torque values.
3. Use plated bolts and lock washers on terminal connections.

D. Wiring in Enclosures:

1. Form and tie conductors in panelboards, cabinets, control panels, motor controllers, wireways, and wiring troughs in a neat and orderly manner.

2. Use Thomas & Betts wire and cable ties of appropriate size and type.

3. Limit spacing between ties to not more than 6 inches.

E. Taping:

1. Above Ground and Dry Locations: Fill voids and irregularities with half-lapped layers of VC (two minimum) or electrical insulation putty. Insulate with three half-lapped layers of vinyl plastic and one half-lapped layer of friction tape.

2. Below Ground and Wet Locations: In lieu of taping protect connection with resin splicing kit.

3. Fireproofing: Same as specified for above ground and dry locations plus one half-lapped layer of fireproofing.

F. System Separation:

1. Control and Signal Wiring: Provide separate raceways or barriers in raceways to separate each of the following systems from other wiring:

a. 120-volt control wiring.

b. Analog 4-20 Milliamp.

c. Digital (Pulse).

3.2 APPLICATION

A. Wire and Cable:

1. THWN-THHN or XHHW for power wiring through No. 2 AWG, and control wiring in conduit. XHHW for sizes above No. 2 AWG in conduit.

2. Bare copper for ground conductors, which penetrate finished floor or grade and ground loops.

3. No. 12 AWG minimum for power circuits and No. 14 AWG minimum for control circuits unless noted otherwise on Drawings.

B. Connectors and Terminals:

1. Motor Terminations (Single Conductor Circuits): Insulated ring tongue crimp type connectors or compression terminals, connected back-to-back with plated bolt, nut and lockwasher, and then taped. Where strap screw devices are present use split tongue connectors in lieu of ring tongue connectors.

2. Motor Terminations (Parallel Conductor Circuits): Gang compression terminals on a 1/4-inch-thick copper bar.

3. Transformer Terminations: Split bolt connectors for pigtail connections. Compression terminals for all other connections.

C. Multiconductor Control Cable: 14 AWG conductors except 16 AWG may be used in control enclosures.

3.3 COLOR CODING

A. Power Wiring: Provide color coding for single and multi-conductor power circuits as follows:

Voltage	ØA	ØB	ØC	Neutral
240 volts and below	Black	Red	Blue	White
250 - 600 volts	Brown	Orange	Yellow	Natural Gray

1. For specified insulations and jackets not manufactured with integral colors, use conductors with black insulation or jacket and color coding tape.

2. Color code conductors entering boxes, troughs, cabinets, and other enclosures.

3. Color code conductors in wireways, trenches, and other locations where conductors are continuously accessible at intervals not exceeding 5 feet.

B. Insulated Equipment Ground: Green.

C. Control Cables:

1. Single Conductors: Red (AC), Blue (DC).

2. Multi-conductor: Comply with ICEA S-66-524, "Method 1", Table K-2.

D. Signal Cables: Comply with ICEA S-82-552, "Method 9", Table E-2. In addition, number multiple pairs, triads, and quads.

3.4 IDENTIFICATION

A. Cables: Attach nylon tie on markers on both ends of cable denoting cable type and number as noted on Drawings. Where a number of 1/C wires are identified as a single cable, group conductors using "Ty-Raps" and attach markers.

B. Conductor Identification: Attach conductor markers on both ends of wire and label as indicated on Drawings.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART I - GENERAL

1.1 SECTION INCLUDES

A. Section specifies grounding of electrical systems and equipment and grounding of conductive machine frames, enclosures, appliances, structures and other equipment for protection of life, equipment, circuits, and systems.

B. All switchboards, transformers, load break switches and metering shall be grounded per the Utility and NEC requirements.

1.2 QUALITY ASSURANCE

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. In addition to the Codes and Standards summarized in Section 26 05 00, Grounding shall comply with the requirements of IEEE 142, NFPA 70 Article 250 and UL 467.

C. UL Labeling or Listing: Furnish grounding fittings bearing label of or listing by UL.

D. NRTL Labeling or Listing: Furnish grounding fittings bearing label of or listing by a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

1.3 SUBMITTALS

A. Test Reports: Submit to Engineer two (2) copies of grounding system test report certified by testing technician and Owner's representative.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conductors: Copper, refer to Section 26 05 19.

B. Exothermic Welding: Molds and charges by Erico Products, Inc. "Cadweld" or Continental Industries, Inc. "Thermoweld".

C. Ground Rods: (5/8)-inch diameter, 10 feet long, copperclad sectional ground rods.

D. Grounding Clamps: O-Z/Gedney or Steel City "G" series.

E. Connectors, Terminals, and Tape: Refer to Section 26 05 19.

F. Flexible Conduit Connectors: Refer to Section 26 05 33.13.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install grounding system comprised of the following major components:

1. Steel reinforcing bars in column footings with Eufer ground bonded together as grounding electrodes to provide connection to earth.

2. Ground loop.

3. Driven rod at service entrances.

4. Continuous equipment grounding conductors in electrical raceways and cable runs to ensure a positive path for connection of equipment that must be grounded.

5. Water pipe electrode.

6. Continuous bond of all items listed above.Connection of Equipment to Framing

C. Steel:

1. General: Connect below grade and concealed conductors using exothermic welds. Connect above grade using mechanical connectors.

2. Transformer Neutrals: Connect 9 KVA and larger transformer neutrals to the grounding system using conductor sized in accordance with NEC Table 250.66 but no smaller than No. 2 AWG.

3. Distribution Equipment: Connect ground bus in switchgear assemblies, motor control centers, motor control panelboards, and power panelboards to the grounding system using a conductor sized in accordance with NEC Table 250.122 but no smaller than No. 2 AWG.

4. Motor Frames: Connect motor frames rated above 300 volts and located within 6 feet above finished floor to the grounding system using a conductor sized in accordance with NEC Table 250.122 but no smaller than a No. 2 AWG.

5. Tanks and Vessels: Provide No. 2 AWG conductor from each metal tank or vessel to the nearest grounding system.

6. Telephone Equipment: Provide No. 4/0 AWG conductor from the grounding system into each telephone equipment room or telephone service entrance terminal cabinet and terminate as directed by the telephone company.

D. Equipment Grounding:

1. Provide electrically continuous equipment grounding conductors sized per NEC Table 250.122, or as indicated on Drawings, in electrical raceways containing conductors rated higher than 30 volts.

2. Bond grounding conductors to grounding bushings, grounding locknuts, grounding lugs, equipment, fixtures, enclosures and transformer neutrals.

E. Flexible Metal Conduit: Provide an external grounding jumper on flexible conduit runs longer than 6 feet.

1. Spiral wrap the grounding conductor through a minimum of 360° around outside of flexible conduit.

2. Terminate jumper and flex on each end with an insulated grounding fitting.

3. Size jumper same as equipment grounding conductor in the flexible conduit but no smaller than No. 6 AWG.

F. Expansion Joints: Provide No. 4/0 AWG jumper with 6 inches of sag across structure expansion joints.

1. Bond jumpers to framing steel on both sides of the joint using exothermic welds.

2. Provide a jumper every 50'-0" maximum along expansion joint with a minimum of two jumpers per expansion joint.

3.2 FIELD QUALITY CONTROL

A. Tests: After complete installation of grounding system, measure ground resistance using the three terminal "Fall-of-Potential" method.

1. Comply with IEEE 81.

2. Space electrodes so that the potential electrode is located from the reference starting point a distance equal to 62% of the sum of the distances from the reference starting point of the test object and the current electrode.

B. Testing Firm: Employ an independent testing firm using NETA certified testing technicians.

C. Test Values: Maximum resistance value of the ground electrode system is not to exceed 5 ohms. If test results exceed 5 ohms, proceed as directed by the Engineer.

END OF SECTION

SECTION 26 05 29

SUPPORTS AND FASTENERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Supports and hangers, anchors, and fastenings for mounting and anchoring electrical raceways, equipment, and fixtures.

B. Related Sections: Additional support requirements for specific items are specified elsewhere in Division 26.

PART 2 - PRODUCTS

2.1 FIELD FABRICATED SUPPORTS

A. Structural steel shapes shall be hot-dipped galvanized for outdoor locations.

B. 3/8-inch minimum, continuous thread, plated or galvanized hanger rod.

C. Prefabricated structural systems manufactured by American Electric Kindorf, Power-Strut, or Unistrut.

2.2 CONDUIT SUPPORTS

A. Clamps: Steel City or American Electric Kindorf "RC" and "PC" clamps.

B. Straps:

1. Conduit Straps: Plated steel or hot-dipped galvanized, "two-hole" straps.

2. Channel Straps: American Electric Kindorf "C-105," Power-Strut "PS-1300," or Unistrut "P1100" and "P1400."

C. Hangers:

1. Conduit Hangers: Steel City Series "6H" or Erico Products, Inc. Caddy "CD" series.

2. Lay-In Pipe Hangers: American Electric Kindorf "C-149," Power-Strut "PS-3200," or Unistrut "J1200."

D. Clips: Erico Products, Inc. "Caddy M" Series snap-lock conduit clip in combination with a "Caddy Universal" drive-on beam clamp or threaded rod.

2.3 ANCHORS

A. Toggle Bolts: Star "3000" series.

B. Plastic Anchors: Star "06" series with appropriately sized metal screws.

C. Lead Shields and Lag Bolts: ITW Ramset/Red Head "LS" series or Star "1800" series.

D. Hollow Wall Anchors: ITW Ramset/Red Head "WA" series or Star "2700" series.

E. Threaded Expansion Anchors: ITW Ramset/Red Head "J," "S" or "JS" series, or Star "3400" series.

F. Wedge Anchors: ITW Ramset/Red Head "WS" series or Star "3500" series.

2.4 FASTENERS

A. Bolts and Nuts: ASTM Grade 2, low carbon, plated or galvanized, hex head.

B. Beam Clamps: American Electric Kindorf "E-160" or "E-231," Power-Strut "PS800" and "PS2000," or Unistrut "P2600" or "P2700" clamps with retainers.

C. Channel/Angle Clamps: American Electric Kindorf "E-177" or equal.

2.5 GALVANIZING REPAIR PAINT

A. ASTM A 780.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Fabricate and install supports so that supported installation does not weaken or overload structure.

2. Do not impose weight of electrical equipment, raceways, or fixtures on supports provided for non-electrical systems unless indicated otherwise on Drawings.

3. Secure steel supports to structure by bolting or welding.

4. Use retaining device when making connections with setscrew-type beam clamps or C-clamps.

5. Maximum diameter of drilled holes in beam flanges shall not exceed 15% of width of flange.

6. Drill holes to leave minimum of 1/2 inch of steel from edge of member to edge of hole.

7. Support loads from bottom chord member of trusses or steel joists only where diagonal members attach to bottom chord.

8. Do not support loads from metal roof or floor decking.

9. Do not weld to steel joist.

B. Outdoor Supports: Coat bolted and field welded supports with galvanizing repair paint.

3.2 APPLICATION

A. Supports for Single Conduits:

1. Conduit in Direct Contact with Steel Framing: "RC" and "PC" clamps.

2. EMT, 1 Inch and Smaller in Direct Contact with Steel Framing: Conduit clips.

3. Suspended Conduit 1-1/4 Inch and Below: Hanger rod and conduit hanger.

4. Suspended Conduit 1-1/2 Inch and Above: Hanger rod and lay-in pipe hanger.

5. On Walls: Steel "one-hole" straps.

B. Supports for Multiple Parallel Conduits:

1. In Direct Contact with Steel Framing: Attach prefabricated 1-1/2 inch wide channel, of sufficient depth to support the load, directly to framing and attach conduits to channel straps.

2. Suspended: Assemble a "trapeze" hanger using prefabricated 1-1/2 inch wide steel channel of sufficient depth to support load, and two or more hanger rods. Attach conduits to channel using channel straps.

C. Wall Anchors:

1. Hollow Masonry Units: Support light loads such as one and two-hole straps, and outlet boxes with plastic anchors and screws. Support heavy loads such as panelboards, safety switches, and multiple conduit runs with toggle bolts.

2. Solid Masonry Units: Lead shields and lag bolts; use through-bolts for tension loads.

3. Gypsum Board: Hollow wall anchors.

D. Concrete Floor and Overhead Slabs:

1. For overhead equipment loads less than 400 lbs., use at least two (2) 3/8-inch minimum diameter threaded expansion anchors. For equipment loads in excess of 400 lbs., but less than 1,000 lbs., use at least two (2) 3/8-inch minimum diameter wedge anchors.

END OF SECTION

SECTION 26 05 33.13

METALLIC CONDUIT AND FITTINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rigid metal conduit (RMC).

B. Flexible metal conduit.

C. Liquidtight flexible metal conduit.

D. Associated fittings.

1.2 QUALITY ASSURANCE

A. Furnish conduit and fittings bearing UL labels.

B. Furnish conduit and fittings bearing label of a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

C. All exposed conduits shall be RMC.

PART 2 - PRODUCTS

2.1 CONDUIT

A. RMC: ANSI C80.1 and UL 6, hot dipped galvanized, zinc metalized or sheradized, heavy wall, steel.

B. Flexible Conduit: Provide flexible conduit sized 1-1/4 inches and smaller that is UL approved for use as a grounding conductor.

1. Flexible Metal (Greenfield): UL 1, hot dipped or electro-galvanized steel.

2. Liquidtight Flexible Metal Conduit (Sealtite): UL 360, hot dipped or electro-galvanized steel with thermoplastic outer covering.

2.2 FITTINGS

A. Fittings: UL 514B. Provide fittings of same type by same manufacturer.

B. Conduit Bodies:

1. Zinc coated, cast malleable, ferrous metal, threaded fittings, Appleton "Form 35 Unilets" or Crouse-Hinds "Form 7 Condulets."

2. Conduits 1-1/4 Inch and Larger: Cast malleable or aluminum "Mogul" size bodies.

3. Gaskets: Where installed outdoors or in areas with gasketed enclosures, furnish neoprene cover gasket.

C. Insulated Bushings:

1. Thermoplastic: Appleton "BBU," O-Z/Gedney "IB," or Thomas & Betts "510" Series.

2. Thermosetting Phenolic: O-Z/Gedney "A."

3. Grounding: O-Z/Gedney "BLG."

D. Flexible Connectors: Flexible conduit fittings sized 1-1/4 inches and smaller shall be UL approved for use as a grounding device.

1. Metal: Thomas & Betts "3100" series "Tite Bite," insulated.

2. Liquidtight Metal: Thomas & Betts "5200/5300" series or Appleton "ST" series, insulated.

E. Sealing Hubs: Appleton "HUB" or "HUB-U" series or Thomas & Betts "370" series.

F.Expansion Fittings:

1. Exposed: O-Z/Gedney type "AX" or "EX" or Appleton type "XJ" with bonding jumper.

2. Concrete Embedded: O-Z/Gedney "DX."

G. Unions: Appleton type "EC" or Thomas & Betts "670/680" series "Erickson" coupling.

H. Seals: Provide seals with interior cross section to allow 40% wire fill capacity.

1. Enclosure Termination and Stub-ups Into Switchboards, Distribution Panels, and Other Similar Locations: O-Z/Gedney "CSB" series sealing bushing.

2. "In-Line": Gasketed "C" conduit body, filled with Dow Corning "Fire Stop" sealant.

3. Hazardous Area Seals: Appleton type “EYSEF”, “EYDEF”, “ESU” or “SF” or Crouse-Hinds type “EYSX”, “EZS” or “EYDX” with manufacturer’s recommended fiber filler and cement.

4. Miscellaneous Fittings: Locknuts, caps, plugs, reducers, elbows, and other accessories required for a complete installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Do not make unnecessary bends or offsets.

2. Do not heat conduits for making bends or bend conduit through more than 90 degrees of arc.

3. Install conduits so that vertical runs are plumb and horizontal runs are level and parallel or perpendicular to principal structural features.

4. Maintain 6-inch clearance from steam lines, hot water lines, flues, and other heat producing lines or devices where practicable.

5. Make up joints tight and do not use running threads.

6. Clean inside of conduits and swab dry before installing conductors.

7. Support conduits 2-1/2" and smaller in accordance with NEC. For conduits 3" and larger support at intervals of 10'-0" or less.

B. Bending Radius: Comply with NEC 344.24 for minimum bending radius on both field bends and factory bends.

C. Concrete Embedded: Anchor conduit to reinforcing in concrete; plug or cap open ends until concrete and masonry operations are completed.

D. **Below Grade: Encase conduits installed below grade in a 2-inch concrete envelope unless noted otherwise on Drawings.**

E. Conduit Terminations (RMC):

1. NEMA 1 Areas: one interior and one exterior locknut with thermoplastic bushing.

2. Gasketed Enclosure Areas: One interior locknut and one exterior-sealing locknut with appropriate type bushing.

3. Outdoor Areas: Use sealing hubs in top and sides of enclosures. Use an exterior locknut, interior sealing locknut, and bushing in bottom of enclosures.

4. Service Entrances and Circuits above 600 Volts: Same as specified for NEMA 12 areas except use grounding bushing.

F. Expansion Fittings: Furnish for building expansion joints where conduit is rigidly attached to building structure or rod supported within 18 inches of structure.

G. Seals:

1. Install seals where conduit passes from a conditioned space into an unconditioned space, in enclosures mounted outdoors, and in conduits entering structures from outside or underground.

3.2 APPLICATION

A. RMC :

1. Below grade, under load bearing concrete slabs and asphalt roadways unless concrete encased.

2. Below grade sweeps up to finish floor or grade.

3. Above-grade areas subject to physical damage.

4. Do not use RMC conduit smaller than 3/4 inch.

B. Flexible Metal Conduit: Use for final connection to vibrating equipment, enclosed transformers, lay-in lighting fixtures, lighting fixtures with flexible supports, and equipment or devices requiring adjustment, such as motors and limit switches.

1. Greenfield:

a. Indoor areas where gasketed enclosures are not required.

2. Liquidtight:

a. Outdoor areas.

b. Where gasketed enclosures are required.

END OF SECTION

SECTION 26 05 33.16

BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies electrical outlet, device, pull, junction boxes and wireways and installation.

1.2 DEFINITIONS

A. Outlet Box: A box used as a wiring enclosure that may be used as a device box with the addition of a plaster ring or special cover.

B. Device Box: A box designed to house a switch, receptacle or other wiring devices.

1.3 QUALITY ASSURANCE

A. Furnish boxes bearing label or listing of a Nationally Recognized Testing Laboratory (NRTL), as defined in OSHA Regulation 1910.7.

PART 2 - PRODUCTS

2.1 OUTLET AND DEVICE BOXES

A. General:

1. UL 514A and 514B for all boxes.

2. NEMA OS 1 for sheet steel boxes.

B. Cast Iron Boxes: Crouse-Hinds or Appleton "FS/FD" and "ALC" series.

C. Cast Aluminum Boxes: Crouse-Hinds “FS-SA”/”FD-SA” or Appleton “FS-A”/”FD-A” Series.

D. Sheet Steel Boxes: Pressed steel, galvanized, 4-inch octagonal or 4-inch square (or "gang") boxes, depth as needed to accommodate devices and associated wiring.

E. Accessories: Provide fixture studs, plaster rings, extension rings, and covers as required for application. Galvanized steel indoors and galvanized cast ferrous metal or cast aluminum with neoprene gaskets outdoors.

F. Floor Boxes;

1. Acceptable Products:

	Hubbell	Steel City
Single-gang box	B-2436	641
Two-gang box	B-4233	642

Three-gang box	B-4333	643
Duplex receptacle trim	S3625	P-64-DU
Telephone/Signal trim	S2425	P-64-3/4-2

2. Accessories: Provide necessary floor covering adapters, plugs, gaskets, nipples and sealing compound.

2.2 JUNCTION AND PULL BOXES

A. Boxes (6 Inch Minimum Dimension):

1. Welded galvanized sheet steel, of sizes required by NEC, without knockouts.

2. 14-gauge metal for boxes with maximum dimension of less than 24 inches, 12 gauge for boxes with maximum dimension of 24 to 35 inches, and 10 gauge for boxes with any dimension greater than 35 inches.

3. Provide removable, flame retardant, insulating cable supports in boxes with any dimension greater than 42 inches.

4. Comply with UL 50 for boxes over 100 cubic inches volume.

5. Provide screwed or bolted covers of same gauge as box.

B. Boxes (4-11/16 Inch Maximum Dimension): Pressed steel, galvanized, 4 or 4-11/16 inches square, 1-1/2 or 2-1/8 inches deep.

C. Weatherproof Boxes: NEMA 3R, continuously welded-seam, galvanized sheet steel enclosures with gasketed covers.

D. Watertight Boxes: Galvanized cast iron with gasketed, bolt-on covers, tapped holes in bosses or hubs for conduit entrances, and integrally cast mounting lugs.

2.3 WIREWAYS

A. Provide hinged cover NEMA 1 lay-in steel wireway assemblies of sizes indicated on Drawings.

B. Provide special lengths, telescope fittings, box connectors, elbows and other fittings as required for a complete system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Mount boxes plumb and level and rigidly attach them to the structure.

2. Clean interiors before installing trim and cover.

3. Close unused openings with blanking devices or threaded plugs.

4. Install surface mounted units at least 1 inch off of walls with supports placed in such a manner to permit vertical flow of air behind the enclosure.

B. Wireways:

1. Assemble and erect system so that access covers are on top of horizontal runs

2. Do not mount wireways directly to building structure or machinery. Use a trapeze assembly to install wireways.

3.2 APPLICATION

A. NEMA 3R for outdoor installations.

B. NEMA 1 for all other areas unless indicated otherwise on the Drawings.

C. Cast iron "FS/FD" for use with surface mounted steel conduit unless noted otherwise on the Drawings or in other Specification Sections.

D. One-piece stamped steel boxes for installation in partitions, walls, and suspended ceilings.

E. Tile box, 3-½ inch deep for installation in poured concrete walls and concrete columns. 4-inch octagonal box with removable back cover for installation in overhead concrete slabs.

END OF SECTION

SECTION 26 05 50

IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Identification and information signs and warning signs for electrical equipment.

B. Related Sections: Additional identification requirements for specific items are specified elsewhere in Division 16. See Specification Section 26 05 19, Low Voltage Copper Wire and Cable for wire identification.

1.2 APPLICABLE STANDARDS

A. OSHA Subpart S.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Identification and Information Signs:

1. Rigid laminated phenolic, per owner specific color requirements.

2. Text size for equipment designations shall be as large as space allows, up to 1-1/2" maximum.

3. 1/2-inch minimum text size.

4. Contractor shall submit proposed lettering for approval by Owner.

5. The Contractor shall coordinate names, abbreviations, and other designations used in the electrical identification work with the corresponding designations shown, specified and scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

B. Warning Signs:

1. OSHA Subpart J - General Environmental Controls, Section 1910.145.

2. Signs provided with equipment are acceptable provided all necessary signs are issued with equipment.

3. Provide identical signs for each application.

4. High voltage warning signs to read "DANGER - HIGH VOLTAGE - KEEP OUT."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identification and Information Signs:

1. Location: Place signs on the following equipment:

a. Power distribution switchboards.

b. Power distribution panels.

c. Panelboards.

d. Dry-type transformers.

e. Individually mounted motor controllers.

f. Control panels.

g. Safety/disconnect switches.

h. Junction boxes

2. Minimum Information on Sign: Include the following information:

a. Equipment Designation.

b. Operating Voltage.

c. Served From equipment designation.

d. For branch circuit panelboards, include color coding for phase, neutral, and ground conductors for each voltage system used in accordance with NEC paragraph 210-5(c).

3. Equipment Served Identification: Include Equipment Served on identification and information signs for the following equipment:

a. Dry-type transformers.

b. Individually mounted motor controllers.

c. Safety/disconnect switches.

B. Panelboard Directories. Provide fully completed typewritten circuit directory cards. Identify each circuit using descriptions contained in panelboard schedules on Drawings.

C. Mounting: Mount signs to clean, dry equipment surface with an epoxy adhesive.

END OF SECTION

SECTION 26 05 93

CLEANING UNDERGROUND CONDUITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Clean all new underground conduits following conduit installation and prior to the installation of conductors

2. Clean all existing conduits for which existing conductors are to be removed as indicated in the Drawings.

B. Related Sections:

1. Section 26 05 00 Electrical System General Requirements

2. Section 26 05 33.13 Metallic Conduit and Fittings

1.2 SUBMITTALS

A. Comply with the provisions and requirements of Section 01 33 00 Submittal Procedures.

B. Following the cleaning of the existing and new underground conduits, provide the following Submittals:

1. Cleaning Report, to include the following information:

a. List locations, types and sizes of conduits successfully cleaned.

b. Status of conduits which cannot be successfully cleaned (type of conduits, problems encountered, cause of problem, and exact locations measured from 2 adjacent manholes).

c. Report general conditions of the ducts (rusting steel, fiber delaminating, etc.).

d. Report of Conditions Within Manholes:

(1) Unracked cables.

(2) Missing or broken parts on cable racks.

(3) Equipment that is not grounded to a rod electrode (manhole frame, channel racks, metal ladders, splice shields).

(4) Cable arc-proofing damaged or missing.

(5) Conduits without end bells.

(6) Broken manhole covers.

e. Comments on any items that require future corrections.

1.3 QUALITY ASSURANCE

A. Qualifications of Supervisor: The person supervising the Work of this Section shall be personally experienced in this type of Work and shall have been regularly employed by a company engaged in underground pipe or conduit cleaning for a minimum of 2 years.

B. Furnish to the Owner and Engineer the names and addresses of 3 similar projects which the supervisor has worked on.

1.4 PROJECT CONDITIONS

A. Existing Conditions: The spare conduits are to be cleaned with all high voltage cables within the manholes and vaults energized.

B. Protection:

1. Provide electrical insulating blankets, sleeves, gloves, etc., to protect workmen from electrical hazards.

2. Provide heavy blankets, plywood or other devices to protect cables and equipment from physical damage.

PART 2 - PRODUCTS

2.1 DRAG LINE

A. Minimum 1/8" polypropylene monofilament utility rope:

1. American Synthetic Ropes' Flotorope.

2. Greenlee Tool Co.'s 2 ply Rope 431.

3. Ideal's Pro-Pull Rope 3/16.

4. Thomas Industries/Jet Line Products Rope 232.

2.2 CONDUIT SEALS

A. Wood or plastic plugs designed for the purpose or a contrasting color cement/sand mixture. Seals shall be removable for future use of conduits. Seals shall include waterproof tag stating "CONDUIT CLEANED" and date (month, year).

PART 3 - EXECUTION

3.1 PREPARATION

A. Dewater manholes.

B. Remove all debris from manholes.

C. Install protective devices on cables and equipment.

D. Methods used for performing the Work shall have prior approval from the Owner and Engineer.

3.2 PERFORMANCE

A. Remove all dirt, scale, debris and projections by flushing, rodding, scrapping, wire brushing and swabbing the conduits with hand tools and power equipment designed for the purpose.

B. Demonstrate to the Owner and Engineer the condition of the cleaned conduits.

1. Use mandrel l/2" less in diameter than the conduit. Paint sheath of mandrel with black lacquer. Pull mandrel through conduit. Conduit will be considered successfully cleaned if there are no roller marks or scratches on the mandrel.

2. Other methods may be used to determine the status of cleaned conduits, if approved.

C. Demonstrate to the Owner and Engineer any defect found in the conduits that cannot be satisfactorily eliminated.

D. Provide a drag line in each cleaned conduit.

E. Provide conduit seals at both ends of each cleaned conduit.

F. Remove all debris from conduits and manholes resulting from the work of this Project.

END OF SECTION

SECTION 26 09 19

ENCLOSED CONTACTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General purpose contactors.

B. Lighting contactors.

1.2 REFERENCES

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. In addition to the requirements of Section 26 05 00, enclosed contactors shall comply with the following:

1. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

2. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

1.3 SUBMITTALS

A. Comply with the provisions and requirements of Section 01330, Submittal Procedures.

B. Provide dimensions, size, voltage ratings and current ratings.

C. Include manufacturer's installation instructions.

D. Provide record drawings in accordance with Section 26 05 00. Record the actual locations of each contactor and indicate circuits controlled on project record documents.

1.4 QUALIFICATIONS

A. Manufacturer shall be a company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. Conform to requirements of NFPA 70.

C. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE CONTACTORS

A. Manufacturers:

1. Square D Company.
2. General Electric.
3. ASCO.

B. Description: NEMA ICS 2, AC general purpose magnetic contactor.

C. Coil Voltage: 120 volts, 60 Hertz unless otherwise noted.

D. Poles: As indicated.

E. Size: As indicated.

F. Enclosure: ANSI/NEMA ICS 6, Type 1 for indoor installation and type 3R for outdoor installation.

G. Accessories: As shown.

2.2 LIGHTING CONTACTORS

A. Manufacturers:

1. Square D Company.
2. General Electric.
3. ASCO.

B. Description: NEMA ICS 2, magnetic lighting contactor.

C. Configuration: Electrically held 2 wire control.

D. Coil Voltage: 120 volts, 60 Hertz unless otherwise noted.

E. Poles: As indicated.

F. Contact Rating: As indicated.

G. Enclosure: ANSI/NEMA ICS 6, Type 1 for indoor installation and type 3R for outdoor installation.

H. Accessories: As shown.

PART 3 - EXECUTION

Not Applicable

END OF SECTION

SECTION 26 22 00

DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies general purpose and specialty dry-type transformers with windings rated 600 Volts or less.

1.2 RELATED SECTIONS

A. Section 26 05 00 Electrical System General Requirements

B. Section 26 05 03 Equipment Installation

C. Section 26 05 50 Identification

D. Section 26 05 26 Grounding

1.3 QUALITY ASSURANCE

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. In addition to the Codes and Standards summarized in Section 16010, dry-type transformers shall comply with the requirements, ANSI/IEEE C57.12.01, NEMA ST 1, NEMA ST 20, UL 506, and UL 1561.

C. UL Labeling or Listing: Furnish transformers bearing UL label.

D. NRTL Labeling or Listing: Furnish transformers bearing the label of a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

1.4 SUBMITTALS

A. Submit Product Data on each transformer showing ratings, number of phases, winding configuration, KVA capacities, overall dimensions, and weight in accordance with Section(s) 01 33 00, Submittal Procedures.

B. Submit one copy of manufacturer's sound rating certification.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Provide transformers with the following characteristics:

1. Ratings, Configurations, and Capacities: Primary and secondary voltage ratings, number of phases, winding configuration, and KVA capacities as shown on the Drawings.

2. Windings: Electrical Grade Copper, two windings per phase, totally enclosed, non-ventilated, self-cooled. Aluminum windings are not permitted.

B. Shielded isolation transformers shall be provided with an electrostatic shield between the primary and secondary windings.

C. Primary Taps:

1. Below 30 KVA: 2@ 5% FCBN.

2. 30 KVA and Above: 2@ 2-1/2% FCAN and 4@ 2-1/2% FCBN.

D. Insulation: BIL shall be a minimum of 10kV.

1. Below 30 KVA: Class 185.

2. 30 KVA and Above: Class 220.

E. Temperature Rise (Over 40°C Ambient):

1. Below 30 KVA: 115°C.

2. 30 KVA and Above: 150°C.

F. Sound Rating: Do not exceed ANSI and NEMA maximum levels for specified KVA capacities. Sound levels shall be guaranteed by the manufacturer not to exceed the following.

1. 45db for transformers 15-50 kVA

2. 50db for transformers 51-300 kVA

3. 55db for transformers 301-500 kVA

G. Sound levels for transformers mounted in Hospitals, Schools, Office Areas and other sensitive areas shall be nominally 5 db below ANSI levels referenced in paragraph 2.1 G above. Note: “other sensitive areas” will be designated on the drawings.

H. Enclosure: Suitable for indoor locations (NEMA 1) or outdoor (NEMA 3R) locations with the addition of weathershield kit and including a wiring compartment suitable for conduit entry. All transformers shall be provided with rodent screens. Transformers through 75 kVA shall be designed so they can be either floor or wall mounted. Above 75kVA they shall be of a floor mounted design.

I. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with grey, baked, enamel.

2.2 Buck/boost transformers shall be encapsulated type, suitable for 80ºC rise in 40ºC ambient. Secondary windings shall be rated 12/24V and/or 16/32V as indicated on the drawings.

2.3 Provide transformer with engraved nameplates with designation as indicated on the drawings or as directed by the Owner's Representative in accordance with Section 26 05 50 – Identification.

2.4 ACCEPTABLE MANUFACTURERS:

A. General Electric Company.

B. Square-D Company.

C. Siemens.

PART 3 - EXECUTION

3.1 INSTALLATION.

A. Mounting: Refer to Section 16190 for proper support and anchorage. Provide 4-inch tall concrete housekeeping pads when transformers are mounted in equipment rooms or areas subject to occasional moisture on the floor. In all outdoor locations concrete transformer pads are required.

B. Raceway Connections: Connect raceways to transformer enclosure using flexible conduit as specified in Section 26 05 33.13. Use pieces of flex approximately ten diameters in length.

C. Wiring: Terminate wiring connections in accordance with Section 26 05 19.

D. Grounding: Refer to Section 26 05 26.

E. Assure National Electrical Code clearances on all sides for adequate ventilation.

F. Transformers shall be installed in accordance with manufacturer's recommendations. In addition, all transformers shall be installed with Isomode, Aeroflex or Energy Kinetics vibration isolation devices under feet or contact points.

G. Adjust transformer taps for proper secondary voltage.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. The Contractor shall provide all labor, materials, equipment and incidentals as shown on the Drawings, specified and required to furnish and install receptacles.

B. Related Sections: The Contractor shall coordinate the requirements of this Section with the requirements of the Sections listed below.

1. Section 26 05 33.16, Boxes.

2. Section 26 05 19, Low Voltage Copper Wire and Cable.

1.2 QUALITY ASSURANCE

A. Comply with applicable provisions and recommendations of the following:

1. National Electrical Code.

2. UL Standard No. 1010, Electrical Receptacle - Plug Combinations for Use in Hazardous Locations.

1.3 SUBMITTALS

A. Comply with the provisions and requirements of Section 01 33 00, Submittal Procedures.

B. Provide submittals for all Receptacles proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Receptacles for Non-Hazardous Locations:

1. Duplex grounding receptacle, two pole, three wire, 125-volt AC, 20 amperes.

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 5362, for dry indoor locations and Catalog No. 53CM62, for wet and corrosive locations, by Harvey Hubbell Incorporated.

(2) Catalog No. 5362, for dry indoor locations and Catalog No. 5362-CR, for wet and corrosive locations, by Arrow-Hart Incorporated.

(3) Or equal.

2. Single grounding receptacle, two pole, three wire, 125-volt AC, 20 amperes.

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 53CM61, by Harvey Hubbell Incorporated.

(2) Catalog No. 5361-CR, by Arrow-Hart Incorporated.

(3) Or equal.

B. Ground Fault Receptacles:

1. Duplex receptacle, two pole, three wire, 125-volt AC, 20 amperes.

2. Product and Manufacturer: Provide one of the following:

a. Catalog No. GF5362, by Harvey Hubbell Incorporated.

b. Catalog No. GF5342, by Arrow-Hart Incorporated.

c. Or equal.

C. Surge Suppression Receptacles:

1. Duplex grounding, surge suppression receptacle, two pole, three wire, 125-volt AC, 20 amperes, capable of absorbing a transient surge 6,000 volts minimum. Receptacle to include power on indicator light:

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 5350S by Harvey Hubbell Inc.

(2) Catalog No. 5380-GY by Leviton Manufacturing Company.

(3) Or equal.

D. Power Receptacles: 480-volt interlocked receptacle with enclosed safety switch service outlet: Provide service outlets, quantity as shown on the Drawings for portable equipment.

1. Material: Copper free aluminum enclosure with operating handle, NEMA 4 with gasketed hinged door.

a. Switch: Heavy duty, three pole, with visible blades, a quick make and break mechanism with reinforced, positive pressure type blade and fuse clips. Switch shall be mechanically interlocked with the receptacle. The switch cannot be closed until the plug is fully inserted and the plug cannot be withdrawn or inserted, unless the switch is open.

b. Receptacle: As indicated on the drawings. Provide two matching plugs.

c. Type WSR, and Type APS plugs by Crouse-Hinds Company or equal.

E. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown on the Drawings. Coordinate with equipment plugs. Provide matching plug for each receptacle.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install receptacles at locations as shown on the Drawings in outlet or device boxes in accordance with Section 26 05 33.16, Boxes, in non-hazardous locations.

B. Install receptacles in PVC coated galvanized rigid steel conduit systems in hazardous locations.

C. Install receptacles with ground pole in the down position.

D. Mount receptacles 18-inches above finished floor, or in accordance with local building codes, in non-hazardous locations and 4 feet-6 inches above finished floor in hazardous locations, unless otherwise noted.

E. Identify each conductor with the circuit number and the lighting panel number. Identification shall conform to the requirements of Section 26 05 19, Low Voltage Copper Wire and Cable.

F. Identify each receptacle with a permanent phenolic tag. The tags shall include the circuit number and the lighting panel number.

G. Installation shall conform to the National Electrical Code.

END OF SECTION

SECTION 26 27 29

SNAP SWITCHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown on the Drawings, specified and required to furnish and install snap switches for lighting and other systems.

B. Related Sections: Contractor shall coordinate the requirements of the work in this section along with the requirements of the sections listed below which include, but are not necessarily limited to, work that is directly related to this Section.

1. Section 26 05 33.16, Boxes.

2. Section 26 05 19, Low Voltage Copper Wire and Cable.

1.2 QUALITY ASSURANCE

A. Comply with applicable provisions and recommendations of the following, except where otherwise shown or specified.

1. National Electrical Code.

2. UL Standard No. 20, General Use Snap Switches.

1.3 SUBMITTALS

A. Comply with the provisions and requirements of Section 01 33 00, Submittal Procedures.

B. Provide Submittals for all switches proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Switches for Non-Hazardous Locations:

1. Single pole AC toggle switch, quiet type, 120/277 volt AC, 20 amperes, Ivory, specification grade.

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 1221-I, by Harvey Hubbell Incorporated.

(2) Catalog No. 1991-I, by Arrow-Hart Incorporated.

2. Single pole, 3-way AC toggle switch, quiet type, 120/277 volt AC, 20 amperes, Ivory, specification grade.

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 1223-I, by Harvey Hubbell Incorporated.

(2) Catalog No. 1993-I, by Arrow-Hart Incorporated.

3. Two pole AC toggle switch, quiet type, 120/277 volt AC, 20 amperes, Ivory, specification grade.

a. Product and Manufacturer: Provide one of the following:

(1) Catalog No. 1222-I, by Harvey Hubbell Incorporated.

(2) Catalog No. 1992-I, by Arrow-Hart Incorporated.

B. Switch Covers:

1. Indoor covers shall be Type 304, stainless steel.

2. Outdoor or wet location covers shall be weatherproof and corrosion resistant.

C. Key Operated On-Off Switches:

1. Key operated switches shall be complete with legend plate and NEMA 4 enclosure and two keys for each switch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install switches at locations as shown on the Drawings in outlet or device boxes in accordance with Section 26 05 33.16, Boxes, in non-hazardous locations.

B. Mount wall switches 4 feet-6 inches above finished floor unless otherwise noted.

C. Identify each conductor with the circuit number and the lighting panel number. Identification shall conform to the requirements of Section 26 05 19, Low Voltage Copper Wire and Cable.

D. Install switches in conformance with National Electrical Code.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions. Comply with the provisions and requirements of Section 01 33 00, Submittal Procedures

1.2 MAINTENANCE

A. Spare Parts:

1. Six spare fuses of each size and category, including any accessories required for a complete installation.

2. Special tools if required for installation or removal of fuses.

PART 2 - PRODUCTS

2.1 FUSEHOLDERS

A. Equipment provided shall be furnished with fuseholders to accommodate the fuses specified.

2.2 FUSES RATED 600V OR LESS

A. Fuses for Safety Switches (Motor Circuits) and Service Disconnects:

1. Cartridge Type (250 Volts, 600 Amperes or Less): Dual element time-delay, UL Class RK-5, 200,000 amperes R.M.S. symmetrical interrupting capacity:

   a. Cooper Industries Inc.'s/Bussman Div. Type FRN-R.

   b. Gould Inc.'s/Circuit Protection Div. (Shawmut) Type TR-R.

   c. Littlefuse Inc.'s Type FLN-R.

2. Cartridge Type (600 Volts, 600 Amperes or Less): Dual element time-delay, UL Class RK-5, 200,000 amperes R.M.S. symmetrical interrupting capacity:

   a. Cooper Industries Inc.'s/Bussmann Div. Type FRS-R.

   b. Gould Inc.'s/Circuit Protection Div. (Shawmut) Type TRS-R.

   c. Littlefuse Inc.'s Type FLS-R.

3. Cartridge Type (600 Volts or Less - Above 600 Amperes): Current limiting, UL Class L, 200,000 amperes R.M.S. symmetrical interrupting capacity:

   a. Cooper Industries Inc.'s/Bussmann Div. Type KTU.

b. Gould Inc.'s Circuit Protection Div. (Shawmut) Type A4BY.

c. Littlefuse Inc.'s Type KLP-C.

B. Fuses for Safety Switches (Lighting and Heating Circuits):

1. Cartridge Type (250 Volts): Single element, UL Class RK-1, 200,000 amperes R.M.S. symmetrical interrupting capacity:

a. Cooper Industries Inc.'s/Bussmann Div., Type KTN-R.

b. Gould Inc.'s/Circuit Protection Div. (Shawmut) Type A2K-R.

c. Littlefuse Inc.'s Type KLN-R.

2. Cartridge Type (600 Volts): Single element, UL Class RK-1, 200,000 amperes R.M.S. symmetrical interrupting capacity:

a. Cooper Industries Inc.'s/Bussmann Div. Type KTS-R.

b. Gould Inc.'s/Circuit Protection Div. (Shawmut) Type A6K-R.

c. Littlefuse Inc.'s Type KLS-R.

2.3 FUSES RATED OVER 600V

A. Fuses for Metal Enclosed Interrupter Switchgear:

1. Current Limiting, Silver-Sand Type: General Electric Co.'s Type EJ, or Westinghouse Elec. Corp.'s Type CLE.

2. Boric-Acid Type: S & C Electric Co.'s Type SM with snuffler, or Westinghouse Elec. Corp.'s Type RBA with condenser.

B. Fuses for 35KV Service Switch and Fuse Assembly: S & C Electric Co.'s Type SM-5.

C. Fuses for Pad Mounted High Voltage Switch and Fuse Assembly: S & C Electric Co.'s Type SML.

D. Fuses for Fused Load Break Interrupter Switches: General Electric Co. Type EJ, S & C Electric Co.'s Type SM, or Westinghouse Electric Corp.'s Type CLE.

E. Fuses for Distribution Oil Cutouts: General Electric Co.'s Fuse Links 9F57CAA, or G & W Electric Co.'s Type FL.

F. Fuses for Primary Cutouts:

1. Cutouts Rated 5.2KV: EEI-NEMA standard Type K (fast) distribution fuse links; Westinghouse Electric Corp.'s Universal Cable Type Fuse Links Series 632AO--A01.

2. Cutouts Rated 14.4KV: EEI-NEMA standard Type K (fast) distribution fuse links; S & C Electric Co.'s 265000 Series, or Westinghouse Electric Corp.'s Universal Cable Type Fuse Links Series 632A0--A01.

3. Cutouts Rated 38KV: EEI-NEMA standard Type K (fast) distribution fuse links, to suit primary cutouts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fuses in respective equipment.

END OF SECTION

SECTION 26 28 16.13

MOLDED CASE CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies molded case circuit breakers in individual enclosures, panelboards, combination motor starters, and control panels.

1.2 RELATED SECTIONS

A. Section 26 05 00 Electrical System General Requirements

B. Section 26 05 03 Equipment Installation

1.3 QUALITY ASSURANCE

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. In addition to the Codes and Standards summarized in Section 26 05 00, molded case circuit breakers shall comply with the requirements of:

1. NEMA AB 1.

2. UL 489.

C. UL Labeling or Listing: Furnish circuit breakers bearing UL label.

D. NRTL Labeling or Listing: Furnish circuit breakers bearing label of a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

1.4 SUBMITTALS

A. Submit Product Data on each circuit breaker showing ratings, overall dimensions, enclosure type, and accessories in accordance with Section(s) 01 33 00, Submittal Procedures.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General:

1. Voltage rating for the point of application, frame size, trip rating, and interrupting rating are noted on Drawings.

2. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism. Automatic tripping of the breaker shall be clearly indicated by handle position. Contacts shall be non-welding silver alloy and arc extinction shall be accomplished by means of arc chutes.

3. All breakers shall be “bolt on” type.

4. When used for switching lighting circuits, breakers shall be marked “SWD” (Switch Duty Rated).

5. All multi-pole breakers shall have common trip. Wires, pins, etc., between single pole breakers to form common trip will not be acceptable.

6. The use of “Pushmatic” or miniature “Quicklag” breakers shall not be permitted.

7. Provide individually enclosed and panelboard mounted circuit breakers of the thermal-magnetic type with inverse time and instantaneous trip characteristics rated for operation in a 40°C ambient.

8. Provide breakers used in combination with motor starters with adjustable instantaneous trips.

9. Provide shunt trip devices, motor operators, interlocks, auxiliary contacts, bell alarm switches, and other modifications as noted on Drawings or specified in Section 26 29 13.

10. Do not use “trunk type” latches on enclosures.

B. Enclosures:

1. NEMA 1 for dry, indoor areas.

2. NEMA 3R for damp or outdoor locations.

3. Other ratings as noted.

C. Acceptable Manufacturers:

1. General Electric Company.

2. Square D Company.

3. Siemens.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Mounting: Refer to Section 26 05 29. Mount individually enclosed circuit breakers with top of enclosure 6'-6" above finished floor unless indicated otherwise on Drawings.

B. Trip Settings:

C. Set adjustable instantaneous trips to minimum, unless indicated otherwise on Drawings.

D. On magnetic breakers in combination with starters, set trips at the lowest value that will permit motor starting, but not higher than 13 times the motor nameplate full-load current.

3.2 IDENTIFICATION

A. Refer to Section 26 05 29.

END OF SECTION

SECTION 26 28 16.16

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section specifies fusible and non-fusible safety and disconnect switches, individually enclosed and group mounted or applied in combination with motor controllers/contactors in single or grouped installations.

1.2 QUALITY ASSURANCE:

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

B. In addition to the Codes and Standards summarized in Section 26 05 00, disconnect switches shall comply with the requirements of NEMA 250, NEMA KS 1, and UL 98.

C. UL Labeling or Listing: Furnish switches bearing UL label.

C. NRTL Labeling or Listing: Furnish switches bearing label of a Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

1.3 SUBMITTALS

A. Submit Product Data on each switch showing ratings, overall dimensions, enclosure type, and accessories, in accordance with Section 01 33 00, Submittal Procedures.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. General: Fusible and non-fusible "Heavy Duty" safety and disconnect switches with ratings as shown on Drawings and 75ºC or higher temperature rating.

B. Components:

1. Line terminal shields.

2. Visible blades.

3. Non-teasible, positive, quick-make, quick-break interrupter operating mechanism.

4. Reinforced Class R rejection-type fuse clips.

5. Handle whose position ("OFF" or "ON") is easily recognizable and can be multiple padlocked in "OFF" position.

6. Defeatable door interlocks that prevent door from opening when operating handle is in "ON" position.

7. Auxiliary control contact operated by handle mechanism to signal that switch is in the closed position where indicated on Drawings.

8. Factory installed ground lugs.

9. Factory installed cover mounted metal nameplate containing a permanent record of:

   a. Switch type.

   b. Catalog number.

   c. Horsepower ratings using both standard and time delay fuses.

D. Horsepower Ratings:

1. Horsepower rated switches for use as motor disconnecting means, with sizes in accordance with individual manufacturer's published ratings.

2. For applications in excess of switch ratings, provide non-automatic molded case circuit breakers rated not less than 125% of motor full load current.

E. Fuses: Current-limiting-type UL RK1 with a minimum interrupting rating of 200,000 RMS symmetrical amperes and of continuous current ratings as shown on Drawings.

F. Enclosures:

1. NEMA 1 for dry, indoor areas.

2. NEMA 3R for damp indoor or outdoor locations.

3. Others as noted.

G. Acceptable Manufacturers:

1. General Electric Company.

2. Square-D Company.

3. Siemens

PART 3 - EXECUTION

3.1 INSTALLATION

A. Enclosure:

1. Mount switch enclosure plumb and level and rigidly attach to structure.

2. Mount 1 inch off structure with top 6'-6" above finished floor.

3. Install supports in a manner to permit vertical flow of air behind enclosure.

4. Use steel supports fabricated from standard rolled structural steel shapes as specified in Section 26 05 29.

B. Wiring: Install all incoming and outgoing power circuits.

C. Grounding: Refer to Section 26 05 26.

D. Fuses: Install properly rated fuses.

3.2 IDENTIFICATION

A. Refer to Section 26 05 50.

END OF SECTION

SECTION 26 29 13

MOTOR STARTERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manual motor starters.

B. Combination magnetic motor starters.

1.2 RELATED SECTIONS

A. Section 26 05 00, Electrical System General Requirements.

1.3 REFERENCES

A. Refer to Section 26 05 00, Electrical System General Requirements for Codes and Standards.

1.4 SUBMITTALS

A. Comply with the provisions and requirements of Section 01 33 00, Submittal Procedures.

B. Product Data: Provide dimensions, mounting, weight, electrical ratings, control schematics, wiring diagrams and recommended overload heater sizes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. General Electric

B. Square D

C. Siemens

2.2 MANUAL MOTOR STARTERS

A. Shall have "quick-make, quick-break" toggle mechanism.

B. Overload heater(s) shall be sized per motor nameplate and manufacturer's recommendations.

C. Provide NEMA Type 1 enclosure unless otherwise shown on the drawings.

D. Shall be suitable for the voltage, HP and the number of phases as shown on the drawings.

2.3 COMBINATION MAGNETIC MOTOR STARTERS

A. Starters shall be combination, full voltage, nonreversing unless shown otherwise, and shall utilize motor circuit protectors or fusible switches as shown on the drawings.

B. Starters shall be equipped with a fused control power transformer, 120-volt operating coil, ambient compensated overload relays and one NO and one NC spare auxiliary contacts wired to the terminal strip.

C. Each starter shall be provided with the control devices shown on the drawings. If control schematics are not shown on the drawings, provide the following:

1. A 'HAND-OFF-AUTO-COMPUTER' selector switch mounted on the cover.

2. A red 'RUN' light and green 'STOP' light.

3. The 'AUTO' side of switch shall be wired to the external terminal strip for connection to a field-mounted control device.

D. Control power transformers shall be sized for the operating coil and any other loads shown on the drawings. One side of the control power transformer shall be grounded. Primary fusing shall be provided in accordance with the NEC.

E. Motor circuit protectors (MCP) shall provide adjustable magnetic protection and be provided with a pin insert to stop the magnetic adjustment at 1,300 percent motor nameplate full load current. The MCP shall have a "tripped" position on the unit disconnect and a push-to-test button on the MCP. The MCP shall include a transient override feature for motor inrush current.

F. Overload heaters shall be sized per motor nameplate and manufacturer's recommendations. A manual reset button shall be provided on the cover of the door.

G. Control accessories shall be heavy-duty oil tight type. Indicating lights shall be transformer type with 6.3-volt lamps and push-to-test feature.

H. Hour meters (elapsed time meters) shall be 2-1/2-inch square case type for flush panel mounting. The meter face shall have black trim on white or aluminized face. The meters shall have a six-digit nonreset register with the last digit indicating tenths of an hour.

I. Terminal strips shall be provided for connection to external devices.

J. Enclosures shall be NEMA type as shown on the drawings. Where NEMA type enclosures are not shown on the drawings, provide NEMA type most suitable for the environmental conditions where the motor starter is being installed.

K. Enclosures shall be thoroughly cleaned, given a rust-inhibiting primer coat, and painted with manufacturer's standard colors.

L. Provide nameplates for each control device on door in accordance with Section 26 05 00.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install per manufacturer's and NEC requirements.

B. Ensure National Electrical Code clearances.

C. Verify proper overload heater and fuse sizes and replace/adjust if required.

D. Adjust all motor circuit protectors per manufacture's recommendations.

E. Test all control and safety devices to ensure proper operation.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall perform all excavation and backfilling necessary to complete the work. This shall include the excavation of earth and rock, the removal and disposal of unsuitable material, dewatering, placement of suitable fill and backfill material, and the restoration and final grading for all earth surfaces.

1.2 RELATED SECTIONS

A. Section 31 23 19 - Dewatering

B. Section 31 25 00 – Erosion and Sedimentation Controls

C. Section 31 41 00 – Shoring

1.3 REFERENCES

A. MDOT - Michigan Department of Transportation 2012 Standard Specifications for Construction

1.4 PROJECT REQUIREMENTS

A. Work within rights-of-way.

1. Where the governmental bodies having jurisdiction of the streets or rights-of-way have specific specifications relating to the requirements for work within their jurisdiction, such requirements must be met as a minimum requirement, and if these Specifications impose further limitation on the work, they shall also be met as the required work standard.

2. During all operations of the CONTRACTOR in the streets and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by the agency having jurisdiction.

1.5 EXISTING CONDITIONS

A. Soil boring results, if taken on a site, are appended to these Specifications with locations noted. Boring logs are shown to be generally representative of the site and to assist in the design and construction of the work.

1.6 QUALITY ASSURANCE

A. The CONTRACTOR's independent testing firm shall provide the following:

1. Certify that the required soil bearing capacity of prepared excavation meets proposed design criteria.

2. Certify that materials proposed by the CONTRACTOR meet specifications. Certification test reports shall be submitted to the ENGINEER.

3. Conduct compaction testing of engineered fill below footings, foundations, slabs and along backfill for utility trenches. The testing frequency shall be one test per lift per 400 square feet of fill.

4. Any area failing compaction testing shall be compacted and re-tested at the CONTRACTOR's expense.

PART 2 - PRODUCTS

2.1 BACKFILL MATERIAL

A. For areas not requiring "granular backfill" material, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than 3 inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.

B. Where "granular material" backfill is required as specified herein, backfill material shall be defined as a material meeting granular material Class II as defined in MDOT Section 902.

PART 3 - EXECUTION

3.1 GENERAL EXCAVATION

A. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workmen, and the public.

B. All excavation, except where necessary to tunnel, bore or jack under roads, railroads, tree roots and other obstructions within the limits indicated on the Plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.

C. Foreign material or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct the excavation, shall be removed. Such materials found at the bottom of the excavation shall be removed and the foundation restored with approved materials.

D. If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be filled with selected material solidly tamped into place, in not more than 6-inch layers to the satisfaction of the ENGINEER, before the construction work proceeds. At the direction of the ENGINEER, the excess excavation may be filled with 2000 psi concrete at the CONTRACTOR's expense.

E. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing wells and to completed or partially completed structures. The CONTRACTOR shall be responsible for all damages caused by him due to inadequate or improper protection.

3.2 EXCAVATION FOR SEWERS

A. Trenches shall be excavated to the depth required with allowance for bedding the pipe. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of all loadings.

B. The width of the trench at the top of a rigid pipe shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6 inches and a maximum net clearance of 12 inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted.

C. The width of trench at the top of a flexible pipe backfill when using concrete bedding shall be sufficient to allow the pipe to be laid and jointed properly with the minimum net clearance of 12 inches and a maximum net clearance of 18 inches on each side of the barrel of the pipe.

D. Where the conditions of the ground require, or where the work is in close proximity of existing structures, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where it is safe to pull the sheeting without disturbing the protected feature. No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the main or other structures, except with the specific review and direction of the ENGINEER.

E. Other underground mains, sewers or structures encountered in the excavation shall be adequately supported during the CONTRACTOR's operations, and before backfilling, shall be given permanent support as directed by the ENGINEER to meet the standards or requirements of the owning utility or agency.

F. Water, sewer, gas and other utility services disturbed by the CONTRACTOR in his operations shall be repaired or replaced in a manner equal to the original condition by the CONTRACTOR at his own expense. Where these services are encountered and are undamaged, they shall be supported and/or protected by the CONTRACTOR at his expense against later settlement and/or damage after backfill. The CONTRACTOR shall consult the agency or the utility firm having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine method of supporting such duct or pipe.

G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean, or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed except as otherwise provided for herein on a temporary basis.

3.3 EXCAVATION FOR STRUCTURES

A. Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and for practicable construction methods to be followed.

B. Requirements for excavation of sewers and water mains shall also apply to this Section.

3.4 EXCAVATION FOR PAVED SURFACES

A. In excavating around manholes and catch basins or inlets, care shall be exercised to avoid removing the casings and pushing dirt into the structures. Dirt pushed into manholes, catch basins or inlets by the CONTRACTOR's operations shall be immediately removed so that the dirt will not be carried into the sewer by the flow of sewage or storm water.

B. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction area, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in the judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

3.5 SHORING, SHEETING AND BRACING

A. Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained, and except as shown or specified otherwise, removed by the CONTRACTOR.

B. All sheet piling, shoring, sheeting and bracing shall be designed by a professional engineer engaged by the CONTRACTOR with demonstrated competence and experience in such work. The sheeting system shall be designed to prevent bottom failure and hydrostatic uplift within the excavation. Provision shall also be made in the design for lateral pressures due to side slope and construction equipment or other surcharge loads, as applicable.

C. The CONTRACTOR shall provide to the ENGINEER for his review, design calculation and arrangement drawings of the sheeting system prior to ordering any materials for bracing, sheeting, etc., and prior to the commencement of the excavation.

D. All materials, except as otherwise specified, used for sheeting and sheet piling, lagging, braces, shores, and stringers, or waling strips shall be of approved quality and dimensions throughout.

E. Materials for sheeting systems shall be furnished and driven or set in place by the CONTRACTOR, where necessary or wherever ordered by the ENGINEER, whether the same is or is not considered necessary by the CONTRACTOR. If, in the opinion of the ENGINEER, the materials furnished by the CONTRACTOR are not of proper quality or sufficient size or not properly placed to ensure the safety of the work or of adjacent structures and property, the CONTRACTOR shall, upon notice from the ENGINEER to that effect, forthwith procure, furnish and set in place or drive other and satisfactory materials, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the ENGINEER may order all or any part of the work to be stopped until such materials so used are furnished and placed; and the CONTRACTOR shall not be entitled to claim, demand, or receive any compensation for larger size or better quality or different disposal of materials ordered by the ENGINEER, nor any compensation for allowance of

any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.

F. Steel sheet piling may be either new or used. It shall be of adequate strength, straight and properly braced. Steel sheet piling shall be of the interlocking type. Friction in the interlocks shall not be assumed to contribute to the strength of the sheet piling.

G. The design, planning, installation and removal, if required, of all sheet piling, shoring, sheeting, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

H. Steel sheet piling for the excavation shall be driven straight and in-line. The piling shall be supported aboveground, before driving, by a guide frame at least 20 ft high which will keep the piling accurately in the required position and vertical. Each piece of piling shall be driven only a few feet at a time and driving shall proceed continuously around the perimeter so that the piles shall reach their full penetration together.

I. Walers and bracing shall be supplied and installed as required to complete the sheeting system. Walers and braces shall be of adequate strength for the load imposed. Splices in walers shall develop the full strength of the member in bending, shear, and axial compression.

J. If bracing members are to be removed during construction, the timing and procedure for removal shall not induce excessive stresses in the permanent structures or in steel sheet piling and bracing members.

K. If the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the CONTRACTOR shall secure written acceptance of the ENGINEER prior to the installation of such bracing.

L. In trenching operations, the use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench racing will not be permitted. The use of a traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.

M. The neglect, failure, or refusal of the ENGINEER to order the use of sheeting, or sheet piling or steel, or to order the same to be left in place, or the giving or failure to give of any order or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, shores, etc., shall not in any way relieve the CONTRACTOR of any or all obligations under this Contract. Sheeting left in place shall be cut off one (1) foot below existing grade.

N. The rules of the OSHA and the State Department of Labor with respect to excavation and construction shall at all times be strictly observed.

3.6 BACKFILLING FOR SEWERS

A. Backfilling shall consist of placement of the prescribed materials from a level 12 inches above the crown of the pipe. Placement shall be as follows:

1. Under pavements, curb, paved driveways, and sidewalks, the backfill shall be granular material compacted in layers not to exceed 12 inches loose thickness

with backfilling carried up to subgrade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content. After a period of about 60 days or less, if the backfill compaction is satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall retrim neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed. The pavement shall be replaced in accordance with the standard specifications of the agency having jurisdiction.

2. Backfill around lift stations, or buried underground structures shall be granular material compacted in 12-inch lifts. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.

3. For all other areas, backfilling shall consist of placing excavated material as defined in Paragraph 2.1.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum unit density as determined at the optimum moisture content.

3.7 FILLING AND BACKFILLING FOR STRUCTURES

A. Embankments underlying structural footings, streets and drives, sidewalks and around structures shall be granular material meeting the requirements of the Michigan Department of Transportation for granular material compacted to 95% density.

B. In all other areas, material required for embankments and backfilling shall be soil or soil-rock mixture free of organic and other deleterious matter and shall contain no more than 15% rocks or lumps larger than 2-1/2 inches in the greatest dimension, compacted to 90% density.

C. Under all interior and exterior floor slabs, an 8-inch thick granular cushion shall be placed. This material shall be MDOT Class II granular material.

D. Where embankment material is placed to achieve a new surface elevation, the top 4 inches shall be approved topsoil either salvaged from the site or hauled in by the CONTRACTOR.

3.8 FILLING AND BACKFILLING FOR PAVED SURFACES

A. Embankments, including sand cushions and granular fills, shall be placed in successive layers not more than 6 inches in depth the full width of the cross section, each layer to be thoroughly compacted by means of vibratory compactors or by an approved pneumatic-tired roller or combination thereof, as required by the ENGINEER. Each layer shall be compacted to not less than 95% of the maximum unit density as determined at the optimum moisture content. All parts of the embankment shall be uniformly compacted and the CONTRACTOR shall so direct all earthmoving equipment used in the work so that the same shall be attained. Embankment or fill outside the limits of the subgrade where sand or gravel is not required shall be made with suitable material which is free from perishable organic matter, rubbish, stones, broken concrete, roots, or other foreign materials, at no additional compensation. Before any embankments are begin, the base shall be made firm and cleared of topsoil, sod or other perishable material. The sides of the embankment shall be neatly and evenly dressed to the slope shown on the Plans, or such other slope as the ENGINEER may direct.

B. Upon completion of the placing of the curbs, and after the concrete has cured sufficiently, forms shall be removed and the excavated space behind the curb shall be backfilled with a good quality of surface soil, free of rubbish, stone, broken concrete, roots or other foreign material. Where adequate acceptable material for backfill behind the curb is not available, granular fill conforming to 2003 MDOT 902.08, Class II, shall be used. Where the area behind the curb is in cut, it shall be trimmed from the top of the curb on the slope shown on the Plans. If the area is in embankment or fill, an earth berm shall be placed immediately adjacent to the top of the curb and then the embankment of fill shall be finished to the slope shown on the Plans. All trimming and finishing shall be done in a neat, workmanlike manner. All excess concrete and debris shall be removed from the excavation behind the curb line before backfilling begins.

C. In construction of non-rigid pavements, backfilling back of curb and gutter shall be completed before placement and compaction of the base course of the roadway.

3.9 PREPARATION OF SUBGRADE FOR PAVED SURFACES

A. The bottom of the excavation for the pavement or top of the fill shall be known as the pavement subgrade and shall be smoothed, trimmed and compacted to the required line, grade and cross section to receive the road metal. It shall be thoroughly compacted by rolling with a roller of approved type weighing not less than 8 tons. The subgrade shall be compacted to at least 95% of the maximum density as designated by the test method AASHTO T-180. Inaccessible areas, where rolling is not practical, shall be thoroughly compacted by mechanical tampers capable of striking a blow equivalent to at least 250 foot-pounds per square foot. The subgrade thus formed shall be maintained in a smooth and compacted condition until the pavement has been placed. No base course, surfacing, curb, or curb and gutter, shall be placed until the subgrade has been reviewed by the ENGINEER. The subgrade shall be finished in an acceptable condition at least one day in advance of the pavement construction at all times. Six inches of compacted depth of granular material shall be used where uncompactable soil is encountered. The granular fill shall conform to the 2003 MDOT 902.08, Class II, compacted to 95% of its density.

B. Immediately prior to placing the pavement, the subgrade shall be tested for conformity with the cross section shown on the Plans by means of an approved template riding on the curb and gutter sections or on side forms. If necessary, materials shall be removed or added, as required, to bring all portions of the subgrade to the correct elevation. Corrected portions shall then be thoroughly compacted and again tested with the template. Pavement material shall not be placed at any portion of the subgrade which has not been tested for correct elevation.

C. The finished subgrade shall be maintained in a smooth and compacted condition until the pavement is placed. No storage piles of fine or coarse aggregate shall be placed directly upon the finished subgrade. Should the subgrade become rutted or disturbed in any manner, it shall be reshaped and recompacted.

3.10 GRADING

A. The CONTRACTOR shall grade the site to achieve the elevations as shown on the Plans. All disturbed areas beyond the grading limits shall be restored to prior condition.

B. Surplus excavated material not needed shall be disposed of by the CONTRACTOR. Headwalls, culverts, drains, sewers and appurtenances filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, repaired, or replaced at his expense.

C. All temporary earth changes shall be in conformance with the Soil and Erosion Control Act.

3.11 RESTORATION

A. Headwalls, culverts, and drainage systems filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, re-laid or rebuilt with new materials to a condition equal to the original state, and of thickness equal to the original structure and to the original line and grade at the CONTRACTOR's expense.

B. Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR's operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section.

C. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

D. The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a condition equal to its original state.

E. The final condition of the streets and roadways shall be subject to the approval of the governmental body having jurisdiction thereof, as well as review by the ENGINEER.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. If necessary, the CONTRACTOR shall supply all labor, materials, tools and equipment required to lower and control the groundwater levels and hydrostatic pressures to permit all excavation and construction specified under this contract to be performed in the dry. The control of all ice, snow and surface water shall be considered as part of the work under this Section.

B. The work under this Section shall include all costs of mobilization, supply, installation, operation, maintenance, supervision, and final dismantling and removal from the site of any and all dewatering equipment.

C. The CONTRACTOR or his dewatering subcontractor shall be currently and appropriately licensed by the State of Michigan to undertake the work covered under this Section and shall submit such information to the ENGINEER.

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork.

1.3 SUBMITTALS

A. The CONTRACTOR shall submit complete plans and description of the overall dewatering system he proposed to use for the work under this Section for review by the ENGINEER, showing the details of the dewatering system prior to initiation of any excavation within 3 feet of the prevailing groundwater levels.

B. Review by the ENGINEER of the dewatering system proposed by the CONTRACTOR will be only with respect to the basic principles of the methods the CONTRACTOR intends to employ. Review by the ENGINEER of the dewatering system will be based on the demonstrated performance of the system to satisfy the requirements for dewatering as specified herein.

1.4 SITE CONDITIONS

A. The CONTRACTOR shall take all the steps that he considers necessary to familiarize himself with the site conditions, the ground conditions and the groundwater conditions. Copies of the logs of the borings and a soils report are among the data available and a part of these Contract Documents. The data described above is furnished for information only, and it shall be expressly understood that the OWNER and/or the ENGINEER will not be held responsible for any interpretation or conclusions drawn therefrom by the CONTRACTOR.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. It is the intent of this Section that an adequate dewatering system shall be installed to lower and control the groundwater in order to permit excavation, grading, construction of the structures and the placement of the fill materials, all to be performed under dry conditions. The dewatering system shall be adequate to pre-drain the water-bearing strata above and below the bottom of the structure foundations, the drains, the sewers and all other excavations. In addition, the system to be used shall reduce the hydrostatic head in the water-bearing strata below the structure foundations, the drains, sewers, and all other excavations to the extent that the water level and piezometric water levels in the construction area are substantially a minimum of 3 feet below the prevailing excavation surface at all times. Appropriate screens and filters shall be used to prevent loss of soil through the dewatering equipment.

B. Prior to any excavation below the groundwater level, the dewatering system shall be placed into operation to lower the water levels as required and shall be operated continuously 24 hrs. per day, 7 days per week until all drains, sewers and structures have been satisfactorily constructed including placement of fill materials and no longer requiring dewatering. An adequate weight of fill material or of structure shall be in place to prevent buoyancy or flotation prior to discontinuing operation of the dewatering system.

C. The CONTRACTOR shall obtain written approval from the ENGINEER before discontinuing the operation of the dewatering system.

D. The CONTRACTOR shall be solely responsible for the arrangement, location and depths of the dewatering system necessary to accomplish the work described under this Section. The dewatering shall be accomplished in a manner that will reduce the hydrostatic head below any excavation to the extent that the water level and piezometric water levels in the construction area are substantially a minimum of 3 feet below the prevailing excavation surface, will prevent the loss of fines, seepage, boils, quick conditions or softening of the foundation strata, will maintain stability of the sides and bottom of the excavation and will result in all construction operations being performed in the dry.

E. The control of all surface and subsurface water, ice and snow is considered as part of the dewatering requirements. The control shall be adequate such that the stability of excavated and constructed slopes are not adversely affected by water, that erosion is controlled, and that flooding of excavations or damage to the existing and/or new structures or portions thereof does not occur. Surface water or roof runoff shall not be directed toward the excavations.

F. The CONTRACTOR shall dispose of all water removed from the excavations in such a manner as will not endanger public health, property, any portion of the work under construction or completed either by him or any other CONTRACTOR, shall not recharge the water bearing strata and shall be performed in such a manner as will cause no inconvenience whatsoever to the OWNER, ENGINEER, or to others engaged on work about the site. Water shall be conveyed in conduits or open water channels to avoid erosion in foundation areas. However, open channels adjacent to existing footings shall not be permitted.

G. The CONTRACTOR shall provide complete standby equipment, installed and available, for immediate operation as may be required, to adequately maintain dewatering on a continuous basis in the event that all or any part of the dewatering system may become inadequate or fail.

H. If the dewatering requirements are not satisfied due to inadequacy or failure of the dewatering system, loosening of the foundation strata or instability of the slopes or damage to the foundations or structures may occur. The supply of all labor, materials and plant, and the performance of all work necessary to carry out any necessary additional work for the reinstatement of the structures or the foundations soils resulting from such inadequacy or failure shall be undertaken by the CONTRACTOR subject to the approval of the ENGINEER and at no additional expense to the OWNER.

3.2 OBSERVATION WELLS

A. If site conditions necessitate, the CONTRACTOR shall supply, install, take measurements and maintain the observation wells (piezometers) at various locations near existing structures to insure complete drawdown.

B. The observation wells shall be of a suitable design proposed by the CONTRACTOR and as reviewed by the ENGINEER.

C. The CONTRACTOR shall be responsible for installing and maintaining all observation wells and observing and recording the elevation of the groundwater and piezometric water levels in all the observation wells daily. A record of the information obtained shall be given to the ENGINEER each day. The CONTRACTOR shall also permit the ENGINEER to make his own observations. Any observation well that becomes inactive, damaged or destroyed shall be replaced within 24 hrs. by the CONTRACTOR at no additional expense to the OWNER. If an observation well becomes inactive, damaged, or destroyed, and if in the opinion of the ENGINEER the observations from that observation well are critical, further excavation shall be suspended at the discretion of the ENGINEER and at no additional expense to the OWNER. Excavation shall not recommence until that observation well is repaired or replaced to the satisfaction of the ENGINEER and reliable observations can be obtained from that well or its replacement well.

D. The CONTRACTOR shall demonstrate by adding or removing water from all observation well risers that the observation wells are functioning properly.

E. All observation wells shall be satisfactorily installed and proven to be functioning properly prior to commencement of dewatering in any section of the site.

3.3 CONTROL OF GROUNDWATER LEVELS

A. The observation wells and test pits or holes shall be used as a primary basis of determining compliance with the requirements of this Section.

3.4 REMOVAL OF SYSTEM(S)

A. After all requirements of this Section are met, the CONTRACTOR shall remove all materials and equipment used during this operation. All holes, wells, and pits shall be filled immediately with suitable material.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and perform all installation, maintenance, removal and area cleanup related to sedimentation control work as shown on the Drawings and as specified herein. The work shall include, but not necessarily be limited to; installation of temporary access ways and staging areas, silt fences, inlet protection devices, sediment removal and disposal, device maintenance, removal of temporary devices, temporary and permanent seeding, mulching and fertilization, and final cleanup. All erosion control devices shall remain in place throughout construction and until approval of final site stabilization is given by local or state authorities.

B. The Contractor is responsible for implementing Best Management Practices (BMP's), as shown on the Contract Drawings and specified herein, to prevent and minimize erosion and resultant sedimentation in all cleared, grubbed, and active work areas during and after construction. This item covers the work necessary for the installation and maintenance of all structures and measures necessary for the prevention and control of soil erosion.

C. Construction on this site shall disturb less than 1 acre and is greater than 500 feet from water's edge, therefore a grading/SESC permit is not required on this project. However, the project is still subject to the standards and responsibilities of City Code Chapter 63, regardless of the necessity for a permit.

D. The following items from Rule 1709 promulgated under the authority of Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, are particularly important:

1. Design, construct, and complete the earth change in a manner that limits the exposed area of disturbed land for the shortest period of time.

2. Remove sediment caused by accelerated soil erosion from runoff water before it leaves the site of the earth change.

3. Temporary or permanent control measures shall be designed and installed to convey water around, through or from the earth change at a non-erosive velocity.

4. Install temporary soil erosion and sedimentation control measures before or upon commencement of the earth change activity and maintain the measures on a daily basis. Remove temporary soil erosion and sedimentation control measures after permanent soil erosion measures are in place and the area is stabilized. ("Stabilized" means the establishment of vegetation or the proper placement, grading, or covering of soil to ensure its resistance to soil erosion, sliding, or other earth movement.)

5. Complete permanent soil erosion control measures for the earth change within five (5) calendar days after final grading or upon completion of the final earth change. If it is not possible to permanently stabilize the earth change, then maintain temporary soil erosion and sedimentation control measures until permanent soil erosion control measures are in place and the area is stabilized.

E. Due to the nature of the work required by this Contract, it is anticipated that the location and nature of the erosion and sedimentation control devices will be adjusted on several occasions to reflect the current phase of construction. The construction schedule adopted by the Contractor will impact the placement and need for specific devices required for the control of erosion. The Contractor shall develop and implement such additional techniques as may be required to minimize erosion and off-site sedimentation. The location and extent of erosion and sedimentation control devices shall be revised at each phase of construction that results in a change in either the quantity or direction of surface runoff from constructed areas. All deviations from the erosion and sedimentation control provisions shown on the Drawings shall have the prior acceptance of the Engineer.

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 32 92 00 – Turf and Grasses

1.3 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01 30 00 – Submittal Procedures, technical product literature for all commercial products to be used for sedimentation and erosion control.

1.4 QUALITY ASSURANCE

A. The Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the movement of sediment from the construction site to offsite areas or into the stream system via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered.

1.5 REFERENCES

A. Chapter 63 – Stormwater Management and Soil Erosion and Sedimentation Control, of the City of Ann Arbor City Ordinance.

B. City of Ann Arbor Public Services Department Standard Specifications Manual, latest edition.

C. Michigan Department of Environmental Quality Water Division Soil Erosion and Sedimentation Control Program, Soil Erosion and Sedimentation Control (SESC) Training Manual, 2004 Edition, or latest.

D. Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction.

1.6 EROSION AND SEDIMENTATION CONTROL DEVICES

A. The following erosion and sedimentation control devices shall be incorporated into the work. Other devices, as necessary and acceptable to the Engineer shall be installed as required.

1. Temporary Sediment Traps shall be constructed at the locations shown on the Drawings, at the termination of all Temporary Diversions diverting sediment laden runoff, and at other locations indicated by the Engineer. Temporary Sediment Traps shall be constructed by excavating the appropriate size rectangular basin and constructing a rock-fill dam on the discharge end to form a sediment trap. Temporary Sediment Traps shall be designed, installed and maintained in accordance with the requirements of Unit 4 of the SESC Training Manual.

2. Temporary Diversions shall be constructed at the locations shown on the Drawings, and at other locations indicated by the Engineer. Dimensions shall be as shown on the Drawings. All Diversions transporting sediment-laden runoff shall terminate in Temporary Sediment Basins. Temporary Diversions shall be designed, installed and maintained in accordance with the requirements of Unit 2 of the SESC Training Manual.

3. Silt Fence shall be constructed at the locations shown on the Drawings, and at other locations indicated by the Engineer. Silt Fence shall not be installed across streams, ditches, or waterways. Silt Fence shall be designed, installed and maintained in accordance with the requirements of Unit 4 of the SESC Training Manual.

4. Check Dams shall be constructed at the locations shown on the Drawings, and at other locations indicated by the Engineer. Check Dams shall be designed, installed and maintained in accordance with the requirements of Unit 2 of the SESC Training Manual.

5. Storm Drain Inlet Protection shall be constructed at the locations shown on the Drawings, and at other locations indicated by the Engineer. Storm Drain Inlet Protection measures shall be designed, installed and maintained in accordance with the requirements of Unit 4 of the SESC Training Manual.

6. Temporary and Permanent Channels shall be installed at the locations shown on the Drawings, and at other locations indicated by the Engineer. Channels, and Channel Linings, shall be designed, installed and maintained in accordance with the requirements of Unit 2 of the SESC Training Manual.

7. Rock Construction Exits shall be located at points where vehicles enter and leave a construction site, or at other locations indicated by the Engineer. Rock Construction Exits shall be designed, installed and maintained in accordance with the requirements of Unit 4 of the SESC Training Manual.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. Materials for use in erosion and sedimentation control devices shall be in accordance with the City of Ann Arbor Public Services Department Standard Specifications Manual, latest edition, and the Michigan Department of Environmental Quality Soil Erosion and Sedimentation Control (SESC) Training Manual, 2004 Edition, or latest edition.

2.2 TEMPORARY DIVERSIONS

A. Temporary Diversions shall be constructed as shown on the Contract Drawings and as specified herein. Temporary Diversions shall be installed and maintained in accordance

with Part 3 of this Section. The cost of Temporary Diversions shall include the excavation and all maintenance and restoration activities required.

2.3 SILT FENCE

A. Silt Fence shall be a woven geotextile filter fabric made specifically for sediment control. Filter fabric shall not rot when buried and shall resist attack from soil chemicals, alkalides and acids in the pH range from 2 to 13, and shall resist damage due to prolonged ultraviolet exposure. Filter fabric shall be Type FX-11, as manufactured by Carthage Mills, Geotex 910SC as manufactured by Synthetic Industries, Inc., Amoco 2130 as manufactured by Amoco Fabrics & Fibers Co., or equal.

B. Filter fabric for the silt fence shall have the following minimum properties:

	Value	Test Method
Grab Tensile Strength	100 lbs.	ASTM D 4632
Grab Elongation	15%	ASTM D 4632
Trapezoid Tear Strength	50 lbs.	ASTM D 4533
Mullen Burst Strength	265 lbs.	ASTM D 3786
Puncture Strength	58 lbs.	ASTM D 4833
Retained Strength (500 hrs. accelerated UV exposure)	80%	ASTM D 4355
Filtration Efficiency	75%	VTM-51
Flow Rate	10 gal/min/ft^2	ASTM-D4491
Height	36 inches	

C. Posts for silt fence shall be steel and shall have the following properties:

ASTM Designation:	ASTM A702
Length:	5-Feet Long (T-Type)
Weight:	1.25#/Foot (min.)
Area of Anchor Plate:	14 Sq. In.

Note: Five (T) Fasteners shall be furnished with each post.

D. Wire Fabric for the silt fence shall have the following properties:

Wire Fabric Designation:	832-12-10-12.5 Class 1
Designation:	ASTM A116
Width:	32"
Number of Line Wires:	8
Stay Wire Spacing:	12"
Line and Stay Wires:	12.5 Ga.
Top and Bottom Wires:	10 Ga.
Wire Coating:	ASTM Class 1 Zinc Coating

E. Silt Fence shall be installed and maintained in accordance with Part 3 of this Section, and Unit 4 of the SESC Manual, to the satisfaction of the Engineer until the site has been

stabilized. The cost of Silt Fence shall include the fabric, posts, wire fabric, excavation and all maintenance and restoration activities required.

2.4 STONE FOR EROSION CONTROL AND RIP RAP

A. Crushed stone for sediment filtration devices, access ways and staging areas shall conform to MDOT Sections 208 and 307.

B. Riprap shall meet the requirements of MDOT Section 916 for plain riprap.

2.5 STRAW WITH NET TEMPORARY ROLLED EROSION CONTROL MAT (RECM)

A. The Contractor shall place straw with net temporary RECM on all disturbed areas. The mat shall consist of clean wheat straw from agricultural crops made into a knitted straw mat that is machine assembled. The straw shall be evenly distributed throughout the mat. The mat shall be covered with a photodegradable synthetic mesh attached to the straw with degradable thread.

B. The Contractor shall place the straw with net temporary channel and slope RECM where directed immediately after the channel or slope has been properly graded and prepared, fertilized, and seeded. If the mat is of single net construction, the netting shall be on top with the straw in contact with the soil.

C. The Contractor will immediately repair or replaced any section of straw with net temporary channel and slope RECM which is not functioning properly or has been damaged in any way until a stable growth of grass has been established.

D. Straw with net RECM shall be North American Green S150, American Excelsior Co. Curlex I, Contech SFB1, or equal with a minimum bare soil shear stress value of 1.5 lb/ft^2.

2.6 CURLED WOOD OR COCONUT FIBER ROLLED EROSION CONTROL MAT (RECM)

A. The Contractor shall place curled wood or coconut fiber RECM on all disturbed areas with slopes greater than 1 on 3. The mat shall consist of machine-produced mat of curled wood excelsior or coconut fiber with a majority of the fibers 6 inches or longer with consistent thickness and the fibers evenly distributed over the entire area of the mat. The top of the mat shall be covered with a biodegradable synthetic mesh. The mesh shall be attached to the curled wood excelsior or coconut fiber with photodegradable synthetic yarn.

B. The Contractor shall place the curled wood or coconut fiber channel and slope RECM where directed immediately after the channel or slope has been properly graded and prepared, fertilized, and seeded. If the mat is of single net construction, the mesh shall be on top with the fibers in contact with the soil.

C. The Contractor will immediately repair or replace any section of curled wood or coconut fiber RECM which is not functioning properly or has been damaged in any way until a stable growth of grass has been established.

D. Curled wood or coconut fiber RECM shall be American Excelsior Curlex II, North American Green C125, Contech EFB4 or equal matting with a minimum bare soil shear stress value of 2.0 lb/ft^2.

2.7 ROCK CONSTRUCTION EXITS

A. Rock construction exits shall be constructed as shown on the Drawings and as specified herein. Rock construction exit shall be maintained in accordance with Part 3 of this Section to the satisfaction of the Engineer until the site has been stabilized. The cost of temporary gravel construction entrances shall include the gravel and all maintenance activities required.

2.8 TEMPORARY SOIL STABILIZER

A. The temporary agent for soil erosion control shall consist of an especially prepared highly concentrated powder which, when mixed with water, forms a thick liquid such as "Enviroseal 2001" by Enviroseal Corporation, "Terra Control" by Quattro Environmental, Inc., or "CHEM-CRETE ECO-110" by International CHEM-CRETE Corporation, and having no growth or germination inhibiting factors. The agent shall be used for hydroseeding grass seed in combination with other approved amendments resulting in a highly viscous slurry which, when sprayed directly on the soil, forms a gelatinous crust.

2.9 STRAW MULCH

A. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

B. Latex acrylic copolymer, such as Soil Sealant with coalescing agent by Soil Stabilization Co., Merced, CA or equivalent shall be used as straw mulch tackifier.

C. An asphalt tackifier shall only be used when temperatures are too low to allow the use of a latex acrylic copolymer and only with prior written approval from the Engineer.

PART 3 – EXECUTION

3.1 INSTALLATION AND MAINTENANCE

A. Erosion and sedimentation control devices shall be established prior to or concurrent with the clearing operations in a given area. Where such practice is not feasible, the erosion and sedimentation control device(s) shall be established immediately following completion of the clearing operation.

B. The Contractor shall furnish the labor, materials and equipment required for routine maintenance of all erosion and sedimentation control devices. Maintenance shall be scheduled as required for a particular device to maintain the removal efficiency and intent of the device. Maintenance shall include but not be limited to 1) the removal and satisfactory disposal of accumulated sediment from traps or silt barriers and 2) replacement of filter fabrics used for silt fences and stone used in temporary sediment traps, stone filters, gravel construction entrances, etc. Sediment removed from erosion and sedimentation control devices shall be disposed of in locations that will not result in offsite sedimentation as acceptable to the Engineer, at no additional cost to the Owner.

C. The Contractor shall provide temporary sedimentation traps at all locations shown on the Contract Drawings and as per the approved SESC Plan for the settling of water pumped from the excavations or intercepted by drainage ditches for keeping water out of the excavations or to protect existing structures. The Contractor shall remove accumulated sediment from the traps as necessary to maintain their effectiveness or as indicated by the Engineer. Sediment material removed from the traps shall be disposed by the Contractor in locations that will not result in off-site sedimentation as acceptable to the Engineer, at no additional cost to the Owner.

1. Inspect temporary sediment traps after each period of significant rainfall. Remove sediment and restore the trap to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Place the sediment that is removed in a designated disposal area and replace the contaminated part of the gravel facing.

2. Check the structure for damage from erosion or piping. Periodically check the depth of the spillway to ensure it is a minimum of 1.5 ft. below the low point of the embankment. Immediately fill any settlement of the embankment to slightly above design grade. Any riprap displaced from the spillway must be replaced immediately.

3. After all sediment-producing areas have been permanently stabilized, remove the structure and all unstable sediment. Smooth the area to blend with the adjoining areas and stabilize properly.

D. The Contractor shall provide temporary diversions at all locations noted on the Contract Drawings and as per the approved SESC Plan. All temporary diversions shall outlet at a temporary sediment trap or other appropriate structure.

1. Inspect temporary diversions once a week and after every rainfall. Immediately remove sediment from the flow area and repair the diversion ridge. Carefully check outlets and make timely repairs as needed. When the area protected is permanently stabilized, remove the ridge and the channel to blend with the natural ground level and appropriately stabilize it.

E. Silt fence shall be erected as shown on the Drawings, as per the approved SESC Plan and specified herein. Silt fence shall be erected and maintained to the satisfaction of the Engineer until a vegetative ground cover has been established. Replacement of the filter fabric, if required by the Engineer, will be at the Contractor's expense.

1. Silt fence shall be erected around all catch basins which are located downstream from any construction work. Should any catch basins be indicated to be relocated or modified, silt fence shall be utilized until work is completed on the catch basins. Upon completion of the modification, the area shall be rough graded, as shown on the Drawings, until the end of the project, at which time final grading shall occur.

2. Inspect silt fence at least once a week and after each rainfall. Make any required repairs immediately.

3. Should the fabric of a silt fence collapse, tear, decompose or become in-effective, replace it promptly.

4. Remove sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.

5. Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized. Removal of any silt fence shall be permitted only with the prior approval of the Engineer, or the local governing agency.

F. Riprap shall be graded so that the smaller stones are uniformly distributed through the mass. The Contractor may place the stone by mechanical methods, augmented by hand placing where necessary or ordered by the Engineer. The placed riprap shall form a properly graded, dense, neat layer of stone. The placed riprap shall have a minimum depth of 24 inches. Type II Separator Geotextile, shall be used under all riprap unless otherwise noted.

G. Riprap and stone for erosion control shall be dumped and placed in such manner that the larger rock fragments are uniformly distributed throughout the rock mass and the smaller fragments fill the voids between the larger fragments. Rearranging of individual stones by equipment or by hand shall only be required to the extent necessary to secure the results specified above, to protect structures from damage when rock material is placed against the structures, or to protect the underlying Separator Geotextile from damage during installation.

H. The Contractor shall provide gravel and riprap filter berm basins at all locations noted on the Contract Drawings and as per the approved SESC Plan.

1. Inspect gravel and riprap filter berm basins after each period of significant rainfall. Remove sediment and restore the basin to its original dimensions when the sediment has accumulated to one-half the design depth of the trap. Place the sediment that is removed in a designated disposal area and replace the contaminated part of the gravel facing.

2. Check the structure for damage from erosion or piping. Any stone or riprap displaced from the berm must be replaced immediately.

3. After all sediment-producing areas have been permanently stabilized, remove the structure and all unstable sediment. Smooth the area to blend with the adjoining areas and stabilize properly.

I. Engineer may direct the Contractor to place Straw with Net, Curled Wood or Coconut Fiber RECM's and Synthetic TRM's in permanent channels or on slopes at other locations not shown on Drawings.

1. All temporary and permanent channel and slope lining RECM's and TRM's shall be unrolled in the ditch in the direction of the flow of water. Temporary linings shall overlap the buried end of the downstream blanket by a minimum of 6 inches. Permanent linings shall overlap a minimum of 3 feet. All anchor and transverse trenches shall be a minimum of 12 inches deep. All mats shall be stapled as per manufacturer's specifications.

2. During the establishment period, check grass, RECM and TRM-lined channels after every rainfall event. For grass-lined channel once grass is established, check periodically and after every heavy rainfall event. Immediately make repairs. It is particularly important to check the channel outlet and all road crossings for bank stability and evidence of piping and scour holes. Give special attention to the outlet and inlet sections and other points where concentrated flow enters. Remove all significant sediment accumulations to maintain the designed carrying capacity. Keep the grass in a healthy, vigorous condition at all times.

J. The Contractor shall provide temporary slope drains at all location noted on the Contract Drawings, and as per the approved SESC Plan, and at other locations as may be directed by the Engineer.

1. Inspect the temporary slope drain and supporting diversion after every rainfall event and promptly make any necessary repairs. When the protected area has been permanently stabilized, temporary measures may be removed, materials disposed of properly, and all disturbed areas stabilized appropriately.

K. The Contractor shall provide temporary gravel construction entrances at all locations noted on the Contract Drawings, and as per the approved SESC Plan, and at all other locations as may be directed by the Engineer.

1. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2-inch stone. After each rainfall, inspect each construction entrance and clean out as necessary. Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.

L. The Contractor shall provide temporary or permanent ground cover adequate to restrain erosion on all disturbed areas that will be left unworked for periods exceeding 30 calendar days.

1. Reseed and mulch temporary seeding areas where seedling emergence is poor, or where erosion occurs, as soon as possible. Do not mow. Protect from traffic as much as possible.

2. Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and reseedings within the same season, if possible.

3. Reseeding – If a stand has inadequate cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding.

4. If vegetation fails to grow, soil must be tested to determine if acidity or nutrient imbalance is responsible.

5. Fertilization – Contractor shall refertilize in the second growing season.

M. Additional Requirements

1. All storm sewer piping shall be blocked at the end of every working day until the inlet is constructed above grade.

2. All streets around the construction area shall be swept as necessary at the end of each day's work and after each rainfall event of ½-inch or greater to prevent accumulation of dirt and debris. Inlet protection shall be maintained on all stormwater inlets on site, in streets, or downstream of site until construction is complete.

3. The Contractor shall provide adequate means to prevent any sediment from entering any storm drains, curb inlets (curb inlet filter box), ditches, streams, or bodies of water downstream of any area disturbed by construction. Excavation materials shall be placed upstream of any trench or other excavation to prevent sedimentation of offsite areas. In areas where a natural buffer area exists between the work area and the closest stream or water course, this area shall not be disturbed.

4. Contractor shall provide adequate means to control dust on the site and prevent it from entering the process tanks on site.

5. The Owner or Engineer may direct the Contractor to place any additional sediment and erosion control devices at other locations not shown on the Drawings.

3.2 INSPECTIONS AND MAINTENANCE

A. The Contractor shall designate a Certified Operator to perform inspections required by this Section. The following areas are to be inspected and maintenance performed, if needed, at least once every 7 calendar days and within 24 hours of a rainfall event that has a precipitation of 1/2 inch or greater.

1. Disturbed areas of the construction site that have not undergone final stabilization

2. Erosion and sediment control structures, dust control measures

3. All locations where vehicles enter or exit the site

4. Material storage and construction laydown areas that are exposed to precipitation and have not been finally stabilized

C. Immediate action will be taken to correct deficiencies to BMP's. The State or Local Authorities reserves the right to stop all construction activities not related to maintaining BMP's until such deficiencies are repaired.

D. In areas that have been finally stabilized, inspections and, if necessary, maintenance by Contractor will occur at least once per month for the duration of the contract or project, whichever is longer.

E. During inspections the following will be observed, and appropriate maintenance procedures taken:

1. The conformance to specifications and current condition of all erosion and sediment control structures

2. The effectiveness and operational success of all erosion and sediment control measures

3. The presence of sediments or other pollutants in storm water runoff at all runoff discharge points

4. If reasonably accessible, the presence of sediments or other pollutants in receiving waters

5. Evidence of dust being transported to any process tank on site

6. Evidence of off-site tracking at all locations where vehicles enter or exit the site

3.3 TEMPORARY MULCHING

A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 30 days of the completion of rough grading.

B. Straw mulch shall be applied at rate of 100 lbs/1000 sq ft and tackified with latex acrylic copolymer at a rate of 1 gal/1000 sq ft diluted in a ratio of 30 parts water to 1 part latex acrylic copolymer mix.

3.4 REMOVAL OF TEMPORARY SEDIMENT CONTROL STRUCTURES

A. At such time that temporary erosion and control structures are no longer required under this item, the Contractor shall notify the Engineer of its intent and schedule for the removal of the temporary structures, and obtain the Engineer's approval in writing prior to removal. Once the Contractor has received such written approval from the Engineer, the Contractor shall remove, as approved, the temporary structures and all sediments accumulated at the removed structure shall be returned upgrade. In areas where temporary control structures are removed, the site shall be left in a condition that will restore original drainage. Such areas shall be evenly graded and seeded as specified in Section 32 92 00 – Turf and Grasses.

3.5 FINAL CLEANUP

A. Once the site has been fully stabilized against erosion and all sediment control measures have been removed, dispose of accumulated silt and waste materials in proper manner. Re-grade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Drawings.

END OF SECTION

SECTION 31 41 00

SHORING

PART 1 - GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall design, furnish all labor, materials, services, equipment and shall excavate and install temporary shoring as indicated on the Contract Documents and as required to construct the project. The temporary shoring shall protect foundation soils, adjacent earth, pavement, sidewalks, utilities and structures against cave-ins, settlement, excessive movement, or other hazards to persons, foundations, utilities and property during the contract period. Steel sheet pile or other systems that require vibratory equipment shall only be used when the vibration can be maintained within the required level.

B. The CONTRACTOR shall design, install, and be responsible for the shoring systems. The design of the shoring systems shall be prepared and sealed by a Registered Professional Engineer in the State of Michigan, employed by the CONTRACTOR.

1.2 RELATED SECTIONS

B. Section 31 00 00 – Earthwork.

D. Section 03 30 00 – Cast-in-Place Concrete

1.3 REFERENCES

A. Occupational Safety and Health Act (OSHA).

B. Naval Facilities Engineer's Command Design Manual (NAVFAC D.M.) 701, 7.02, 7.03.

1.4 DESIGN REQUIREMENTS

A. The shoring design shall include, but not necessarily be limited to, the following:

1. A review of the project site including above grade and below grade utilities and obstructions.

2. Coordination, sequence of construction, removal of obstructions and temporary dewatering.

3. The design shall conform to earth pressure diagrams determined through calculations (including surcharge) from soil, water, vehicular traffic, construction equipment, material storage, and adjacent structures. Vehicular traffic shall include semi-trucks and chemical delivery trucks.

4. Loading conditions during various stages of construction and installation of internal bracing.

5. The design computations shall show load, shear, moment and cumulative deflection diagrams.

6. The design shall show the type of bracing and method of installation.

7. Overall soil mass stability shall be included in the design.

8. The shoring system design shall be checked for structural adequacy and deflection serviceability for the planned construction sequence.

1.5 SUBMITTALS

A. CONTRACTOR Qualifications: The excavation, bracing, and shoring shall be installed by a Contractor with suitable equipment, competent personnel, and a reputation of satisfactorily performing the work. The CONTRACTOR shall have a minimum of five years successful experience and a minimum of five successful installations on projects of a similar size and scope to this project. Evidence of compliance with this section shall be submitted to the ENGINEER for review prior to entering into a contract for the work.

B. A design for the Temporary Earth Retention Systems shall be submitted for record in a bound volume sealed and signed by a registered professional engineer in the State of Michigan.

C. Shop Drawings:

1. Shoring Members: Submit shop drawings or all wood, steel, bracing, steel sheet piling and piles.

2. Installation Method: Submit for ENGINEER review and approval detailed procedures of the excavation and bracing installation methods.

3. Submit for ENGINEER review and approval an excavation plan of the details and the sequence of below ground construction, including illustrations and the positions of excavation ramps and berms, methods of excavating obstructions, shoring and bracing systems.

4. Internal Braces: Submit for ENGINEER review and approval complete details on internal braces, connections to walers, methods of field adjustments, prestressing details, connections after prestressing and bracing removal procedures.

D. Monitoring of Retention System:

1. Monitoring data shall be submitted for ENGINEER review.

1.6 QUALITY ASSURANCE

A. Provide surveys to monitor movements of critical facilities including all adjacent buildings.

1.7 PROJECT CONDITIONS

A. Test borings were made during the design of this project at locations identified on the Drawings. Interpretation of all data and reports for construction purposes is the responsibility of the CONTRACTOR.

B. Protection of Existing Structures:

1. Determine and verify the location of existing underground utilities and existing structures before starting excavation, temporary dewatering installation or drilling operations. If utilities are to remain in place, provide protection from damage during excavation operations.

2. Existing inactive utility lines left abandoned shall be removed, drilled through, or cut as directed by the ENGINEER to install the retention system without extra charge to the OWNER.

3. Should uncharted obstructions or incorrectly charted obstructions, or utilities be encountered during excavation operations, notify the ENGINEER immediately and submit a plan for continuation of the work for ENGINEER review and approval. Cooperate with the OWNER and public or private utility companies in keeping their respective service and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

4. Do not interrupt existing utilities serving facilities occupied and used by the OWNER or others, except when permitted in writing by the ENGINEER, and then only after acceptable temporary utility services have been provided at no additional cost to the OWNER.

5. Protect all structures, underground utilities, and other construction from damage caused by excavation, bracing, shoring, temporary dewatering and drilled pier installation operations.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

A. ASTM A992 or A572 Grade 50 steel shapes and ASTM A36 plates with high strength bolts (ASTM A325) and welds conforming to ASW D1-1, unless approved or noted otherwise on the drawings.

2.2 CONCRETE

A. Concrete shall meet all requirements of Section 03 30 00 – Cast-in Place Concrete.

2.3 WOOD LAGGING

A. Sound mixed oak free of knots, shakes, irregularities.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine the areas and conditions under which the shoring system is to be installed and notify the ENGINEER if unsatisfactory conditions exist and submit a plan for correction of unsatisfactory conditions necessary to proceed with the work.

B. Installation work and procedures shall conform to the Contract Documents, shop drawings, engineering calculations, and testing and monitoring procedures.

C. Coordinate installation with scheduled excavation work, geotechnical instrumentation, and temporary dewatering.

3.2 EXCAVATION

A. Excavated Material: Remove excavated material and dispose of it in accordance with Section 31 00 00 Earthwork, without violating local and federal laws.

B. Protection of Excavation:

1. Maintain continuous protection of the excavation during construction outside and above the tops of the shoring system and piers so that no slope stability and/or soil erosion can occur.

2. Sloped excavation shall be in accordance with slopes shown on the Drawings.

3. Any surface flow from rains or water discharges shall be diverted from the excavation.

4. The excavation shall be dewatered in accordance with Section 31 23 19, Dewatering.

5. Temporary sheeting shall be used to protect the trucks, chemical deliveries and plant traffic along the edges of the excavation.

3.3 INSTALLATION

A. Examine the areas and conditions under which the shoring system is to be installed and notify the ENGINEER if unsatisfactory conditions exist and submit a plan for correction of unsatisfactory conditions necessary to proceed with the work.

END OF SECTION

SECTION 32 11 00

BASE COURSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aggregate Base Course

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

1.3 SUBMITTALS

A. Submit manufacturer's gradation report and certification letters to the OWNER at least 30 days prior to placing aggregate base courses.

B. After installation, submit field quality control test results and delivery tickets for each load.

1.4 REFERENCES

A. Michigan Department of Transportation 2012 Standard Specifications for Construction (MDOT).

1.5 QUALITY ASSURANCE

A. The CONTRACTOR's testing subcontractor and laboratory shall provide the following services in accordance with Division 1 and Section 01 45 00 – Quality Control.

1. Sieve analysis per source

2. Proctor per source

3. Compaction test once per 1,000 SF of placement.

1.6 PROJECT CONDITIONS

A. Aggregate base course shall not be placed when there are indications that the mixture may become frozen before the maximum unit weight is obtained, and in no case shall the aggregate be placed on a frozen subbase, or when the subgrade is wet.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Aggregate base course shall meet the requirements of MDOT Section 902.06, 21AA Dense-Grade Aggregate, unless noted otherwise. Aggregate shall be natural; no slag, crushed concrete or salvaged aggregate will be permitted.

PART 3 - EXECUTION

3.1 INSPECTION

A. The underlying course or subgrade shall be checked and accepted before placing and spreading operations are started. Notify ENGINEER, in writing, of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

B. Any ruts or soft, yielding places caused by improper drainage conditions, hauling, or any other cause, shall be corrected and rolled to the required compaction before the base course is placed thereon.

C. To protect the underlying course or subgrade and to insure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

3.2 BASE COURSE INSTALLATION

A. Aggregate base course shall meet the requirements of MDOT Section 302.

3.3 PROTECTION

A. If the subbase or subgrade at any time prior to acceptance of the work becomes soft or unstable to the extent that it is forced up through or prevents compaction of the aggregate, such subbase or subgrade material and aggregate shall be immediately removed and disposed of.

B. After the subbase or subgrade has been corrected, new material shall be placed and compacted as provided herein.

C. When such work and materials are required as a result of the CONTRACTOR's operations, the CONTRACTOR shall restore the subbase or subgrade, and base course to the condition required by these specifications without additional compensation.

END OF SECTION

32 12 00

FLEXIBLE PAVING

PART 1 -- GENERAL

1.1 SUMMARY

A. Section Includes

1. The Contractor shall furnish all labor, materials, tools, and equipment necessary to construct hot-mix asphalt (HMA) pavement as described herein and/or shown on the Plans.

B. Related Requirements

1. Section 01 33 00 Submittal Procedures

2. Section 31 00 00 Earthwork

1.2 REFERENCES

A. ASTM – American Society for Testing and Materials

1. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples

2. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures

3. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

4. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Asphalt Mixture Specimens

5. ASTM D3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

6. ASTM D6927 - Standard Test Method for Marshall Stability and Flow of Asphalt Mixtures

B. MDOT - Michigan Department of Transportation 2012 Standard Specifications for Construction

1.3 SUBMITTALS

A. Contractor shall submit to the Engineer all design mixes, certification of compliance and any other submittals required per the submittal requirements of the 2012 MDOT Standard Specifications for Construction.

B. Quality Control (QC) plan for HMA Pavements: Provide a QC play for the HMA Pavements that will maintain adequate QC for production and construction processes applicable to this Specification and the Contract Documents. The Owner shall be provided a copy of the QC play for review, prior to mix production and placement.

1.4 QUALITY ASSURANCE

A. The paving-mix manufacturer shall be registered with and approved by MDOT.

B. The HMA testing agency shall be qualified in accordance with ASTM D3666 for the testing indicated.

C. Regulatory Requirements

1. Comply with materials, workmanship, and other applicable requirements of MDOT for asphalt paving work.

1.5 SITE CONDITIONS

A. Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 60 deg F.

2. Tack Coat: Minimum surface temperature of 60 deg F.

3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 -- PRODUCTS

2.1 AGGREGATES

A. Use aggregate materials in accordance with 2012 MDOT Standard Specifications for Construction, Section 501.

2.2 MISCELLANEOUS MATERIALS

A. Saw and Joint Seal in accordance with 2012 MDOT Standard Specifications for Construction, Section 502.

2.3 HMA MIXES

A. Use materials in accordance with 2012 MDOT Standard Specifications for Construction, Section 501.

PART 3 -- EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

A. Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12-inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching, 2-inch depth or less: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

D. Patching, greater than 2-inch depth: Partially fill excavated pavements with hot-mix asphalt leveling mix and, while still hot, compact. Cover asphalt leveling course with compacted, hot-mix top layer finished flush with adjacent surfaces.

3.3 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.

C. If prime coat is not entirely absorbed within 24-hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic.

1. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

2. Protect primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

E. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.

2. Proof roll with heavy pneumatic-tired equipment.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Construction Observer, and replace with compacted backfill or fill as directed.

3.4 PLACEMENT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt leveling course in number of lifts and thicknesses indicated.

2. Place hot-mix asphalt surface course in single lift.

3. Spread mix at minimum temperature of 250 deg F.

4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.

5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 COMPACTION

A. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hotmix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D6927, but not less than 94 percent nor greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Leveling Course: Plus or minus 1/8-inch.

2. Top Course: Plus 1/8-inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Leveling Course: ¼-inch.

2. Top Course: 1/8-inch.

C. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/8-inch.

3.7 SITE QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. Field density of in-place compacted pavement will be determined by nuclear method according to ASTM D2950 and correlated with ASTM D1188 or ASTM D2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fine Grading

B. Topsoil

C. Fertilizers

D. Seeding

1.2 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 31 25 00 – Erosion and Sedimentation Controls

1.3 SUBMITTALS

A. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

B. Certification of all fertilizers.

C. Certified analysis of the topsoil from each source.

1.4 REFERENCES

A. Michigan Department of Transportation 2012 Standard Specifications for Construction (MDOT).

B. ASTM D5268 - Topsoil Used for Landscaping Purposes

1.5 DESCRIPTION

A. The CONTRACTOR shall permanently prepare, fertilize, and seed or riprap the areas designated on the Plans or disturbed by the CONTRACTOR. Grass seed shall be placed on areas having a slope flatter than 3:1. Sod may be placed in other areas at the CONTRACTOR's own option and expense. Riprap shall be placed where shown on the Plans or required by the ENGINEER.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers, bearing seed analysis and the date of the seed testing. The testing shall be within a period of six months prior to commencement of planting operations.

B. Fertilizer: Delivered in bags or other convenient containers, each fully labeled, conforming to applicable state fertilizer laws, bearing the grade and the trade name of the producer.

C. The CONTRACTOR is responsible for proper storage & security of all seeding materials.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work. At option and under full responsibility of CONTRACTOR, planting operations may be conducted under unseasonable conditions, but without additional compensation.

1.8 SCHEDULING

A. Planting Season: Sow seed during normal planting seasons and per project schedule. Optimal time for seed is between April 1 and June 1, and between September 1 and October 15.

1.9 MAINTENANCE

A. It is the responsibility of the CONTRACTOR to establish a dense lawn of permanent grasses, free from mound and depressions. Any portion of a seeded area that fails to show a uniform germination, shall be re-seeded. Such re-seeding shall be at the CONTRACTOR's expense and shall continue until a dense lawn is established.

B. The CONTRACTOR shall maintain all lawn areas until they have been accepted by the OWNER. Lawn maintenance shall begin immediately after the grass seed is in place and continue until provisional acceptance.

1. Lawns shall be protected and maintained by watering, mowing, and re-seeding as necessary for one year to establish a uniform weed-free stand of grasses and until specific lawn acceptance has been made. CONTRACTOR shall review lawn establishment on a minimum bi-weekly basis. Maintenance includes deposition of additional topsoil and re-seeding as may be required to correct all settlement and erosion until the date of final acceptance.

2. At the time of the first cutting the lawn shall be 2-1/2 to 3-1/2 inches high, and the mower blades shall be set at 2-1/2 inches high. All lawns shall receive at least six (6) mowings, with a minimum of 1 week between mowing, before acceptance.

3. Damage to seeded areas resulting from erosion shall be repaired by the CONTRACTOR at the CONTRACTOR's expense. Scattered bare spots in seeded areas will not be allowed over three (3) percent of the area nor greater than 3" x3" in size.

4. OWNER will withhold $4,000 from final payment and will release up to $1,000 per quarter upon satisfactory completion of lawn and landscaping maintenance work.

C. When the above requirements have been fulfilled, the OWNER will accept the lawn.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil shall meet the requirements of ASTM D5268 Topsoil shall not be contaminated or excessively acidic or alkaline, and shall be free of stones 1 inch or larger in any dimension. Topsoil shall consist of natural loam, sandy loam, silty loam, or clay loam humus-bearing soils adapted to sustain plant life.

B. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.2 FERTILIZER

A. Fertilizer shall meet the requirements of the MDOT Section 917.

2.3 SEED

A. Permanent seed shall meet the requirements of the MDOT Section 917 for seed mixture THM, as follows:

1. 65% Kentucky Bluegrass, 98% pure with an 85% germination factor.

2. 25% Creeping Red Fescue, 97% pure with an 85% germination factor.

3. 10% Perennial Ryegrass, 96% pure with an 85% germination factor.

B. Temporary seeds, their spreading rates and dates of application shall be as follows:

1. April 1 to August 15:
   Spring oats or barley, at 2 lbs/1000 sq ft, or 3 bu/acre;
   Domestic rye grass, at .5 lb/1000 sq ft, or 20-25 bu/acre.

2. June - July:
   Sudangrass, at 1 lb/1000 sq ft, or 30-40 lbs/acre.

3. August 1 to October 15:
   Rye, at 1lbs/1000 sq ft, or 2-3 bu/acre; Perennial Ryegrass, at .5 lb/1000, or 20-25 lbs/acre.

4. September 20 to October 15:
   Wheat, at 3 lbs/1000 sq ft, or 2-3 bu/acre

2.4 MULCH

A. Mulch shall meet the requirements of the MDOT Section 917 for straw mulch blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to seeding, OWNER must approve condition of the seedbed. Inadequate seedbed preparation shall result in the reworking of the area to the complete satisfaction of the

OWNER.

B. Do not proceed until unsatisfactory conditions have been corrected.

C. The CONTRACTOR is solely responsible to determine the quantity of cut and fill required to complete the work and to locate a suitable source and amount of topsoil.

3.2 TOPSOIL PLACEMENT

A. The application of topsoil shall occur only when conditions are favorable so as to minimize damage to the subgrade.

B. Where undesirable soils exist within the subgrade, it will be the responsibility of the CONTRACTOR not to contaminate the topsoil during the replacement or finishing process. All undesirable soils or objects will be removed from the topsoil seedbed at the cost of the CONTRACTOR.

C. Topsoil shall be placed and spread over the areas graded as shown on the plans in such a manner so that after compaction and natural settling the topsoil will conform to finished grades as shown.

D. Provide a smooth transition between adjacent existing grades and new grades.

E. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.3 FINE GRADING

A. Areas to be planted shall be finish graded to provide surface drainage.

B. Undulations and unsightly variations in grade which will not permit the use of normal mowing equipment without scalping shall be removed so that proper use of such equipment may be accomplished.

C. Limit preparation to areas that will be planted in the immediate future.

D. Loosen existing topsoil to a minimum depth of 4 inches. Remove stones, sticks, roots, rubbish, and other extraneous matter larger than 1 inch in any dimension.

E. Mix soil amendments and fertilizers with new topsoil per recommendations from soil report. Delay mixing fertilizer if planting does not follow placing of topsoil within a few days. Either mix soil before spreading or apply soil amendments and fertilizers on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting

3.4 TEMPORARY SEEDING AND MULCHING

A. The seedbed immediately before seeding shall be firm but not so compact as to prohibit covering seed, securing adequate germination, or root penetration. Tillage implements shall be used as necessary to provide at least a 3-inch depth of firm but friable soil, free of large clods and stones.

B. Seed may be broadcast by hand, by cyclone-type mechanical seeders or applied with a drill, cultipacker-seeder, or other suitable equipment. Seed should be covered approximately 2-inches deep either during seeding operation or by following broadcast application with cultipacker or similar tool.

C. Mulching shall be used with all seedings on disturbed soil areas and for temporary use without seeding during months unfavorable to seeding.

D. Immediately after seeding, mulch with unweathered small grain straw (preferably wheat) or hay spread uniformly at the rate of 1-1/2 ton per acre, or 100 lbs (2-3 bales) per 1,000 sq ft.

3.5 PERMANENT SEEDING

A. Topsoil shall be spread to a depth of 4 inches unless otherwise shown on the Plans. Placement of topsoil shall conform to MDOT Section 816.

B. All areas to be seeded shall be fertilized in accordance with MDOT Section 816. CONTRACTOR shall provide all necessary soil tests to determine fertilizer needs.

C. Permanent seeding shall conform to MDOT Section 816. Seeding rate shall be 300 lb/acre.

D. Fertilizing shall conform to all local restrictions.

3.6 MULCHING

A. Straw mulch blankets shall be applied to all seeded areas. Blankets shall be attached with biodegradable wooden pegs per the manufacturer's recommendations.

3.7 PROTECTION

A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

END OF SECTION

SECTION 33 10 00

WATER UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall furnish, install, and perform testing of all materials necessary to complete the work. This shall include all exterior potable and non-potable water piping, and exterior valves and wells.

1.2 RELATED SECTIONS

A. Section 01 14 00 – Work Restrictions

B. Section 31 00 00 – Earthwork

1.3 REFERENCES

A. AWWA – American Water Works Association

1. AWWA C104 – Cement–Mortar Lining for Ductile-Iron Pipe and Fittings
2. AWWA C105 – Polyethylene Encasement for Ductile-Iron Pipe Systems
3. AWWA C111 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4. AWWA C150 – Thickness Design of Ductile-Iron Pipe
5. AWWA C151 – Ductile-Iron Pipe, Centrifugally Cast
6. AWWA C153 – Ductile-Iron Compact Fittings for Water Service
7. AWWA C301 – Prestressed Concrete Pressure Pipe, Steel-Cylinder Type
8. AWWA C600 – Installation of Ductile-Iron Mains and Their Appurtenances
9. AWWA C651 – Disinfection of Water Mains
10. AWWA Manual M9 – Concrete Pressure Pipe

B. City of Ann Arbor Public Services Department Standard Specifications

1.4 SUBMITTALS

A. Shop drawings, catalog data and manufacturer's technical data showing complete information on material composition, physical properties, certification letters and dimensions of pipe and fittings.

B. Prior to the fabrication of the pipe, submit fabrication and laying drawings to the ENGINEER for review. Detailed scaled pipe layout shall show the dimensions of each component, their relationship with each other and other equipment and valves, restraints, existing utilities and other accessories.

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide a sequence of all final connections to the existing system for review by the ENGINEER and OWNER. In addition, a meeting shall be coordinated in the field between the ENGINEER, OWNER and CONTRACTOR to review the connection procedure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Loading, unloading, handling, inspection, and storage of pipe, fittings, valves, joint accessories, and appurtenances: Follow AWWA C600 and AWWA Manual M9, and as specified herein.

B. Store pipe, fittings, valves, and appurtenances off ground using sound wood blocks placed on stable foundation or using other appropriate means. Do not stack pipe higher than 54-inches high. Immediately upon delivery, the ends of all pipe and fittings shall be covered with polyethylene encasement that is securely taped in place. Allow space between rows, individual pieces and bundles with clearance below and above to allow full view for inspection purposes.

C. Store in well-drained area away from brush and accessible for inspection. Do not place excavated material over or against the stored material.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Ductile-iron pipe water main shall meet all the requirements of the latest revision of ANSI/AWWA C151. Ductile iron pipe shall be Thickness Class 53 in accordance with the latest revision of ANSI/AWWA C150.

B. Ductile iron pipe and fittings shall be double cement lined with an approved bituminous seal coat in accordance with ANSI/AWWA C104.

C. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110 for full body fittings and ANSI/AWWA C153 for compact fittings and be of the mechanical joint type.

D. All ductile iron pipe and fittings shall be made in the USA.

E. All ductile iron pipe and fittings shall be restrained joint. Restrained joint pipe and fittings shall consist of bolted retainer rings, ductile iron locking segments held in place by rubber retainers, or ductile iron retaining rings that lock over the bell of the joint and are secured to prevent rotation, and factory welded retainer beads or rings on the spigot of the pipe. All components of the bolted or snap ring assemblies shall be constructed of corrosion-resistant, high strength, low-alloy steel. Restrained pipe and fittings shall be Flex-Ring as manufactured by American Cast Iron Pipe Company, TR Flex as manufactured by US Pipe, or TR Flex as manufactured by Clow Water Systems.

F. Restraint of field cut pipe shall be provided with the manufacturer's compatible field cut restraint systems. Field cut restraint systems shall include Field Flex-Ring assembly or TR Flex gripper ring and field welds. Field cut pipe shall be permitted only where approved by the ENGINEER.

G. The above systems for thrust restraint shall be used on all ductile iron pipe and fittings. Thrust restraint and harnessing systems such as thrust blocks, threaded-rods, friction clamps, retainer glands, and other proprietary systems such as the Mega Lug by EBAA

Iron, etc. shall not be used unless specifically allowed by the Engineer in isolated applications such as connections to existing piping, or walls, etc. Where threaded rods are allowed, the rods and tabs shall be designed for the specified restraint system design pressure, shall have lengths less than 10 feet between fittings, and shall be painted with two heavy coats of coal tar epoxy after installation.

H. Restrained mechanical joints of the wedge action type shall use a follower gland and shall include a restraining mechanism which, when activated, impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. Twist off nuts shall be used to insure proper actuating of the restraining device. Restrained mechanical joints for ductile iron pipe shall be Megalug, Series 1100, or approved equal. Mechanical joints shall be in conformity with the requirements of the latest revision of the ANSI AWWA C111. Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111. Bolts and nuts must be Cor-Blue T-Bolts with a ceramic-filled, baked on fluorocarbon resin.

I. Flanged joints shall conform to ANSI B16.1 Class 125.

2.2 CONCRETE PIPE AND FITTINGS

A. Concrete lined cylinder water main shall meet all the requirements of the latest revision of ANSI/AWWA C301 for Prestressed Concrete Pressure Pipe, Steel-Cylinder Type. The design shall conform to ANSI/AWWA C304 for Design of Prestressed Concrete Cylinder Pipe.

B. Concrete pipe and fitting design conditions shall be as follows:

1. Depth as shown on plans or 6.0' minimum.

2. Soil Weight = 120 lbs./Cu. Ft.

3. Ku' = 0.130

4. Live Loads – HS-20

5. Design Working Pressure – 250 Psi

6. Transient Pressure – 40% of the working pressure

C. Cement shall be Type I or Type II and shall be in accordance with ASTM C150. The pipe core shall be manufactured by the centrifugal or vertically cast process. Mortar coatings shall consist of one part cement to a maximum of three parts fine aggregate, by weight. Rebound, not to exceed one-fourth of the total mix weight, may be used provided the rebound is treated as fine aggregate.

D. Bell and spigot joint rings shall be steel, self-centering type and otherwise as specified in AWWA C301. The rubber gaskets shall be in accordance with AWWA C301.

E. Steel thickness of all fittings shall be designed in accordance with AWWA Manual M9 and ANSI/AWWA C301 specifications. Interior and exterior concrete/mortar coating shall be as per ANSI/AWWA C301.

F. Restrained joints, installed as indicated on the drawings or as directed by the ENGINEER, shall be the clamp type or snap ring type as shown in AWWA Manual M9.

G. The date of manufacture or a serial number traceable to the date of manufacture and the mark or trademark of the manufacturer shall be clearly marked by stencil with waterproof paint at the bell end of the pipe barrel. Unsatisfactory or damaged pipe will be either permanently rejected or returned for minor repairs. Pits, blisters, rough spots, minor breakage and other imperfections may be repaired, subject to the approval of the engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 3,000 psi (20.7 MPa) at the end of 7 days and 4,500 psi (31 MPa) at the end of 28 days, when tested in cylinders stored in the standard manner. Major breakage or spalling from interior of pipe shall be reason for the rejection of pipe.

H. Concrete pipe and fittings shall be manufactured by Thompson Pipe or approved equal.

2.3 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of ANSI/AWWA C500, C504, C509 and C515 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn to the left (counterclockwise) to open.

B. Resilient-Seated Gate Valves

1. Resilient seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515. Valves shall have a minimum working pressure of 250 psi. The gate shall be ductile iron encased in a bonded synthetic rubber to form resilient seating surfaces. Stem shall be bronze with a non-rising design and double O-ring packing. Joints shall be mechanical joint type or match the ductile iron pipe restraint system. Valves 20-inch or larger shall be provided with a spur gear actuator.

2. Resilient Seated Gate Valves shall be manufactured by American Flow Control Series 2500, East Jordan Iron Works Flowmaster, or approved equal.

C. Butterfly Valves

1. Butterfly valves shall be manufactured in accordance with the latest revision of ANSI/AWWA C504 for Class 150B service with operator designed for buried service and a two-inch square operating nut. Butterfly valves shall have a cast iron body, neck and top piece. Seats shall be Buna -N rubber providing leak-proof shut-off. Valve discs shall be made from cast iron on sizes 20 inches and smaller, and ductile iron on valve sizes 24 inches and larger. Disc shall be furnished with stainless steel seating edge to mate with the rubber seat on the body. Valve joints shall be mechanical joint.

2. Butterfly valves shall be manufactured by Henry Pratt Model Groundhog or Mueller Model Lineseal III or approved equal.

D. Air/Vacuum Valves

1. Air/Vacuum valves shall be manufactured and tested in accordance with ANSI/AWWA C512 and shall be designed to operate under a maximum operating pressure of 300 psi. Valves shall have a cast iron body with stainless steel trim.

2. Valves shall be Crispin Series AL or approved equal.

E. Tapping Sleeves and Valves

1. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

2. Tapping sleeves be manufactured of cast iron and designed for water service with a minimum working pressure of 150 psi. The sleeve shall be a full-bodied split sleeve design manufactured by Clow number F-5205; Muller Co. number H-615; Waterous Series 800 or East Jordan.

3. Tapping Sleeves for Prestressed Concrete Steel Cylinder Pipe shall be in accordance with AWWA Manual M-9. The sleeves shall have a separate gland which permits installation of the sleeve prior to cutting of the prestress wires. The gland shall have a fusion epoxy coated (per AWWA C-213) waterway, and a broad gasket set in a retaining groove of a pressure plate gusseted to eliminate flexing. The gland shall be equipped with load bearing set screws to protect the cylinder. Grout under saddle is needed whether saddle is epoxy coated or not. Sleeves shall be furnished with grouting seals and grout horns to facilitate filling the space between the sleeve and the pipe. Tapping sleeves shall be a Hanson Tapping Sleeve for Prestressed Concrete Steel Cylinder Pipe or approved equal.

F. Corporation Stops

1. Corporation stops. Corporation stops used for insertion into mains shall be Ford FB600 or approved equal. All stops shall have bronze cast bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be able to receive the flared end of the copper service pipe.

G. Curb Stops

1. Curb stops installed between the corporation valve and new service structure shall be Mueller B-25155N or approved equal. All stops shall conform to the latest revision of AWWA C800

G. Valve Boxes

1. Valves boxes shall be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The word "Water" shall be cast in raised letters on the cover. Valve boxes shall be EJIW 8560 with number 6 base or approved equal.

H. Curb Boxes

1. Curb boxes shall be of cast iron construction. They shall be of two-piece, screw-type adjustment design. All curb boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The word “Water” shall be cast in raised letters on the cover. Curb boxes shall be Mueller H-103002 or approved equal.

I. Yard Hydrants

1. Yard Hydrants shall be of cast iron construction. They shall be self-draining with MDOT 6A aggregate installed underneath the fitting connecting to the feeding water line. The handle shall be removable screw-type design. All yard hydrants must have signs indicating non-potable water per EGLE requirements. All yard hydrants to be JR Smith 5693 or approved equal.

2. Each yard hydrant shall be enclosed in a lockable, swing open type cover. Enclosures shall be Hubbell Hot Box Fiberglass Air Valve Enclosure AVG2036 or approved equal. Enclosures shall be of fiberglass construction with a minimum thickness of 1½," and shall be provided with holes or ports at the bottom to allow for drainage. They shall be adequately sized to allow for ease of use and access to the yard hydrant, as determined by the ENGINEER. Exterior color shall be custom dark green to be approved by the ENGINEER. Enclosures shall be secured per manufacturer's recommendations to a concrete pad sized as specified on drawings.

2.4 GATE WELLS

A. A gate well shall be provided where shown on the plans and shall be constructed per the details on the Contract Drawings

B. Reinforced concrete gate wells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections with rubber gasket joints. The bottom section shall be furnished with an integral concrete base.

C. Grade adjustment of gate wells shall be with precast concrete grade rings

D. Mortar for masonry or plastering outside of gate wells shall be made of one part of Portland Cement to two parts of sand. Mortar materials and mixing shall correspond, in general, to those for concrete.

E. All openings in gate wells shall be closed with brick and mortar in a manner that will make them watertight.

F. Water pipe to gate well connections shall be through a watertight flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be NPC, Kor-N-Seal, or approved equal. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

G. Gatewell steps shall be reinforced polypropylene coated steel. Steps shall be M.A. Industries models PS1-PF or approved equal.

H. Frames and covers shall conform to the City of Ann Arbor Standard Casting Schedule.

2.5 COPPER PIPE

A. Pipe for air relief and sample lines 3/4-inch to 2-inch shall be soft annealed Type K copper.

B. Curb stops shall be Ford B22 ball valve or approved equal. All parts shall be cast from bronze. They shall have an inverted key stop. Both inlet and outlet connections shall be able to receive the flared end of the copper service pipe

C. Curb boxes shall be the "Arch" type. All curb boxes shall have an I.D. screw type adjustment and shall be furnished complete with cover, rod, and 27/32" point to flat pentagon bolt(s). All curb boxes shall be coated inside and out with a tar base enamel. All curb boxes shall be Ford Arch Pattern Curb Box with 1-inch Upper Section or approved equal.

2.6 POLYETHYLENE ENCASEMENT

A. All ductile iron pipe, fittings, and valves shall be polyethylene encased. Polyethylene encasement must be manufactured in accordance with the requirements of ANSI/AWWA C105.

B. Polyethylene Encasement shall be a linear low-density polyethylene with a minimum thickness of 8 mils.

2.7 THRUST BLOCKS

A. Thrust blocks shall be installed where designated in the schedule on the Contract Drawings.

B. Thrust blocks shall bear on undisturbed soil and shall be 4,000 psi concrete.

C. In unstable soil conditions, the thrust blocks are to be supported by removal of the unstable soils and replacement with ballast of sufficient stability to resist the thrusts.

D. Where field conditions prevent the placement of thrust blocks against undisturbed earth, CONTRACTOR shall provide a design for an alternative means of restraint. Alternative restraint may include piles or sheeting which provides an equivalent restraint to a thrust block.

2.8 TRACER WIRE

A. Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-09964 wire connectors, or approved equal.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. All excavation and backfill shall conform to Section 31 00 00 - Earthwork.

3.2 DUCTILE IRON PIPE INSTALLATION

A. The installation of ductile iron water main shall conform to the requirements of ANSI/AWWA C600.

B. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

C. Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be

removed from the construction site. The interior of each pipe shall be inspected for cleanness and cleared of all dirt and foreign matter before being lowered into the trench.

D. In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of belt slings or automatic release type pipe tongs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the ENGINEER.

E. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe; the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.

F. A minimum of 18-inches clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the ENGINEER. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of concrete bedding of the main, complete concrete encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:

1. A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.

2. Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main; i.e., a concrete saddle under the pipe with a span length extending to undistributed earth bearing.

G. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean, and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket.

H Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the ENGINEER.

I. To prevent trench water from entering the pipe, joints, which for any reason may not be completed as the pipe is laid, shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.

J. Each pipe shall be laid accurately to the line and grade shown on the laying plan. Wherever deflections at joints are required by changes in grade or alignment or to plumb valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

K. The deflection at any joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.

L. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

3.3 CONCRETE PIPE INSTALLATION

A. The installation of concrete lined cylinder pipe must conform to the requirements of AWWA Manual M9.

B. Gasket, gasket groove and bell shall be cleaned and lubricated with a vegetable lubricant furnished by the pipe manufacturer. The lubricant shall be approved for use in potable water and shall be harmless to the rubber gasket. Pipe shall be laid to match existing pipe. As soon as the spigot is centered in the bell of the previously laid pipe, it shall be forced home with approved automatic equipment. After the gasket is compressed, verify the position of the gasket with a feeler gauge provided by the pipe manufacturer.

C. Insert a steel feeler gauge about 1/2" (13 mm) wide and 0.010" (0.25 mm) thick into the joint recess and determine by feel if the gasket is properly seated in the groove.

D. Place a cloth diaper approved by the pipe manufacturer around each exterior joint recess and fasten it in place with either wire or steel strapping stitched into its edges. Mix a 1:3 mortar grout of sufficient liquid consistency to flow easily and pour it into the joint recess beneath the cloth band. To assist the flow and to assure complete filling of the entire recess completely around the pipe, fill the joint with mortar from one side in one continuous operation until the grout has flowed entirely around the pipe. During the filling of the joint, pat or manipulate the sides of the wrapper to settle the mortar and expel any entrapped air. Close the joint recess at the top with a stiffer mix of the same mortar.

E. Where applicable, pack interior joints of pipe 30” diameter and larger with mortar after backfilling is completed. Mortar grout shall be employed, consisting of one part by volume of Portland cement, three parts by volume of well graded coarse concrete sand meeting the requirements of ASTM C33, and sufficient water to make a stiff mortar suitable for overhead work. The mixture shall have a dry, crumbly consistency and shall be pushed into place and troweled to make a smooth joint.

F. Provide mechanical joint restraint per AWWA Manual M9 where required on the Contract Drawings.

G. Bolts, flange faces and steel joint rings shall be shop coated with rust preventative compound. All other metal surfaces shall be shop primed in accordance with the manufacturer’s recommendations.

3.4 GATE VALVES AND WELLS

A. Brick and block adjustment used in structures that fall within the pavement area or for valve supports shall be plastered on the outside with at least 1/2 inch of mortar in a manner that will seal the structure completely. Bricks shall be thoroughly wetted and laid in a full bed of mortar. Plastering shall be performed in conjunction with the laying of the brick. The laying of brick and block shall never be more than six and two courses ahead of the exterior plaster, respectively.

B. All brick, block, mortar and concrete work shall be properly cured and protected from freezing for a minimum of 48 hours. When the temperature is 40ºF and falling, brick, mortar, and concrete shall be heated to a minimum temperature of 60ºF.

C. Where gate wells are located outside of pavements and sidewalks, the final grade adjustments shall be made with pre-cast concrete grade adjustment rings; brick construction will not be allowed except where located in paved surfaces. Grade rings shall be a minimum of 3 inches thick, reinforced with 2 full circles of 3/16" diameter steel reinforcing wire. Manhole casting frame concrete adjustment rings shall be secured to the precast cone section with a minimum of four 5/8" diameter cadmium coated threaded studs or bolts. All joints in the assembly shall be sealed with two layers of butyl rope. The maximum allowable grade adjustment using grade rings shall be 15 inches.

D. The joints between the base section and all riser sections shall be rubber sealed joints.

E. The bottom section of the gatewell shall be a pre-cast base section with Kor-n-Seal pipe connections.

F. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

G. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main.

3.5 POLYETHYLENE ENCASEMENT

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI/AWWA C105/A21.5.

B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

3.6 TRACER WIRE

A. Tracer wire shall be installed along the top of all water mains. The tracer wire shall be installed at a height of not more than 6 inches above the main line pipe. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.

B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:

1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.

2. Terminations at valve/curb boxes, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.

3. Gate well terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gate well is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside.

3.7 CONNECTION TO EXISTING MAINS

A. Once the water main has passed all required tests, final connections to existing mains may be performed. All connections to existing water mains shall be made at the locations as shown on the plans. Final connections shall follow the connection sequence approved by the ENGINEER.

B. All valves shall be operated by the OWNER.

3.8 FIELD QUALITY CONTROL

A. General

1. CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER. All water mains, branches and valves shall be subject to hydrostatic pressure testing, disinfection and bacteriological testing. A copy of all test results shall be furnished to the ENGINEER.

2. Hydrostatic pressure testing of ductile iron pipe must be performed in accordance with ANSI/AWWA C600. Hydrostatic pressure testing of concrete pressure pipe must be performed in accordance with AWWA Manual M9.

3. Disinfection and bacteriological testing of all piping must be performed in accordance with ANSI/AWWA C651.

4. Should the results of any test fail to meet the criteria established in this Section, the CONTRACTOR shall, at his own expense, locate and repair the rejected section and retest until it is within the specified allowance.

B. Sequence

1. All water mains shall be flushed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:

a. Pressure Testing

b. Flushing

c. Chlorination

d. Flushing

e. Bacteriological Testing

C. Hydrostatic Pressure Testing

1. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants are not available at high points, the CONTRACTOR shall make the necessary taps to release the air and insert plugs after the test has been completed, or install corporation stops and leave them in place after testing.

2. Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes shall include a reduced zone backflow preventer to prevent backflow and possible contamination of the public water.

3. All water mains shall be subjected to the hydrostatic pressure listed in the exterior piping schedule. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the main. No pipeline installed will be accepted until the leakage measured is less that allowed by the applicable testing standard. All visible leaks must be corrected.

4. In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction and under the observation of the ENGINEER.

D. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24-hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

2. CONTRACTOR shall submit a flushing plan to the ENGINEER for review, which shall include the quantity of flushing water and location where the water will be discharged. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to neutralize the residual chlorine prior to discharge. Refer to Appendix C of AWWA C651 for information on neutralizing chemicals. Where necessary, Federal, State, County and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

E. Bacteriological Testing

1. The CONTRACTOR shall coordinate and schedule with the ENGINEER to take bacteriological samples of the water in the mains for analysis at two different

times. The CONTRACTOR is responsible for taking samples and transporting them to the OWNER's laboratory under the accompaniment and supervision of the ENGINEER. The OWNER shall provide sample testing services for two rounds of sampling per pipe section tested, any additional sample testing shall be at the CONTRACTOR's expense. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hours later. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or hydrants.

3. If analysis of any sample indicates that the water is unsafe for human consumption, the disinfection sampling and analysis procedures shall be repeated until samples obtained on two (2) consecutive days are found to be safe.

END OF SECTION

SECTION 33 10 10

TEMPORARY PLUGGING OF WATER MAIN

PART 1 - GENERAL

1.1 SUMMARY

A. Hot tapping and pipeline plugging are mechanical methods that have been developed to permit alterations to be made to an operating pipe system without having to interrupt service. The hot tap method gains access, under pressure, into the system and the plugging method permits the introduction of a tool into the system to permit isolation of a specific section of system. Isolation shall be accomplished with the plugging equipment. In the case of plugging, a temporary valve will be provided by the plugging contractor and will be recovered, under pressure upon job completion.

B. The Contract Drawings indicate the location of the existing pipe system and where the work is to be performed.

C. The intent of the plugging operation is to allow the installation of permanent isolation valves. A temporary bypass will not be required.

1.2 RELATED SECTIONS

A. Section 33 10 00 – Water Utilities

1.3 DESIGN REQUIREMENTS

A. The Contractor shall be responsible for all thrust design calculations and placement of support required for this portion of the project. This will include all lateral pipe thrust restraint that will be encountered as a result of the pipe plugging process. It will also include all pipe support based upon the size and weight of the equipment to be utilized.

B. Calculations for concrete support will be based upon site soil conditions and actual operating pressures. This data should be approved by a registered professional engineer prior to implementation in the field.

1.4 SUBMITTALS

A. Contractor Qualifications.

B. A design for the trust restraint design shall be submitted for record in a bound volume sealed and signed by a registered professional engineer in the State of Michigan.

C. Shop Drawings and product data shall be submitted for all components of the hot tapping and pipe plugging procedures.

D. The Contractor shall furnish a written calculation for the hot tap and pipe plugging operation. That written calculation must include pilot drill travel, location of the pilot drill keeper wires in relation to the severed coupon and hot tap shell cutter travel. Hot tap machine will be provided with a positive travel measurement device and all calculations will verified by the Engineer prior to the start of the tap. Plugging head sealing element sizing data and plugging head travel calculations will be provided in a written format. Completion plug setting calculations will also be required.

1.5 QUALITY ASSURANCE

A. All fittings, equipment and work will be accomplished only by those specialty contractors that can demonstrate at least a ten (10) year history of successful application of these methods and in the sizes as specified.

B. The Contractor will be directly responsible for all aspects of the pipe alteration process under pressure and shall hire only specialty pressure subcontractor firms that have a minimum of 10 years demonstrated history of performing these types of operations without service interruption. Contractor shall specify in the submitted bid the name of the pressure contractor they intend to use.

C. The field technician actually operating the machinery will have, as a minimum, a five (5) year continuous employment history with the hot tapping / plugging company. The Company will be required to furnish employment history for this technician along with a safety and other operational training summary. In no case will a technician without proper supporting documentation and qualifications be permitted to work on the jobsite.

D. The field technician for this type of work will be qualified under ISO 9002 quality control standards along with US Department of Transportation Operator Qualification procedures. Further, his safety and operational training records for the past two years will be furnished for review by the Engineer prior to acceptance of the specialty contracting company for this work.

1.6 PROJECT CONDITIONS

A. Prior to fabrication of materials required for the plugging process, the Contractor will determine, in the field, the actual site conditions of the pipe at the location where the work is to take place

B. Excavation drawings (including all dimensions) will be prepared by the Contractor for the purpose of taking physical pipe dimensions at the actual work site and prior to ordering any materials for this portion of the project.

C The Contractor will safely excavate, expose, and clean the outside of the pipe (including power brushing and/or power washing) to accurately circumferentially tape measure and caliper the pipe for the purpose of determining the outside diameter and ovality of the pipe to which the specialty fitting must be installed.

D. Should the existing pipe be encased in concrete or other protective material, the encasement will be removed down to the factory supplied pipe outside diameter or the location for the work changed to an area where the factory supplied pipe is accessible.

E. If existing site conditions preclude the complete operation from taking place at the designated location, the Engineer shall be so advised.

F. Cast/Ductile Iron pipes will be circumferentially tape measured and calipered at a minimum of four points.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The pipe plugging fitting to be used for this type of work shall be manufactured in two sections. The back (bottom) section will be of the full encirclement type and conform to the measured pipe outside diameter. The front (top) section will also be full encirclement type with a factory installed nozzle and flange outlet. Hot tapping saddles will be fabricated from approved carbon steel materials. The body run sections (top and bottom) shall be made of ASTM A283 grade steel as a minimum. ASTM A285 and ASTM A36 grade steels may also be utilized with proof of acceptability. Steel run sections will conform to and re-enforce the existing pipe. Fittings will have a minimum 7/8" wide recess for installation of a Buna-N rubber gasket around the hot tapping outlet. Bolts and nuts shall be stainless steel 18-8 type 404.

B. Pressure service rating for 4" to 60" outlets shall be 150 psi

C. Body: ASTM A283 grade C, A285 or ASTM A36. Saddle plate thickness shall be in accordance with the design criteria for the entire fitting. The minimum wall thickness for saddle plates shall be 0.375". All welding of materials shall be in accordance with applicable code standards and all welds shall be stress relieved when code standards so specify. Saddle plates shall be designed to permit longitudinal bolting of the top and bottom halves around the pipe.

D. Nozzles attached to the saddle plates and used for hot tapping shall be constructed of A106 grade B steel or ASTM A234 or A283 steel. All weldments will be suitably stressed relieved when required by code or by common practice. Nozzle thickness will be as a minimum standard steel pipe wall thickness (0.250" minimum in sizes 6" and above) and in compliance with the maximum working pressure of the system as provided by the owner / operator of the system.

E. Nozzle to pipe sealing gasket: Shall be molded from elastomer compounds that resist compression set and are compatible with potable water in the temperature range of 32 to 140 degrees F. Buna-N rubber is recommended for use with water, salt solutions, mild acids and bases.

F. Flanges used for pipe plugging: All flanges used for line plugging will be manufactured from ASTM A105 grade steel only. Flanges will comply with ASME B16.5 in sizes up to 24". Flanges 26" and larger will comply with MSS-SP 44 specifications in the pressure compatible with the fitting design characteristics. These special flanges facilitate the removal of the temporary control valve utilized for pipe plugging operations.

1. Completion plug flanges and completion plug locking mechanisms shall consist of ring segments or steel leaves that lock from or into the flange bore with at least 80% of bore engagement.

2. The use of point loaded set screw type locks to engage the completion plug about its periphery are strictly prohibited. Only segments or steel leaves will be permitted.

G. Completion plugs used for pipe plugging: Shall be manufactured from steel plate, ASTM A516 GR 50 or 70 STEEL as a minimum. Completion plugs shall be constructed in such a manner that an "O" ring pressure activated device will permit sealing the completion plug to the flange bore thus permitting the safe recovery of the temporary control valve utilized for the pipe plugging operation. Locking grooves or locking leaves will be designed to meet the maximum working pressure of the system.

H. Blind flanges: Will be provided in ASTM A181 or ASTM A105 grade steel and will mate with the line plugging flanges listed above. Minimum blind flange thickness shall comply with AWWA C207.

I. Flange gaskets: All gaskets will be of non-asbestos composition and will be designed to mate to the inner bore and inner bolt circle of the line plugging flange. All gaskets will be at least 0.125" minimum thickness.

J. Fasteners: All external bolting, studs and nuts that shall become a permanent part of the fitting installation shall be Stainless Steel 18-8 type (AWWA C-111 ANSI 21.111).

K. Test plug: Each fitting will be furnished with a factory supplied ¾" threaded test outlet and plug attached to the hot tap nozzle to facilitate field testing of the installed fitting.

L. Finish: After completion of fabrication, all fittings shall be coated both internally and externally with fusion bonded epoxy coating per AWWA Specification C213. Coatings will be applied to 10-20 mil. thickness minimum.

M. Marking: All pipe plugging fittings will be clearly marked to permit proper alignment in the field and to ensure ends are properly matched when installed around the pipe. The use of paint strips and/or matched serial numbers at one end of the fitting will be required.

2.2 EQUIPMENT

A. All equipment utilized for the hot tapping and pipe plugging operations will be designed and manufactured to meet the maximum working pressures of the system onto which they are to be used. All equipment that will come into contact with potable water will be suitably chlorinated at the jobsite, under the supervision of the Engineer, prior to mounting to the valve used for hot tapping or pipe plugging.

B. Hot tapping machinery: Will be designed and constructed in such a manner that they will withstand the pressure and mechanical forces to be encountered during the hot tapping process. Equipment will be power operated. The machinery utilized to perform each hot tap shall have a pressure tight chamber attached to the power rotation portion of the mechanism. The shell cutter utilized for the trepanning process shall have carbide or high strength carbons steel tips to insure a smooth cut. Shell cutter will be inspected by the site engineer for sharpness prior to mounting the hot tap machine to the valve. At least one spare hot tap cutter will be on site prior to the start of the hot tap.

C. The pilot drill will also have carbide or high strength carbon steel tip and will be inspected by the Engineer. Drill will be furnished with "coupon catching" device to ensure that every precaution has been taken to recover the cut-out pipe section. Site Engineer will inspect the coupon catching devise. The use of threaded tip pilot drills that act as coupon catching devices is strictly prohibited. The Contractor shall demonstrate either by experience or by calculation that the catching mechanism is of sufficient strength to retain the weight of the cut-out pipe section (coupon).

D Pipe plugging equipment: All equipment utilized for the pipe plugging operation will be designed and manufactured to meet the maximum working pressures of the system onto which it will to be placed.

E. All equipment will be pressure rated for the operating pressures of the pipelines. The pressure ratings will include a suitable safety factor above the operating pressures in the equipment design calculations.

F. All equipment that is to be installed on the potable water system will be field cleaned with a suitable bacterial protectant prior to mounting to the tapping saddle.

G. Temporary pipe plugging control valve: This valve will be provided by the hot tapping contractor along with a certificate of pressure test, at the factory, for the maximum pressures to be encountered while working on the pipe.

1. The use of knife gate or steel wedge gate seal valves for pipe plugging is prohibited.

2. All temporary valves are the property of the tapping contractor and will be returned upon project completion

H. Pipe plugging machinery: The pipe plugging machinery will consist of an actuator attached to a pressure tight housing. Contained within the pressure tight housing shall be a plugging head with an elastomer seal captured between steel plates. The design and operation of the plugging head and sealing element shall meet the maximum pressures to be encountered in the water system. The sealing element shall be manufactured of elastomeric material and will be non-toxic. The use of a vegetable base lubricant will be mandatory for placement of the sealing element into the pipe system.

1. Plugging head seals will be manufactured in steel or aluminum molds and will evidence a carefully designed pattern with reinforcement at all bolting locations. The use of plugging head seals poured in wood molds with screen mesh and no bolting reinforcement are strictly prohibited.

I Purge/equalization: pipe plugging requires the use of an ancillary fitting for depressurization of the pipe system after the pipe plugging head has been placed into the system. The purge / equalization fitting is used to ensure the integrity of the pipe plugging mechanism, to ensure no other valves in the system might be open or not holding and to safely and in a controlled manner to de-pressurize and pump the water out of the main prior to modification. This fitting is also required to reintroduce pressure into the pipe system after alterations are completed. The pipe system pressure must be "equalized" on both sides of the plugging head to permit its removal from the system. Wherever possible, existing connections will be used for this purpose. When existing fittings are not available, then the Contractor will provide a completion type fitting for this purpose.

PART 3 - EXECUTION

3.1 PREPARATION

A. The pipe will be excavated at the location indicated on the plans and specifications. Excavation will be in accordance with current OSHA safety standards. Excavation will include necessary sheeting and shoring, gravel base and site de-watering. Proper pipe support and thrust restraint will be in place prior to the start of hot tapping saddle installation The pipe will be thoroughly cleaned down to the factory supplied outside diameter. The pipe will be carefully inspected, especially at the point where the fitting "O" ring must seal to the pipe surface. Any surface pitting will be filled in with an Engineer approved epoxy or the site moved to an acceptable location.

B. The excavated pipe will be properly supported by the Contractor in accordance with sound engineering practices and based upon the length of pipe exposed to permit saddle installation.

3.2 INSTALLATION

A. Fittings will be installed in accordance with the manufacturer's recommendation. In no case will the fitting be retrofitted while it is on the pipe. Any mismatch in fitting installation will require the contractor to remove the fitting from the pipe and make Engineer approved alterations.

B. The bottom half of the fitting will be placed around the pipe first and properly supported from the bottom of the pipe with wood cribbing. The top half of the fitting will have the "O" ring seal lightly lubricated with vegetable base grease and then place upon top of the pipe. Side seam draw bolts will be installed, and the fitting halves will be uniformly drawn together, in a loose fashion, starting from the center and working out to each end. Once the fitting is snug to the pipe, it will be rotated with the flange in the top horizontal position to the flange in a vertical position. The flange will be plumbed using a spirit level. Once the outlet flange is plumb, the sides of the fitting should be drawn together until the "O" ring is compressed against the pipe surface. The use of a feeler gauge may be used to determine "O" ring compression.

1. Saddle draw bolts will be torqued to a stress value as recommended by the manufacturer.

C. Concrete encasement / thrust restraint: After acceptance of the pressure test, the concrete support and thrust restraint should be placed around the fitting and pipe joints to properly support the pipe, including equipment weights, and to prevent lateral movement of the pipe joints when the system is altered downstream of the pipe plugging process.

1. The size, length and depth of the concrete support and thrust restraint will be in accordance with a registered professional engineer's calculations and based upon existing geophysical conditions at the work site, as well as the pressures under which the pipe system is operating and the type of joints that connect the pipe system.

2. Concrete shall reach minimum cure strength of 4000 psi prior to the mounting of any tapping-plugging machinery. The use of concrete additives to speed the cure time will be used with the approval of the Engineer.

D. The hot tapping machine will be field chlorinated and mounted to the temporary control valve. The hot will be performed, and the cut-out pipe section (coupon) will be retracted into the tapping machine's pressure housing. The temporary control valve will be closed, the tapping machine de-pressurized and removed from the temporary control valve.

E. Once the hot tap machine has been attached to the valve, the hot tap pilot drill will be advanced to the pipe face by hand (not by power operation). Travel calculations will be checked in relation to the previous recorded data. The drill will be retracted at least (2) two full turns off the pipe face prior to engaging the power drive. Once the pilot drill has penetrated the pipe wall, the hot tap machine will be shut down and all joints inspected for leaks. The hot tap process will be continued to the pre-determined cut completion calculation. The machine will be shut down and the cutting head retracted by hand back to the start measurement.

F. The tap coupon will be removed from the hot tapping machine and the coupon will be measured for the purpose of verification of the pipe plugging sealing element.

G. The plugging machine will be field chlorinated and mounted to the temporary control valve. The plugging sealing element will be lubricated with vegetable base grease only and prior to retraction into the pressure housing. No petroleum base grease will be permitted.

H. The temporary control valve will be opened, and the plugging head will be placed the measured and calculated distance into the main line.

I. De-pressurization will be in accordance with the manufacturer's recommendations based upon the main size being plugged. Once de-pressurization is confirmed then the Contractor may perform alterations to the pipe system as specified.

J. Upon termination of pipe alterations, the pipe system will be re-sealed, and pressure will be introduced into the section of the pipe that has been modified.

K. With system pressure equalized on both sides of the plugging head, the plugging head will be removed from the pipe system and retracted back into the pressure housing on the plugging machine. The temporary control valve will be closed and the line plugging machine de-pressurized. Once all accessories are removed, the plugging machine will be removed from the temporary control valve.

L. The hot tap machine will have the hot tap cutter removed and replaced with a completion plug setting tool and a completion plug.

1. A completion machine will have the completion plug mounted to the tool holder and the completion plug "O" ring will be lubricated with a vegetable-based grease. The completion machine will be installed on the temporary control valve and the valve opened.

2. The completion plug will be lowered the pre-measured distance into the special flange on the line plugging fitting. The completion plug will be securely locked into position and verified locked by the hot tap field technician.

3. The completion machine will be carefully de-pressurized and disconnected from the completion plug tool holder, the machine de-pressurized to confirm the plug is secure and holding. The completion machine will then be removed from the temporary control valve.

M. The temporary control valve will be removed from the plugging fitting. A new gasket and blind flange will be installed on the plugging fitting.

3.3 SITE TESTING

A. Field pressure testing: A blind flange should now be attached to the fitting flange outlet and a suitable pressure test applied to check the contoured elastomeric "O" ring seal. After successful pressure test, the blind flange is to be removed.

1. The field pressure test shall not exceed 15% above actual pipe system operating conditions. Duration and method of pressure testing will be approved by the engineer prior to field implementation.

END OF SECTION

SECTION 33 31 26

LOW PRESSURE SEWER

PART 1 - GENERAL

1.1 SUMMARY

A. Under this section, the CONTRACTOR shall furnish all labor, materials, and equipment required to construct a low pressure sewer (LPS), grinder pump station, and necessary appurtenant work as herein specified. The low pressure sewer main and grinder pump station shall be installed in the locations as shown on the Plans and shall meet the line acceptance tests.

1.2 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, fittings, valves, curb boxes, and grinder pump components for review by the ENGINEER before ordering.

PART 2 - PRODUCTS

2.1 POLYETHYLENE PIPE AND FITTINGS

A. Low pressure sewer pipe and fittings shall be high density polyethylene plastic pipe, DR11, IPS, manufactured in accordance with the specification and requirements of AWWA C906.

B. Materials used for the manufacturing of polyethylene pipe and fittings shall be extra high molecular weight, high density PE 3408 polyethylene resin meeting the ASTM D3350 minimum cell classification of PE 345464C. The cell classification properties of the material shall be certified by the supplier.

C. Polyethylene material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73.4°F when tested in accordance with ASTM D2837.

D. HDPE fittings shall be in accordance with ASTM D3261 (butt fused) and shall be manufactured by injection molding, a combination of extrusion and machining, or fabrication from HDPE pipe conforming to this specification and by the manufacturer of the pipe. The fittings shall be fully pressure rated and provide a working pressure equal to that of the pipe with an included 2:1 safety factor. The fittings shall be manufactured from the same base resin type and cell classification as the pipe itself. The fittings shall be homogeneous throughout and free from cracks, holes, foreign inclusions, voids, or other injurious defects.

E. Mechanical fittings including flanged joints, restrained mechanical joints used with polyethylene pipe shall be specifically designed for restrained mechanical joints, or tested and found to be acceptable for use with polyethylene pipe by the fitting manufacturer.

F. The HDPE pipe shall contain no recycled compound except that generated in the manufacturer's own plant. The physical appearance of the pipe having deformities such as concentrated ridges, discoloration, excessive spot roughness, pitting, varying wall thickness, etc. shall constitute sufficient basis for rejection. The HDPE pipe shall be homogenous throughout, free from visible cracks, foreign inclusions and other defects that may affect the wall integrity.

G. Any pipe that is damaged or does not meet the ENGINEER's approval shall be replaced at the CONTRACTOR's expense.

H. A certificate of "Compliance with Specification" shall be furnished for all materials to be supplied.

I. Heat Fusion Joining Systems

1. Pipes shall be jointed to one another and to polyethylene fittings by thermal butt-fusion in accordance with ASTM D-2657. Butt-fusion joining of the pipes and fittings shall be performed in accordance with the procedures recommended by the pipe manufacturer. Depending upon the installation requirements and site location, joining shall be performed within or outside the excavation. Joints between pipe sections shall be smooth on the inside and internal projecting beads shall not be greater than 3/16-inch.

2. The tensile strength at yield of the butt-fusion joints shall not be less than the pipe.

2.2 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of AWWA C500 and C504 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn counter clockwise to open.

B. The check lead shall be E/ONE UNI-LATERAL stainless steel valve or approved equal.

2.3 SERVICE LEADS

A. Pipe for service leads shall be 1-1/2 inch high density polyethylene plastic pipe, DR11, manufactured in accordance with the specification and requirements of AWWA C906.

B. Curb stops shall be Mueller 300 series or equal. All parts shall be cast in bronze.

C. Curb boxes used for service connections shall be the “Arch” type. All curb boxes shall have a screw type adjustment and shall be furnished complete with lid and pentagon plug. All curb boxes shall be coated inside and out with a tar base enamel. The word "SEWER" shall be cast into the lid.

2.4 BEDDING

A. Bedding is defined as the material placed around the bottom, sides, and on top of the pipe to the dimensions shown on the plans.

B. Granular bedding shall be defined as material meeting the requirements of MDOT Class II material.

C. Aggregate bedding shall be pea gravel or crushed stone conforming to MDOT 6A coarse aggregate.

2.5 PUMP STATIONS

A. The Grinder Pump Station will consist of a grinder pump, suitably mounted in a high density polyethylene basin with pump removal system, shut off valve, anti-siphon valve, and check valve assembled within the basin, remote electrical control panel (as specified below), and all necessary internal wiring and controls.

B. Grinder Pump Stations to be E/One Model DX071 or equal. Pump station must be explosion proof, appropriately rated for industrial use. The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single

mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

C. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties.

   This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

   1. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.

   2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.

   3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.

   4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

   5. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of “foreign objects,” such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

D. Grinder Pump Stations will be equipped with a pump capable of meeting the following operating conditions:

Capacity at TDH	
(ft)	(gpm)
0	15
92	11
185	7.8

The pump must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

E. Grinder Pump control panel shall be E/one Model Sentry Alarm Panel designed for use with explosion proof pumps.

F. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F insulation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless steel. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.

G. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

H. The tank shall be a wetwell/drywell design made of high density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall construction are to be 0.250” thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure. The tank shall be furnished with one EPDM grommet fitting to accept a 4.50" OD DWV or Schedule 40 pipe. The tank capacities shall be as shown on the contract drawings.

I. The drywell accessway shall be an integral extension of the wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The accessway design and construction shall enable field adjustment of the station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed. The station shall have all necessary penetrations molded in and factory sealed. To ensure a leak free installation no field penetrations will be acceptable. All discharge piping shall

be constructed of 304 Series stainless steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1-1/4" Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight. The accessway shall include a 75-foot electrical supply cable for use between the grinder pump alarm panels and the grinder pump/tank. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

J. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

K. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

L. The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96" may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

M. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. The controls shall also include a moisture detection sensor and a redundant pump starting circuit in the event of a high-level alarm. Locating motor starting controls in a plastic enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-Impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The

air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be radial sealed with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump. The level control system shall be electrically connected to the motor controls using inductive means that requires no wiring between compartments. This control system shall be approved to comply with FM3610 Intrinsically Safe Controls. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation.

N. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure. The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.

O. All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split-coller locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling. Assemble the compression fittings according to the fitting manufacturer's recommendations.

P. Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5" W x 14" H x 7" D, or 12.5" W x 16" H x 7.5" D if certain options are included.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.

2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.

3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

2.6 ELECTRICAL WIRING

A. All electrical wiring shall be furnished as specified and as detailed on the plans.

2.7 CONCRETE

A. Concrete used to anchor the station shall be 3000 psi, minimum.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. All excavation and backfill above the pipe shall conform to Section 2.04 - Earthwork. Within marl soils and loose sand soils the CONTRACTOR shall conform to the details in the Plans.

3.2 PIPE INSTALLATION

A. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

B. The sewer shall be laid on a compacted aggregate bedding 4 inches thick, and around and above the main to a height of 12 inches over crown of pipe, unless otherwise specified in the plans. Granular backfill, where applicable, shall be compacted in 6-inch lifts and to 95% density.

C. All pipe and fittings shall be carefully lowered and moved into position in the trench or vault in a controlled manner such as will prevent damage to the pipe.

D. To prevent trench water from entering the pipe, joints which for any reason may not be completed as the pipe is laid shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.

E. Each pipe shall be laid accurately to the line and grade shown on the Plans. The ENGINEER will set all grade and line stakes which the CONTRACTOR must maintain and keep uncovered so they may be examined at any time.

F. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer's recommendations. The pipe should be handled in such a manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.

G. Segments of pipe having cuts or gouges in excess of 10 percent of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt-fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt-fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure.

H. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

I. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow at least two lengths behind pipe laying and shall be completed to the top of the trench not more than ten lengths behind pipe laying.

J. Valve Structures are to be constructed where shown on the Plans, and shall be constructed in accordance with the details shown on the Plans.

3.3 CONNECTION TO EXISTING SEWER

A. The new low pressure sewer shall be connected to existing sewer at an existing sanitary sewer manhole indicated on the plans. The contractor shall be responsible for coring the manhole in order to make the connection at the specified elevation. The connection shall be sealed with Kor N' Seal boot, or approved equal.

3.4 GRINDER PUMP STATION INSTALLATION

A. The location of the station will be located as shown on the plans. Should the CONTRACTOR determine that existing conditions require a different installation location for the grinder pump station; the change shall be approved by the ENGINEER in the field.

B. The CONTRACTOR shall endeavor to minimize the area of construction.

C. The 4 inch inlet and 1-1/2 inch discharge shall be installed per the details shown on the Plans.

D. A concrete anti-flotation collar, as detailed on the drawings, and sized according to the details in the plans, shall be required and be cast to the grinder pump. If pre-cast, the Grinder Pump Station with its pre-cast anti-flotation collar shall have a minimum of three (3) lifting eyes for loading and unloading purposes.

E. The backfill surrounding the grinder pump station shall be in accordance with the details on the plans.

3.5 GRINDER PUMP STATION STARTUP AND FIELD TESTING

A. The Contractor shall perform field tests as specified herein, before the stations are accepted.

B. All equipment and materials necessary to perform testing shall be the responsibility of the Contractor. This will include, as a minimum, a portable generator (if temporary power is required) and water in each basin.

C. Upon completion of the installation, the Contractor will perform the following test on the station:

1. Make certain the discharge shut-off valve and curb stop are fully open. This valve must not be closed when the pump is operating.

2. Turn ON the alarm power circuit.

3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.

4. Turn ON pump power circuit. Initiate pump operation to verify automatic "on/off" controls are operative. Pump should immediately turn ON. Within one (1) minute alarm light will turn OFF. Within three (3) minutes the pump will turn OFF.

END OF SECTION

SECTION 35 22 26

CAST IRON SLUICE GATES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, Engineering data, instructions, and recommendations of the equipment manufacturer unless otherwise instructed in writing by the OWNER or ENGINEER.

Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete and properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of cast iron water control gates.

B. Unit Responsibility: To insure compatibility of all components directly related to the sluice gates, unit responsibility for the sluice gates, actuators, and accessories as described in this section shall be the responsibility of the sluice gate manufacturer and CONTRACTOR unless specified otherwise.

C. CONTRACTOR is responsible for field verifying all dimensions associated with the sluice gates.

1.2 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 “Submittal Procedures” and as specified herein.

B. Submittals shall include:

1. Shop Drawings

2. Manufacturer’s operation and maintenance manuals and information.

3. Manufacturer’s installation certificate.

4. Manufacturer’s equipment warranty.

5. Manufacturer’s performance affidavit in accordance with Section 01 91 00 “Commissioning”.

6. Design calculations demonstrating lift loads and deflection in conformance to the application requirements. Design calculations shall be approved by a licensed ENGINEER (PE) and shall be submitted with the shop drawings.

1.3 QUALITY ASSURANCE

A. Qualifications

1. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20-years of experience designing and manufacturing cast iron sluice gates. The manufacturer shall have manufactured cast iron sluice gates of the type described herein for a minimum of 20 similar projects.

2. The sluice gate shall be manufactured by Watermain Industries, or ENGINEER approved equal.

PART 2 - EQUIPMENT

2.1 GENERAL

A. The gates shall be non-self-contained with stem guides and operator, in accordance with the requirements of this specification.

B. The gates shall be compliant with the latest version of AWWA C560, as described below.

C. Specific configurations shall be as noted on the gate schedule or as shown on the plans.

D. Materials:

COMPONENTS	MATERIALS
Frame, Cover Slide	Cast Iron ASTM A126 Class B
N/A	Ductile Cast Iron ASTM A536
Seats	Naval Bronze ASTM B21 Alloy 48200
Flush Bottom Seals	Neoprene ASTM D2000 BC 615/625 Grade BE 625
Wedges and Stem Blocks	Manganese Bronze ASTM B584 Alloy 86500
Stems	Stainless Steel ASTM A276 AISI Type 304
Stem Cover	Clear Butyrate with Mylar Strip
Stem Guides	Stainless Steel ASTM A240/A276 AISI Type 304L UHMW Bushed
N/A	Stainless Steel ASTM A240 AISI Type 304L

Pedestals	Steel ASTM A36/A53
Fasteners and Anchor Bolts	Stainless Steel ASTM F593 / F594 Type 304 CW
Finish	NSF/ANSI 61 Compliant Paint

E. Gate Schedule:

Equipment Number	Gate Size, inch[1]	Gate Type + Mounting[2]	Opening Direction[3]	Bottom Seating[4]	Design Head, feet		Operator Type
					Seating	Unseating	
1	36" x 72"	WT-F	U	FB	26	0	Geared lift w/ side mounted handwheel

Notes:
1. Clear opening width by height.
2. W = wall mounted, T = Thimble (specify type E, F, or MJ), Y = self-contained, F = flatback, SC=square/circular
3. U = upward, D = downward
4. FB = flush bottom

2.2 FRAME AND GUIDES

A. The frame and guides shall be cast one-piece construction or may have guides dowelled and bolted to the frame.

B. Frames shall be of the standard flangeback or extended flange type with round or rectangular opening as indicated on the plans and in the sluice gate schedule.

C. A machined dovetail groove for the mounting of the seat facings shall be provided on the front face of the frame for all dovetail embedded seats.

D. The frame shall be provided with cast-on pads which shall be machined, drilled, and tapped for the mounting of the wedge device.

E. The back of the frame flange shall be machined to a plane and drilled to match the wall thimble. CONTRACTOR shall field verify existing Thimble bolt pattern.

F. Guide rails shall be of such length as to retain at least one-half of the vertical height of the slide when it is in the fully opened position.

G. A groove running the full length of the guide shall be accurately machined to receive the slide tongue, with a nominal clearance of 1/16-inch.

2.3 STEMS AND STEM GUIDE(S)

A. The stem shall be solid stainless steel of the specified grade.

B. Stem threads shall be machine cut 29-degree full Acme or stub Acme type.

C. Nominal diameter of the stem shall not be less than the crest of the threaded portion.

D. Stem guides and brackets shall be fabricated stainless steel, with UHMW bushings.

E. Two-piece guides shall be adjustable in two directions and shall be so constructed that, when properly spaced, they will hold the stem in alignment and still allow enough play to permit operation per AWWA C560.

F. Stem guide spacing shall be as recommended by the gate manufacturer for the specific stem size, but in no case, shall the unsupported stem length/radius of gyration (l/r) exceed 200.

G. Stem guide brackets shall be secured to the wall by anchor bolts of sufficient strength and arrangement to prevent unacceptable stem guide deflection due to either axial and/or radial stem loading caused by gate operation forces during manual operation, or caused by motor-operator locked rotor stall conditions.

2.4 COVER (SLIDE)

A. The cover shall be designed for the design head indicated with a minimum safety factor of 5 with regard to ultimate tensile, compressive, and shear strength.

B. The cover shall be of one-piece cast construction with vertical and horizontal ribs, a reinforced pocket to receive the thrust nut, pads to receive the wedges, and a reinforced periphery around the back side of the cover for machining of the dovetail grooves in which the seating faces shall be mounted.

C. All wedge pads shall be machined, drilled and tapped to receive the wedge devices.

D. The cover shall have fully machined tongues running the full length of each side to properly engage the guide grooves.

E. A thrust nut shall be provided to attach the slide to the stem. The nut shall be threaded and, in the case of rising stems, provided with keys and/or two set screws locked into indents in the stem to prevent rotation of the stem.

F. For non-rising stems, the stem shall turn freely in the thrust nut, to open and close the slides as the stem is rotated, the nut pocket shall be cast on top of the slide so that the stem does not project into the waterway when the gate is fully opened.

2.5 SEATING FACES

A. All seating faces for both covers and frames shall be malleable corrosion resistant material (see materials section) of a shape that will fill and permanently lock in the dovetail grooves of the slide and the frame. No other means of attachment will be allowed.

B. The seats shall be machined to a 63 micro-inch finish, or better.

2.6 WEDGES

A. All wedges and wedge blocks shall be of solid corrosion resistant material and shall be of sufficient number to provide a practical degree of water tightness per AWWA C560.

B. All wedge bearing surfaces and contact faces shall be machined to give maximum contact and wedging action.

C. Wedges shall be fully adjustable, but once set shall not rotate or move from the set position.

D. All wedge fasteners and adjustment screws shall be corrosion resistant.

2.7 FLUSH BOTTOM SLUICE GATES

A. When a flush bottom closure is specified, a resilient seal shall be attached to the frame so that it is flush with the gate invert.

B. The flush bottom seal shall be supported by a stainless-steel bracket which shall be bolted to machined pads provided on the frame.

C. The seal shall be held in place by a stainless-steel bar which shall be bolted through the seal to the bracket with stainless steel fasteners.

2.8 WALL THIMBLES AND ANCHOR BOLTS

A. CONTRACTOR shall field verify the bolt pattern and dimensions of the existing wall thimble prior to ordering the gate.

B. After machining, the front flange shall be marked with vertical centerline and the word "top" for correct alignment.

C. A mastic type gasket shall be provided between the sluice gate and the wall thimble.

D. Gate anchor bolts shall be Type 304 stainless steel. Size of bolts, installation details, embedment, etc. shall be included with the sluice gate design.

E. CONTRACTOR to field verify the configuration of the existing wall thimble configuration “Type E, F, MJ, and/or Bell.”

2.9 MANUALLY-OPERATED LIFTS

A. Sluice gates shall be operated manually by a gear lift with side mounted handwheel operated pedestal.

B. Each lift shall be provided with a threaded cast bronze lift nut to engage the threaded portion of the stem. The lift nut shall have a machined surface, fitted above and below with thrust ball or rolling element bearings.

C. Handwheel lifts shall be without gear reduction. A maximum effort of 40 lbs. pull (25 lb. pull) on handwheel or crank shall operate the gates under the specified operating head.

D. The gears, when required, shall be steel with machine-cut teeth. Pinion gears shall be supported by bronze bushings or rolling element bearings.

E. The lift mechanism shall be totally enclosed within a cast iron housing.

F. The pedestal shall be structural steel.

G. All lifts for rising stems shall be provided with a galvanized steel stem cover, a tubular transparent plastic stem cover with mylar strip position indicator.

H. Handwheels shall be approximately 36" from the operating floor unless otherwise shown or specified.

I. The word "open" shall be cast onto the handcrank or handwheel indicating direction of rotation to open the gate.

2.10 PAINTING

A. All cast iron parts of the sluice gate (not bearing or sliding contact) shall be painted in accordance with the section 09 91 00 found in these specifications.

2.11 SHOP TESTING

A. The completely assembled gate and hoist shall be separately shop-operated to insure proper assembly and operation.

B. The gate shall be adjusted so that a .002" thick gauge (1/2 that required by AWWA standard) will not be admitted at any point between frame and cover seating surfaces.

C. All gates and equipment shall be inspected and approved by a qualified shop inspector prior to shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All work required to isolate, remove and install the sluice gate including stop log installation/removal, crane/gantry installation, sealing, etc. shall be the responsibility of the CONTRACTOR.

B. Installation of the gates shall be performed in accordance with standard industry practices. It shall be the responsibility of the CONTRACTOR to handle, store, and install the equipment specified in this Section in strict accordance with the Manufacturer's recommendations.

C. The CONTRACTOR shall review the installation drawings and installation instructions prior to installing the gates.

D. The gate frames shall be installed in a true vertical plane, square and plumb, with no twist, convergence, or divergence between the vertical legs of the guide frame.

E. The CONTRACTOR shall fill any void between the guide frames and the structure with non-shrink grout as shown on the installation drawing and in accordance with the grout manufacturer's recommendations.

3.2 FIELD TESTING

A. After installation, all gates will be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate assembly shall be water tested by the CONTRACTOR at the discretion of the ENGINEER and OWNER, to confirm that leakage does not exceed the specified allowed leakage per AWWA C560.

END OF SECTION

SECTION 35 22 29

STAINLESS STEEL SLUICE GATES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, Engineering data, instructions, and recommendations of the equipment manufacturer unless otherwise instructed in writing by the OWNER or ENGINEER.

Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete and properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of stainless steel water control gates.

B. Unit Responsibility: To ensure compatibility of all components directly related to the sluice gates, unit responsibility for the sluice gates, actuators, and accessories as described in this section shall be the responsibility of the sluice gate manufacturer and CONTRACTOR unless specified otherwise.

C. CONTRACTOR is responsible for field verifying all dimensions associated with the sluice gates.

1.2 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 “Submittal Procedures” and as specified herein.

B. Submittals shall include:

1. Shop Drawings

2. Manufacturer’s operation and maintenance manuals and information.

3. Manufacturer’s installation certificate.

4. Manufacturer’s equipment warranty.

5. Manufacturer’s performance affidavit in accordance with Section 01 91 00 “Commissioning”.

6. Design calculations demonstrating lift loads and deflection in conformance to the application requirements. Design calculations shall be approved by a licensed ENGINEER (PE) and shall be submitted with the shop drawings.

1.3 QUALITY ASSURANCE

A. Qualifications

1. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20-years of experience designing and manufacturing cast iron sluice gates. The manufacturer shall have manufactured cast iron sluice gates of the type described herein for a minimum of 20 similar projects.

2. The sluice gate shall be manufactured by Watermain Industries, or ENGINEER approved equal.

PART 2 - EQUIPMENT

2.1 GENERAL

A. The gates shall be non-self-contained with stem guides and operator, in accordance with the requirements of this specification.

B. The gates shall be compliant with the latest version of AWWA C560, as described below.

C. Specific configurations shall be as noted on the gate schedule or as shown on the plans.

D. Materials:

COMPONENTS	MATERIALS
Frame, Cover Slide, Yokes	Stainless Steel: ASTM A240/A276 AISI Type 304
Stems	Stainless Steel: ASTM A276 AISI Type 304
Fasteners and Anchor Bolts	Stainless Steel ASTM F593 / F594 Type 304 CW
Flush Bottom Seals	Rubber: ASTM D 2000 BC 615/625 Grade BE 625
Seat/Seals	Ultra-High Molecular Weight Polyethylene (UHMW)
Stem Cover	Clear Butyrate with Mylar Strip
Stem Guides	Stainless Steel: ASTM A240/A276 AISI Type 304L UHMW Bushed
Pedestals	Steel: ASTM A36/A53
Finish	Mill Finish on all Stainless-Steel Surfaces

E. Gate Schedule:

Equipment Number	Gate Size, inch[1]	Gate Type + Mounting[2]	Opening Direction[3]	Bottom Seating[4]	Design Head, feet		Operator Type
					Seating	Unseating	
1	36" x 72"	WT-F	U	FB	26	0	Geared lift w/ side mounted handwheel

Notes:
1. Clear opening width by height.
2. W = wall mounted, T = Thimble (specify type E, F, or MJ), Y = self-contained, F = flatback, SC=square/circular
3. U = upward, D = downward
4. FB = flush bottom

2.2 FRAME AND GUIDES

A. The gate frame shall be composed of stainless-steel guide rails with UHMW seat/seals upstream and downstream. The seat/seals shall form a tight seal between the frame and the slide. The weir gate invert seal shall be a wiper type seal equal to the Waterman Guardian Seal™.

1. The UHMW seats will impinge on the slide by way of a continuous loop neoprene seal. Seal designs incorporating neoprene or other resilient side and top seals in direct contact with the slide are not acceptable.

2. The neoprene seal will perform the function of a seal between the frame and the UHMW as well as a spring force to maintain contact between the UHMW and the slide.

3. The tight seal shall provide an allowable leakage rate of no more than 0.05 gallons per minute (GPM) per peripheral foot of opening for seating head and unseating heads.

2.3 STEMS AND STEM GUIDE(S)

A. The stem shall be solid stainless steel of the specified grade.

B. Stem threads shall be machine cut 29-degree full Acme or stub Acme type.

C. Nominal diameter of the stem shall not be less than the crest of the threaded portion.

D. Stem guides and brackets shall be fabricated stainless steel, with UHMW bushings.

E. Two-piece guides shall be adjustable in two directions and shall be so constructed that, when properly spaced, they will hold the stem in alignment and still allow enough play to permit operation per AWWA C560.

F. Stem guide spacing shall be as recommended by the gate manufacturer for the specific stem size, but in no case, shall the unsupported stem length/radius of gyration (l/r) exceed 200.

G. Stem guide brackets shall be secured to the wall by anchor bolts of sufficient strength and arrangement to prevent unacceptable stem guide deflection due to either axial and/or radial stem loading caused by gate operation forces during manual operation or caused by motor-operator locked rotor stall conditions.

2.4 SLIDE COVER

A. The slide cover shall be stainless steel plate reinforced with structural shapes welded to the plate.

1. The slide cover shall not deflect more than 1/720th of the span, or 1/16" at the sealing surface of the gate under maximum specified head.

2. The stem connection shall be either the clevis type, with structural members welded to the side and a bolt or bolts to act as a pivot pin, or a threaded and bolted (or keyed) thrust nut supported in a welded nut pocket.

3. The clevis or pocket and yoke of the gate shall be capable of taking, without damage, at least twice the rated thrust output of the operator at 40 pounds of pull on a hand wheel or hand crank.

2.5 SEATING FACES

A. All seating faces for both covers and frames shall be malleable corrosion resistant material (see materials section) of a shape that will fill and permanently lock in the dovetail grooves of the slide and the frame. No other means of attachment will be allowed.

B. The seats shall be machined to a 63 micro-inch finish, or better.

2.6 FLUSH BOTTOM CLOSURE

A. Gates shall be furnished with a flush seal arrangement. A resilient seal with minimum width of exposed face of 1-3/8" shall be securely attached to the frame along the invert, and shall extend to the depth of the guide groove. The resilient seal extrusion shall be constructed to be ribbed and self-retaining. Invert seal designs that require mechanical retention are not allowed.

2.7 WALL THIMBLES AND ANCHOR BOLTS

A. CONTRACTOR shall field verify the bolt pattern and dimensions of the existing wall thimble prior to ordering the gate.

B. After machining, the front flange shall be marked with vertical centerline and the word "top" for correct alignment.

C. A mastic type gasket shall be provided between the sluice gate and the wall thimble.

D. Gate anchor bolts shall be Type 304 stainless steel. Size of bolts, installation details, embedment, etc. shall be included with the sluice gate design.

E. CONTRACTOR to field verify the configuration of the existing wall thimble configuration "Type E, F, MJ, and/or Bell."

2.8 MANUALLY OPERATED LIFTS

A. Sluice gates shall be operated manually by a gear lift with side mounted handwheel operated pedestal.

B. Each lift shall be provided with a threaded cast bronze lift nut to engage the threaded portion of the stem. The lift nut shall have a machined surface, fitted above and below with thrust ball or rolling element bearings.

C. Handwheel lifts shall be without gear reduction. A maximum effort of 40 lbs. pull (25 lb. pull) on handwheel or crank shall operate the gates under the specified operating head.

D. The gears, when required, shall be steel with machine-cut teeth. Pinion gears shall be supported by bronze bushings or rolling element bearings.

E. The lift mechanism shall be totally enclosed within a cast iron housing.

F. The pedestal shall be structural steel.

G. All lifts for rising stems shall be provided with a galvanized steel stem cover, a tubular transparent plastic stem cover with mylar strip position indicator.

H. Handwheels shall be approximately 36" from the operating floor unless otherwise shown or specified.

I. The word "open" shall be cast onto the hand crank or handwheel indicating direction of rotation to open the gate.

2.9 PAINTING

A. The pedestal and hand actuator shall be painted in accordance with the section 09 91 00 found in these specifications.

2.10 SHOP TESTING

A. The completely assembled gate and hoist shall be separately shop-operated to insure proper assembly and operation.

B. The gate shall be adjusted so that a .002" thick gauge (1/2 that required by AWWA standard) will not be admitted at any point between frame and cover seating surfaces.

C. All gates and equipment shall be inspected and approved by a qualified shop inspector prior to shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All work required to isolate, remove and install the sluice gate including stop log installation/removal, crane/gantry installation, sealing, etc. shall be the responsibility of the CONTRACTOR.

B. Installation of the gates shall be performed in accordance with standard industry practices. It shall be the responsibility of the CONTRACTOR to handle, store, and install the equipment specified in this Section in strict accordance with the Manufacturer's recommendations.

C. The CONTRACTOR shall review the installation drawings and installation instructions prior to installing the gates.

D. The gate frames shall be installed in a true vertical plane, square and plumb, with no twist, convergence, or divergence between the vertical legs of the guide frame.

E. The CONTRACTOR shall fill any void between the guide frames and the structure with non-shrink grout as shown on the installation drawing and in accordance with the grout manufacturer's recommendations.

3.2 FIELD TESTING

A. After installation, all gates will be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate assembly shall be water tested by the CONTRACTOR at the discretion of the ENGINEER and OWNER, to confirm that leakage does not exceed the specified allowed leakage.

END OF SECTION

SECTION 40 05 00

PROCESS VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Valve work shall include the furnishing, by the CONTRACTOR, of all labor, materials and services necessary for installing all the valves, valve operators, and necessary equipment shown on the Plans and specified herein for a complete and functioning installation in accordance with the Contract Documents for process systems. This work does not include plumbing systems or underground buried valves.

B. All valves shall turn to the left (counterclockwise) to open.

C. Valves shall not contain any PTFE linings on wetted parts including seals, bearings, shafts, etc.

1.2 STANDARDS

A. All valves and operators installed under this Specification shall conform to the applicable requirements of NSF, AWWA, ASTM, and ANSI standards governing materials of construction, dimensional tolerances and workmanship of the valves for potable water use. Every valve and operator shall carry the name or trademark of the manufacturer. Each valve shall have a permanent position indicator easily readable from operating position.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Specification Section 15 07 50, Mechanical Identification

1.4 SHOP DRAWINGS

A. Shop drawings shall be submitted to the ENGINEER for his review in accordance with the requirements of Division 1 of these Specifications.

1.5 INSTRUCTION MANUALS AND INSTRUCTIONS

A. The CONTRACTOR shall obtain from the manufacturer of all major valves Operations and Maintenance Manuals instruction manuals covering maintenance, service and lubrication of the valves, in accordance with the requirements of Division 1 of these Specifications.

B. The CONTRACTOR shall provide a competent field service representative to inspect and install and make necessary adjustments and calibration of the valves and controls and instruct the OWNER's personnel in the proper operating of valves, actuators, and controls.

PART 2 - PRODUCTS

2.1 GATE VALVES

A. Valves 12 inches through 48 inches shall have a ductile iron body and bonnet with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule.

Seats shall be of bronze and shall be screwed into the valve body. The disc shall be a solid wedge; cast iron with permanently rolled-in bronze faces, or all bronze. Stem shall be bronze of the rising stem design and shall be packed with TFE impregnated non-asbestos packing. Packing shall be replaceable while valve is in service. All stem washers and bushings shall be bronze, grease or permanently lubricated. Valves shall have ANSI 125 lb. standard drill flat faced flanges and hand wheel operators unless otherwise specified or shown on the Plans. Handwheels shall be 16-inch diameter on valves 14 inches and smaller and handwheels shall be 24-inch diameter on valves 16 inches and larger. Handwheels shall be painted orange.

2.2 PVC BALL VALVES

A. Valves 2-1/2 inches and larger shall have a polyvinyl chloride (PVC) body with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Seats shall be TFE easily removable for replacement. Stem shall be PVC with "O" ring viton seal or ENGINEER approved equal. Valves shall have a union and connector for ease in access to the ball and seats. Valves shall have ANSI 125 lb. standard drill flat faced flanges and "T" handle operators unless otherwise specified or shown on the Plans.

2.3 BUTTERFLY VALVES

A. Valves 6 inches and larger shall have a cast iron body, neck and top piece with a minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Seats shall be Buna-N or Hycar providing leak-proof shutoff with the disc and acting as a body liner to prevent corrosion. Disc shall be ni-resist, cast iron with stainless steel mating surfaces and stainless steel shaft rotating in permanently lubricated bearings. Stem seal shall be Buna-N or Hycar. Valves shall be flanged type with gear operators unless otherwise specified or shown on the Plans. Handwheels shall be 16-inch diameter on valves 14 inches and smaller and handwheels shall be 24-inch diameter on valves 16 inches and larger. Handwheels shall be painted orange.

B. Valves 2 inches through 4 inches shall have a cast iron body, neck and top piece with minimum non-shock W.O.G. working pressure rating as specified in the valve schedule. Seats shall be Buna-N or Hycar providing leak-proof shutoff with the disc and acting as a body liner to prevent corrosion. Disc shall be ni-resist, cast iron, with a 316 stainless steel shaft rotating in permanently lubricated bearings. Stem seal shall be Buna-N or Hycar. Valves shall be flanged type with lever operators unless otherwise specified or shown on the Plans.

C. Butterfly valves shall be manufactured in accordance with the latest revision of ANSI/AWWA C504 Valves with a working pressure of 250 psi. Butterfly valves shall meet the requirements of NSF/ANSI 61/372. Butterfly valves shall be manufactured by Henry-Pratt Company, DeZurik or ENGINEER approved equal.

2.4 GEAR OPERATORS

A. All manual gate, plug, and butterfly valves 6 inches or larger shall be provided with gear operators unless otherwise specified or shown on the Plans. The operators shall be of the threaded screw, linked traveling nut-type, threaded screw traveling nut in slotted arm, or worm and pinion type. Materials off construction shall be of hardened steel and bronze. The operators shall be self-locking and shall be capable of transmitting twice the operational torque without permanent damage to the faces of the gear teeth.

B. All gears and linkage shall be totally enclosed in a high strength cast iron or steel gear case to prevent entry of foreign matter and provide a leak proof container for lubricant.

2.5 STEM GUIDES

A. Furnish and install stem guides where required or shown on the Plans. Stem guides shall be of all cast iron construction with grease lubricated bronze bushings to preserve stem alignment. No stem will be permitted to be unsupported for more than 10 feet. All stem guides shall be adjustable in two directions in the horizontal plane.

PART 3 - EXECUTION

3.1 VALVE LOCATIONS

A. Refer to Contract Drawings for location of valves.

3.2 PAINTING FOR VALVES

A. All iron work of valves, stem guides, operating stands and accessories to be installed within buildings shall be painted as specified in Section 09 90 00 - Painting. Valve nameplates shall not be painted over.

3.3 VALVE TAGS

A. Each valve must be tagged as indicated under Section 15 07 50 - Mechanical Identification for numbering and coding as directed by the ENGINEER. Tags shall be permanently attached to valve body or with chain on small valves.

END OF SECTION

SECTION 40 05 39.13

CONCRETE PRESSURE WATER PIPE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. CONTRACTOR shall furnish all labor, materials, tools, equipment, and required appurtenances to install, ready for operation, all prestressed concrete cylinder pipe including fittings, rubber gaskets, mortar for joints of all pipe for the installation of the 42" and 36" resilient seated gate valves as shown on the drawings and as specified herein. The work shall include the testing of materials, pipe and pipelines.

1.2 RELATED WORK

A. Trenching, Backfilling, and Compaction are included in Section 31 00 00 "Earthwork".

B. Fill Materials are included in Section 31 00 00 "Earthwork".

C. Valves and Appurtenances are included in Section 40 05 00 "Process Valves and Accessories".

1.3 SUBMITTALS

A. Submit shop drawings to the ENGINEER for review in accordance with Section 01 33 00 "Submittal Procedures" showing details of reinforcement, concrete, and joint dimensions for all pipe and fittings. Submit a tabulated laying schedule which references stationing and elevations as shown on the drawings as well as all fittings, bevels, restrained joints, and specials, along with the manufacturer's drawings indicating details of all items. The laying schedule shall show code numbers for all pipe, fittings, and specials. These code numbers shall correspond to markings on the pipe, fitting, or special. The above shall be submitted to the ENGINEER for review before manufacture and shipment. The locations of all pipes shall conform to the locations indicated on the drawings. Pipe supplied from inventory shall be authorized by the ENGINEER.

B. Submit anticipated production and delivery schedule.

C. Design Data:

1. Design specification data sheets listing all parameters used in the pipe design.

    a. Type of Pipe

        1) Lined Cylinder (L-301)

    b. Cylinder Data

        1) Thickness and Diameter

    c. Prestressing Wire Data

        1) ASTM Designation and Class

        2) Size

        3) Area

4) Wire spacing

5) Minimum ultimate strength

6) Wrapping stress

d. Concrete/Mortar Data

1) Concrete proportions

2) Minimum Compressive Strength at Time of Wrapping

3) Minimum Compressive Strength at 28 days

4) Core thickness

5) Coating thickness

2. Submit design calculations in accordance with AWWA C304. Clearly indicate all calculation constants for this specific project.

D. Test Reports

1. Shop test results for steel, cement, and gasket rubber

2. Field pressure/leakage tests

E. Certificates

1. Prior to shipment of pipe, submit a certified affidavit of compliance stating that the pipe for this contract was manufactured, inspected, and tested in accordance with the AWWA standards specified herein.

1.4 REFERENCE STANDARDS

A. The AWWA Standard for Prestressed Concrete Pressure Pipe, Steel Cylinder Type (AWWA C301, latest revision) is made a part of these Specifications. Documents referenced in AWWA C301, Section 2 form a part of this specification to the extent specified herein.

B. Other standards applicable to the work specified herein are, but not limited to, the following:

1. AWWA C301 – Prestressed Concrete Cylinder Pipe, Steel-Cylinder Type

2. AWWA C304 - Design of Prestressed Concrete Cylinder Pipe

3. AWWA C651 - Disinfecting of Water Mains

4. AWWA Manual M9 - Concrete Pressure Pipe

C. American Society for Testing and Materials (ASTM)

1. ASTM A648 - Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Pipe

2. ASTM C33 - Standard Specification for Concrete Aggregates

3. ASTM C150 - Standard Specification for Portland Cement

4. ASTM A568 – Standard Specification for Steel Sheet, Carbon and High-Strength, Low-Alloy, Hot Rolled and Cold Rolled, General Requirements for

5. ASTM A1011 – Standard Specification for Steel, Sheets and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

6. ASTM A635 Grades 1012 through 1020 – Standard Specification for Steel, Sheet, and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled

7. ASTM A659 - Standard Specification for Steel, Carbon (0.16 Maximum to 0.25 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial Quality

8. ASTM A1018 – Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability

D. American Association of State Highway and Transportation Officials (AASHTO)

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

A. Qualification

1. The materials specified herein are intended to be standard types of prestressed concrete cylinder pipe and fittings for use in transporting water.

2. All prestressed concrete cylinder pipe and fittings shall be furnished by reputable manufacturers with a minimum of ten years of experience in manufacturing prestressed concrete cylinder pipe. The pipe and fittings shall be manufactured and installed in accordance with industry standards and methods and shall comply in all respects with requirements of these specifications and with the latest edition of all referenced standards and specifications.

B. Inspection of the pipe and fittings will be made by the ENGINEER upon delivery at the site. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements. Pipe rejected after delivery shall be marked for identification and shall be repaired or removed from the job at once unless otherwise approved by the ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise specified, the design materials and workmanship for pipe shall conform to the requirements of AWWA C301. Core and coating thickness for pipe shall be as specified in AWWA C301.

B. Prestressed concrete cylinder pipe and fittings shall be manufactured by Thompson Pipe Group, Grand Prairie, TX or ENGINEER approved equal.

C. Design Conditions

1. Pipe shall be designed in accordance with the AWWA C304 Standard, using the following

design conditions; these conditions shall also be used in designing fittings that include a Portland cement mortar interior and exterior coating of the steel cylinder:

a. External Loading

1) The earth load shall be taken as the greater of the following:

a) Depth from existing ground level to top of pipe as shown on plans, or

b) Five feet minimum in all cases.

2) Earth loads shall be computed using the following parameters:

a) Unit Soil Weight = 120 pounds per cubic foot

b) TYPE R-2 Bedding

c) Bedding angle = 0°

3) Live loads shall be calculated as:

a) Pipe in streets and other paved areas: AASHTO HS-20 for two trucks passing

b) Pipe within railroad right-of-way: AREA Cooper E-80

c) Both HS-20 and E-80 live loads shall be computed in accordance with the *American Concrete Pipe Association* "Concrete Pipe Design Manual" or "Concrete Pipe Handbook".

b. Internal Pressure

1) Design working pressure (P_w) shall be 125 psi

2) Surge Pressure (P_t) shall be 200 psi.

3) Field Test Pressure (P_{ft}) shall be 150 psi.

D. Fittings

1. Steel thickness of all fittings shall be designed in accordance with Chapter 8 of the AWWA M9 Manual. Fittings shall be designed for the same conditions as the adjacent pipe.

2. Fabrication of the fittings shall be as per AWWA M9 Manual and C301.

3. Interior and exterior concrete/mortar coating shall be as per AWWA C301.

E. The date of manufacture or a serial number traceable to the date of manufacture and the design strength classification shall be clearly marked by stencil with waterproof paint at the end of the pipe barrel. Unsatisfactory or damaged pipe will be permanently rejected or repaired in the field if permitted by the ENGINEER, or returned to the pipe plant for repairs. Pits, blisters, rough spots, minor concrete or mortar breakage, and other imperfections may be repaired unless prohibited by the ENGINEER. Repairs shall be carefully inspected before final approval by a manufacturers field service representative at no additional cost to the OWNER. Cement mortar used for repairs shall have a minimum compressive strength of 3,000 psi at the end of 7 days and 4,500 psi at the end of 28 days, when tested in cylinders stored in the standard manner. Major breakage or spalling

from interior of pipe shall be reason for the rejection of pipe.

F. Cement shall be Type II and shall be in accordance with ASTM C150.

G. The pipe core shall be produced by the centrifugal method or the vertical casting method.

H. Wire shall be a minimum of No.6 gauge and shall meet the requirements of ASTM A648, Class III. Wire of a class strength greater than Class III will not be permitted.

I. Steel cylinders shall be No. 16 gauge minimum and shall be hot rolled.

J. Mortar coating shall consist of one-part cement to a maximum of three parts fine aggregate by weight. Rebound not to exceed one fourth of the total mix weight may be used provided the rebound is treated as fine aggregate.

K. Bell and spigot joint rings shall be steel, self-centering type, and otherwise specified in AWWA C301. Surfaces of the joint rings that will be exposed after fabrication is complete shall receive a zinc metalized coating of 4 mils thickness (0.004"). The pipe joints shall be restrained (harnessed) by field welding the joints or anchored mechanical.

All special features, such as anchored mechanical joint spigots, and harness lugs shall be supplied by the pipe manufacturer and installed when the pipe sections are constructed. Field installation of above mentioned appurtenances will not be permitted under the contract.

Lengths of restrained joint pipe shall be determined using the computational method as contained in Chapter 9 of the AWWA M9 Manual for Concrete Pressure Pipe. The steel cylinder thickness in pipe sections between the location of the maximum thrust force and the end of the harnessed section can be prorated on the basis of zero longitudinal thrust at the end of the harnessed section.

Field welding of the joints for thrust restraint during initial installation can be done from inside the pipe or outside the pipe as permitted by the pipe manufacturer and applicable safety regulations. The welded joints shall be encased with grout after the joint has been completed and before the line is pressured.

L. The rubber gaskets shall be in accordance with AWWA C301 and shall be designed and manufactured so that the completed joint will withstand an internal water pressure in excess of the highest pressure to which the pipe will be subjected without showing any leakage by the gasket or displacement of it.

M. Bell and spigot wall fittings shall be the manufacturer's standard design. Wall fittings shall be supplied with adequate bracing to keep them round and true during transportation and installation.

PART 3 - EXECUTION

3.1 GENERAL

A. Care shall be taken during loading, transporting, and unloading to prevent injury to the pipes, fittings, or coatings. Pipe or fittings shall not be dropped. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when laid, shall confirm to the lines and grades shown on the drawings.

B. If any damaged pipe is discovered after it has been laid, it shall be repaired in a satisfactory manner if permitted by the ENGINEER or it shall be removed and replaced with a sound pipe at no additional cost to the OWNER.

C. Regulate and control equipment and construction operations such that the live loading on the pipe does not exceed the loads for which the pipe is designed and manufactured. Pipe found to have longitudinal cracks from construction equipment or other loading exceeding those allowed by AWWA C304 shall be removed from the line and replaced with sound pipe at no additional cost to the OWNER.

D. The method of jointing the pipe shall be in strict accordance with the manufacturer's instructions. Arrange for the manufacturer's representative to provide installation training for the CONTRACTOR's crew prior to the start of pipe installation. The manufacturer's representative shall be on the jobsite and witness installation on the first day.

E. Pipe Manufacturer's Field Service Representative:

1) Pipe manufacturer shall provide a qualified Field Service Representative, who shall be available to be on the project site, with proper notice, from the CONTRACTOR's, ENGINEER's, or OWNER's representative.

2) The Field Service Representative, who shall be an employee of the pipe manufacturer, must have experience as a representative of the pipe manufacturer in the area of providing such services. The individual may be a Registered Professional ENGINEER possessing a minimum of 2 years of experience in the area of manufacture of pipe, sales and service representation.

3) It is the intent of the OWNER to be assured that the installation of this pipeline is performed in accordance with the specified standards and manufacturer's recommendations. Good installation procedures will assure integrity of the pipeline with the minimum amount of pipe joints required for completion of the main. Therefore, the CONTRACTOR shall include in his Bid as a minimum that the pipe manufacturer's Field Service Representative will be on-site for the initial construction training and monitoring.

3.2 INSTALLING PRESTRESSED CONCRETE CYLINDER PIPE AND FITTINGS

A. Prestressed concrete cylinder pipe and fittings shall be installed in accordance with requirements of AWWA M9, except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be provided by tamping select fill in the haunch area and at the side of the pipe to achieve the required bedding support angle. BLOCKING WILL NOT BE PERMITTED, AND ANY PIPE INSTALLED USING THIS METHOD SHALL BE REPLACED WITH NEW PIPE AT NO ADDITIONAL COST TO THE OWNER.

B. All prestressed concrete cylinder pipe shall have a minimum of three and one-half feet of cover. Pipe shall be laid to the elevations shown on the drawings unless approved otherwise by the ENGINEER.

C. The pipe interior shall be maintained dry and broom clean throughout the construction period.

D. Gasket, gasket groove, and bell sealing surfaces shall be cleaned and lubricated with a lubricant furnished by the pipe manufacturer. The lubricant shall be approved for use in potable water and shall be harmless to the rubber gasket. Use only lubricant supplied by the pipe manufacturer. Pipe shall be laid with bell ends looking ahead in the direction of laying. As soon as the spigot ring is centered in the bell of the previously laid pipe, it shall be forced home with approved equipment. After the gasket is compressed, verify the position of the gasket in the spigot ring groove with a feeler gage provided by the pipe manufacturer.

E. The grout diaper for PCCP shall consist of a Typar synthetic fabric layer (gray in color) and a layer of closed cell foam. These layers are sewn together along with a pair of 5/8" wide steel bands at

each edge which are used to secure the diaper to the pipe exterior. Use only grout diapers supplied by the pipe manufacturer. A stretching tool is used to tighten the steel bands. Once the bands are pulled tight, a steel clip is crimped around the bands to hold them in position. It is important that the diaper be carefully placed against the exterior surface of the pipe to insure that it is flush with no gaps or gathers. The closed cell foam surface is to be placed against the pipe exterior.

The wet grout will flow down to the bottom of the diaper and begin to bulge it out. It is often helpful to place some bedding material (or sandbags) directly under the diaper at the bottom to support the weight of the wet grout. Take care to not push excessive amounts of bedding material under the diaper such that the diaper is pushed up into the joint recess impeding the flow of wet grout.

Mix the grout using one-part ASTM C150 Type 1 or Type 2 Portland cement to not more than three parts clean sand with sufficient water to achieve a pourable consistency. The grout should look and pour like a thick cream. Carefully pour the mixed grout into the gap at the top of the diaper. As the pouring proceeds, the workers must inspect the diaper around the joint periphery to insure that the grout is flowing all around. Once the diaper is full and wet grout is puddling at the gap at the top, apply a stiffer mix the consistency of wet brick mortar over the joint insuring that all steel components of the joint are covered.

F. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plug or other approved means to prevent unauthorized entrance of people, animals, dirt, or water into the pipeline already installed. Good alignment shall be preserved in laying. The deflections at joints shall not exceed the amount recommended by the pipe manufacturer.

3.3 TESTING

A. The completed pipeline (or completed sections of the pipeline) shall be bulkheaded, filled with water, and pressure tested to 120 percent of the internal working pressure. After the line is filled, and prior to pressure testing, it shall be allowed to soak under low pressure to allow the pipe walls to absorb water and for temperature stabilization. While filling the line, the CONTRACTOR shall be responsible for properly bleeding off trapped air to avoid adversely affecting the leakage test results.

During the hydrostatic test, the CONTRACTOR shall use a calibrated meter or other device to accurately measure the quantity of water necessary to maintain the test pressure on the gauge. The line will not be accepted until this measured quantity is less than 10 gallons per inch of diameter per mile of pipe per 24 hours. All visible leaks must be repaired regardless of the measured leakage at no additional cost to the OWNER.

3.4 CLEANING

A. At the conclusion of the work, thoroughly clean all of the new pipelines by flushing with water or other means to remove all dirt, stones or other debris which may have entered during the construction period. If, after this cleaning, obstructions remain, they shall be removed.

END OF SECTION

SECTION 40 23 23

POTABLE WATER PROCESS PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this Section the CONTRACTOR shall provide at his own expense all labor, materials, tools and equipment required to furnish and install all pipes, fittings, and accessories for the piping systems as shown on the Plans and specified herein.

B. Appended to this Section are individual pipe data sheets which specify pertinent pipe data for the various services.

1.2 RELATED SECTIONS

A. Section 09 91 00 – Painting

B. Section 15 75 00 – Mechanical Identification

C. Section 40 05 00 – Process Valves and Accessories

1.3 REFERENCES

A. Piping installations shall conform to:

1. All applicable Federal, State and local codes.

2. Applicable industry codes:

   a. ANSI - American National Standards Institute Code for Pressure Piping.

   b. ASME - Boiler and Pressure Vessel Code, Section 1, Power Boiler

3. OWNER's Plans and/or Piping Specifications.

1.4 SUBMITTALS

A. Submittals shall be in accordance with Division 1 of these specifications and shall include catalog cutsheets, manufacturers data and certification on all items in this section including but not limited to the following:

1. Ductile iron pipe and fittings.

2. Steel pipe and fittings.

3. Flanged, mechanical, coupled joints, restraining joints and sleeves.

4. PVC pipe, fittings, joints, solvents and adhesives.

5. Detailed scaled pipe layout showing dimensions of each component, their relationship with each other and other equipment and valves, pipe supports, anchors and other accessories.

1.5 ACCEPTANCE AT SITE

A. Prior to fabrication and/or installation, all piping, fittings, valves and equipment shall be inspected as required. Any materials not meeting the specifications, or obviously faulty material, shall be rejected by the ENGINEER and removed from the job site by the CONTRACTOR.

1.6 MATERIAL PREPARATION

A. All pipe, fittings and accessories shall be free of all foreign matter. Any accumulations of dirt, rust, scale, mud, etc., shall be removed prior to installation. All pipe ends shall be reamed and deburred to prevent loose particles from getting into the pipe line.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials that will potentially be in contact with the Ann Arbor drinking water supply must be certified by Underwriters Laboratory (UL) or the National Sanitary Foundation (NSF) for use in a potable water system. These materials include pipe coatings, pipe metals, pipe linings, and joint lubricants and gaskets.

2.2 DUCTILE IRON PIPE AND FITTINGS

A. Pipe

1. All exposed ductile iron pipe shall be flanged. Flanged pipe shall be fabricated in accordance with ANSI/AWWA C115.

2. Ductile-iron pipe shall meet all the requirements of the latest revision of ANSI/AWWA C151.

3. Ductile iron pipe shall be Thickness Class 53 in accordance with the latest revision of ANSI/AWWA C150.

3. All ductile iron pipe shall be manufactured in the United States of America.

B. Ductile Iron Fittings

1. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110 and be flanged joint type.

2. Ductile iron flanged joint fittings shall be rated for a minimum 250 psi working pressure.

3. All ductile iron fittings shall be manufactured in the United States of America.

C. Coatings

1. The outside of all ductile iron pipes installed inside the structure shall be primed and painted per Section 09 91 00, Painting. These coatings, after drying 48 hours, shall have no deleterious effect upon the quality, color, taste or odor of potable water. Painting may not occur while water is moving through the pipes.

D. Lining

1. Ductile iron pipe and fittings shall be furnished with a bituminous seal coated double cement-mortar lining in conformance with the latest revision of the ANSI/AWWA C104.

E. Gaskets

1. Gaskets for flanged joint pipe shall be 1/8-inch thick SPR rubber, full-faced or ring style, as appropriate for a given diameter of pipe. Gasket shall be compatible with flanges conforming to ANSI/AWWA C115, ANSI/AWWA C110 and ASME B16.1. Gaskets shall be rated for minimum 250 psi working pressure.

2. Gaskets for flanged pipe shall be US Pipe Flange-Tyte gaskets.

F. Bolts, Nuts & Washers

1. Steel bolts, studs, and nuts: Comply with the current ASTM A307, Grade B, or equal.

2. Threads: American National form right hand machine cut threads complying with the current American Standard for Screw Threads ANSI B1-1, Coarse Thread Series, Class 2 fit.

3. Provide zinc plated carbon steel bolts and nuts for flanged pipe joints.

4. Provide stainless steel Type 304 bolts and nuts for underground pipe joints, for all bolts set into concrete, for all bolts securing mechanical equipment, and for all exterior/rooftop bolts

5. Bolt heads and nuts: Semi-finished, hexagonal, complying with the dimensions for the current American Standard for Wrench Head Bolts and Nuts and Wrench Openings, ANSI B18.2, Heavy Series.

6. Size, length and number of bolts shall conform to ANSI/AWWA C110.

G. Couplings

1. Pipe couplings, where shown on the Plans or specified elsewhere in the Specifications shall be of a gasketed, sleeve-type design with diameter to properly fit the pipe. Each coupling shall consist of one (1) stainless steel middle ring, two (2) stainless steel followers, two (2) rubber-compounded wedge section gaskets and sufficient track-head steel bolts to properly compress the gaskets. The middle ring and followers of the coupling shall be true circular sections free from irregularities, flat spots or surface defects. They shall be formed from mill sections with the follower ring section of such design as to provide confinement of the gasket. After welding, they shall be tested by cold expanding a minimum of 1% beyond the yield point. All components shall be NSF-61 approved for exposure to potable water.

2. The coupling bolts shall be of the elliptic-neck, track-head design with rolled threads and shall be hexagonal heavy standard and shall be Stainless Type 316. The manufacturer shall supply information as to the recommended torque to which the bolts shall be tightened. All bolt holes in the followers shall be oval for greater strength.

3. The coupling gaskets shall be composed of a synthetic rubber base compounded with other products to produce a material that will not deteriorate from age, heat, or exposure to air under normal storage conditions and shall conform to ASTM D2000.

4. The couplings shall be assembled on the job in a manner to ensure permanently tight joints under all reasonable conditions of expansion, contraction, shifting and settlement, unavoidable variations in trench gradient, etc.

5. The coupling shall be Dresser Style 38 all Stainless Type 316, as manufactured by Dresser Piping Specialties, Bradford, PA.

6. All couplings shall be restrained with tie-rods between adjacent flanges as indicated in the Plans.

H. Restrained Flange Adapters

1. Restrained flange adapters shall be used where indicated in the Plans. Flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10.

2. Restraint for the flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restrain capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.

3. The flange adapters shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum 0.6" gap between the end of the pipe and the mating flange without affecting the integrity of the seal.

4. For Ductile Iron pipe, the flange adapter shall have a safety factor of 2:1 minimum.

5. The flange adapter shall be the SERIES 2100 MEGAFLANGE adapter as produced by EBAA Iron, Inc., or approved equal.

2.3 STEEL PIPE AND FITTINGS

I. Pipe

1. All exposed steel pipe shall be flanged. Flanged pipe shall be fabricated in accordance with ANSI/AWWA C200.

2. Steel pipe shall meet all the requirements of the latest revision of ANSI/AWWA C200.

3. Steel pipe shall be Schedule 40 in accordance with the latest revision of ANSI/AWWA C200.

3. All steel pipe shall be manufactured in the United States of America.

J. Steel Fittings

1. Steel fittings shall meet all the requirements of the latest revision of ANSI/AWWA C207 and be flanged joint type.

2. Steel flanged joint fittings shall be rated Class F for 300 psi working pressure.

3. All steel fittings shall be manufactured in the United States of America.

K. Coatings

1. The outside of all steel pipes installed inside the structure shall be primed and painted per Section 09 91 00, Painting. These coatings, after drying 48 hours, shall have no deleterious effect upon the quality, color, taste or odor of potable water. Painting may not occur while water is moving through the pipes.

L. Lining

1. Steel pipe and fittings shall be furnished with a liquid epoxy interior lining in conformance with the latest revision of the ANSI/AWWA C210.

M. Gaskets

1. Gaskets for flanged joint pipe shall be 1/8-inch thick SPR rubber, full-faced or ring style, as appropriate for a given diameter of pipe. Gasket shall be compatible with flanges conforming to ANSI/AWWA 200, and shall be suitable for a working pressure equal to the class of pipe furnished.

2. Gaskets for flanged pipe shall be US Pipe Ring Flange-Tyte gaskets.

N. Bolts, Nuts & Washers

1. Bolts and nuts for above exposed flanged piping shall be as specified under Section 15 01 00, Mechanical Basic Materials and Methods.

2. Size, length and number of bolts shall conform to ANSI/AWWA C207.

2.4 COPPER PIPE AND FITTINGS

A. Pipe

1. Copper pipe shall be type L hard temper conforming to ASTM B88.

B. Fittings

1. Fittings shall be wrought solder joint fittings in accordance with ANSI Standard B16.22, or cast bronze solder join fittings in accordance with ANSI Standard B16.18.

C. Solder

1. Solders used on all copper piping shall be lead free conforming to ASTM B32.

2.5 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. PVC Pipe

1. Schedule 80 PVC (ASTM D1785) pipe, Type 1.

2. Samples of pipe and physical and chemical data sheets, shall be submitted to the ENGINEER for review and his review shall be obtained before pipe is purchased.

3. The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform as commercially practical in color.

4. Pipe shall be jointed with solvent bell ends.

5. The workmanship, pipe dimensions and tolerances, outside diameters, wall thickness eccentricity, sustained pressures, burst pressures, flattening, extrusion quality, marking and all other requirements of Commercial Standards CS 256 shall be conformed within all respects.

6. The PVC pipe shall bear the National Sanitation Foundation (NSF) seal of approval.

7. The pipe shall be shipped with one coupling factory applied. Pipe shall have a ring painted around the uncoupled end in such a manner as to allow field checking of setting depth of pipe in the socket. If belled-end pipe is specified, the same ring shall be painted around the male end of the pipe.

8. Pipe must be delivered to job site by means which will adequately support it, and not subject to it undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical.

9. PVC must be stored so as to be protected from prolonged heat or direct sunlight. Any protective covering may be used which will not absorb much heat and which will deflect the direct rays of the sun. Ventilation should be provided with any type of cover used.

B. PVC Fittings

1. Fittings shall be of the same material as the pipe, and in no case shall have thinner walls than that of the pipe furnished. All fittings must be made of NSF approved material.

2. Sample of each type fitting must be submitted for the ENGINEER's review and his review must be obtained before all fittings are used.

3. The dry fit of fittings and coupling sockets must be snug. If the fit is such that it is loose, the pipe and/or fittings will be rejected as faulty because of improper size. Building up the joint to overcome a loose fit with multiple layers of filler solvent will not be permitted.

4. PVC couplings - the 2" and 3/4:" PVC couplings may be of the molded type. The 1" through 8" shall be of the extruded type, designed to be interference fit for at least one-half of the socket depth. They shall have a beveled entrance to prevent the wiping off of the solvents on male end while being installed. The wall thickness of the PVC couplings shall be equal to the pipe SDR or shall be 0.10 of an inch thick, whichever is greater. Elbows shall be long radius bends with minimum walls equal to that of the pipe joining or shall be 0.10 of an inch thick, whichever is greater. Tapered welding sockets shall be equal to those required for couplings.

C. PVC Welding Solvents

1. The solvent cement should meet all the requirements of ASTM Tentative Specification for Solvent Cement for Polyvinyl Chloride (PVDC) Plastic Pipe and Fittings ASTM Designation: D2564.

2. PVC welding solvent shall be compounded to conform with the socket fit and the weather conditions at the time of installation and be such as to assure minimum installation cost and a weld of maximum strength.

3. Since PVC welding solvent is engineered and formulated to perform with a given joint design, all solvent must be purchased from the manufacturer of the pipe.

4. PVC solvent cements should be stored in a cool place except when actually in use at the job site. These cements have a limited shelf life when not stored in hermetically sealed containers.

PART 3 - EXECUTION

3.1 PIPE RECEIVING, HANDLING AND STORING

A. Cleanliness in all piping systems is of paramount importance and procedures used in receiving, handling and storing shall be directed toward assuring that all lines are clean and free of rust, scale, dirt, and all foreign material that can damage equipment or contaminate potable systems or processes. Similar precautions must be taken in handling and storing of fittings, valves, pumps and other equipment to insure a clean pipeline assembly.

B. Any pipe damage in transport or handling shall be rejected and removed from the job site by the CONTRACTOR.

C. Care shall be taken not to injure any pipe or pipe coating and no damaged or imperfect pipe shall be used in the work except that minor damage which may be repaired subject to the review of the ENGINEER.

3.2 INSTALLATION

A. General

1. Only personnel competent at installing the various types of pipe shall be employed on this phase of the work and complete suitable equipment necessary for the execution of same is required. Any incompetency observed by the ENGINEER must be removed at his request, and where improper equipment or

lack of same appears to be impairing the quality or speed of the work, such adjustments in same shall be made to the ENGINEER's satisfaction.

2. Piping shall be installed straight and true, with approved offsets around obstructions as shown on the Plans or as required for satisfactory installation and operation. Horizontal piping shall be sloped to permit drainage. All vertical pipe shall be installed plumb and parallel with the building lines.

3. Piping shall be run in an orderly manner consistent with good operation, neatness of appearance and safety of operating personnel. Wherever possible interior piping will be grouped in banks with a change in elevation when a change in direction occurs. Provisions shall be made in establishing piping runs to allow for maximum accessibility for servicing. Space allowance shall be made for possible future changes or additions. Pockets which will prevent complete drainage of a line shall be avoided. Valves, gauges, controls, and other piping specialties shall be conveniently located for operating and servicing. Piping shall not be run through electrical control rooms or over electrical equipment.

4. Piping shall not be run in such a manner as to interfere with the operation, adjustment or maintenance of equipment. Piping shall not be located directly over pumps, motors, or equipment so as to impede their removal.

5. A minimum clearance of 8'-0" headroom shall be maintained over working areas, passageways and platforms.

6. Compressed air branch lines and air-hose connections shall be made off the top of the main header, unless the branch line is also intended to serve as a drain for the header.

7. Branch lines off main headers such as process, water and air shall have shut-off valves to permit maintenance on equipment or piping without disrupting service to other areas. Valves in sludge line branches shall be located close to the main line to present plugging ahead of the valve.

8. Where pipe sections are pre-fabricated, it shall be the CONTRACTOR's responsibility to check all dimensions and possible interferences in the field. Provisions shall be made to adjust for any discrepancies which may occur between routing and dimensions shown on the Plans to avoid possible interferences and to compensate for final field placement of equipment.

9. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing or pipe cutter or similar tool shall be used to cut the pipe. Cuts must be square and ragged edges removed with a burring tool and/or file.

10. After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer’s instructions or by using another pipe in the field as a guideline.

11. At the termination of pipe installation any open ends of pipeline shall be closed off by a suitable cover until installation operations are resumed.

12. All piping connections to equipment shall be aligned and supported in such manner that no load or thrust will be exerted upon the equipment by the piping at installation or in operating conditions.

B. Dismantling Joints

1. Where shown on the Plan Set, and where lay lengths allow the CONTRACTOR shall install AWWA C207 Class F flanged dismantling joints next to valves.

2. The end ring and body shall be constructed of ASTM A 36 Steel

3. Dismantling joints shall be NSF 61 certified fusion bonded epoxy coated. All surfaces are to be coated including the flange faces.

4. All hardware shall be type 304 stainless steel.

5. Gaskets shall be NBR compounded for potable water use.

6. The dismantling joints shall be manufactured by ROMAC Industries, Inc., or approved equal.

A. Sleeves

1. Penetrations for all pipes passing through concrete or masonry structures shall be sleeved or formed as specified herein.

2. Sleeves for pipe sizes up to 24" diameter shall be molded non-metallic high density polyethylene Model CS Century-Line® sleeves as manufactured by PSI-Thunderline/Link-Seal®. Model CS sleeves shall have integrally formed hollow water stop sized having a minimum of four inches larger than the outside diameter of the sleeve itself and allowing 1/2" movement between wall forms to resist pour forces. Each sleeve assembly shall have end caps manufactured of the same material as the sleeve itself and installed at each end of the sleeve so as to prevent deformation during the initial concrete pour, and to facilitate attaching the sleeve to the wall forms. End caps shall remain in place to protect the opening from residual debris and rodent entry prior to pipe insertion.

3. For pipes 24 inches and larger, penetrations shall be formed using Cell-Cast® Hole Forming Disks as manufactured by PSI-Thunderline/Link Seal, per the manufacturer's installation instructions.

4. Link Seals with stainless steel hardware shall be provided on all penetrations.

5. The CONTRACTOR shall furnish the shop drawings of sleeves to the ENGINEER for his review.

B. Drains and Overflows

1. Provision shall be made for valved drain connections from low points of all piping systems to permit complete drainage after shutdown. Drains shall be provided where a pocket of liquid can form above a control or shut-off valve or other obstruction.

2. Overflow piping and drains from all tanks and vessels shall be provided to suitable drain or sewer and shall be visible to prevent unnecessary losses or contamination.

C. Miscellaneous Connections

1. Small size connections (for gauges, instruments, samples, etc.) to large size pipe or headers may be made with weld-o-lets, threaded-o-lets, couplings or half couplings welded onto steel piping, tapped bosses on cast and ductile iron fittings, or tapping saddles.

D. Pipe Supports, Hangers, Guides, Anchors, Sway Bracing for Process Piping

1. Hangers for process piping will normally be clevis hangers with mild steel rod, and malleable or wrought steel beam clamps, with entire assemblies to be hot dip galvanized. Piping may be supported by the resting type of proper structural designed brackets or racks, as indicated in the drawings. No welding to structural steel building members shall be permitted without review of the ENGINEER. Welding to auxiliary steel pipe support beams will be permitted. Suitable anchors, guides, sway braces, vibration dampeners, and flexible joints shall be provided to prevent excessive vibration or expansion forces on equipment. Heavy valves shall be supported to keep undue strain off of piping and adjacent equipment. Where supporting piping at valves, pumps, heat exchangers and equipment requiring periodic maintenance, support to allow easy removal of equipment with a minimum of temporary supports. Where pipe resting on beam supports to stanchions, is subject to linear or lateral movement, teflon slides or graphite pipe slides cemented to pipe and support members shall be used to eliminate abrasion and corrosion which commonly occurs at these points.

2. Hangers and supports shall be in accordance with the ANSI Code for Pressure Piping B31.1. These shall be the product of Plasti Fab, Inc., Grinnell Company, Power Piping Company, or equal.

3. Hanger rods shall be connected to beam clamps or concrete inserts. These devices shall be Underwriters' Laboratories approved. "C" clamps will not be allowed.

4. Concrete anchors shall be stainless steel epoxy set anchors, Hilti HY-150 or equal. Expansion anchors may not be used. Drilling of holes in concrete shall be made by rotary drill only - not by hammers of any kind.

5. Unless otherwise noted on the drawings, vertical piping shall be supported at each floor or grating level with approved riser clamps except where prohibited by piping flexibility requirements. Lateral movement of exposed vertical piping at building walls shall be restrained by anchor devices attached to walls except where prohibited by piping flexibility requirements. Riser clamps shall be Grinnell Figure 261, Power Piping Company, Figure 36, or equal. Provide retaining straps when clamps are used.

E. Piping Joints

1. Flanged joints or unions shall be provided at connections to equipment, valves, instruments, etc., as required for removal and/or servicing. Provisions must be made for removal and reinstallation of units located between flanged or union joints by providing flexibility in the piping, use of elbow connections, or other means approved by the ENGINEER.

2. Aside from connections at equipment, valves instruments, etc., joints in the pipe line shall be held to a minimum consistent with cleaning or servicing requirements. Flanged joints are preferred to union joints. Welded joints are preferred to screwed joint. Mechanical joints are preferred to caulked joints.

3. For welded pipe joints, pipe ends shall be square cut for pipe with wall thickness of .065 inch or less. For wall thickness over .065 inch the ends shall be beveled 37-1/2 degrees with a 1/16 inch thick land base. Use of welding rings shall be avoided.

4. Screwed joint compound shall be TFE tape or other ENGINEER reviewed material suitable for the particular service. Joint compound shall be applied only to the male thread. Care shall be exercised to prevent component from reaching the pipe interior.

F. Cleaning and Flushing

1. Unless special cleaning procedures are noted in the respective piping specifications, these general methods shall apply for cleaning lines before start-up. Installations of all piping shall be done with extreme care to insure clean pipe lines free of scale, rust, weld splatter or beads, sand, dirt, grease and all other impurities or foreign matter. All piping shall be installed to permit cleaning by flushing through all portions of the piping system with provisions made to open the lines at all low points to permit release of any accumulation of foreign material and to drain off the flushing fluid. Where this flushing operation may be detrimental to specialties and/or equipment, provisions must be made for isolation or removing these components from the system. When feasible, this flushing operation shall be done with the same medium that will normally be conveyed in the line, i.e., air for air or gas lines, water for water lines and liquids, oil for oil pipings, etc. At branch connections to operating equipment provision must be made to blow down through an open pipe line.

G. Testing

1. Field pressure testing the installed pipe line shall normally be done at a pressure as specified on the individual pipe data sheets at the end of this Section. Testing shall be by hydrostatic means. The pipe ends may be valved or blanked off and the test pressure shall be maintained a sufficient length of time to permit an inspection of all joints and connections for any leaks or failures. All pressure piping such as steam, water, oils and gasses shall be tested in accordance with latest ANSI B31.1 code or pressure piping. Provision shall be made for completely draining a pipe line after hydrostatic testing is completed. Testing of non-ferrous piping, plastics, fiberglass reinforced resin and other materials shall be made within the recommended limits of the manufacturer.

3.3 DISINFECTING

A. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-

five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

2. CONTRACTOR shall submit a flushing plan to the ENGINEER for review, which shall include the quantity of flushing water and location where the water will be discharged. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to neutralize the residual chlorine prior to discharge. Refer to Appendix C of AWWA C651 for information on neutralizing chemicals. Where necessary, Federal, State, County and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

B. Bacteriological Testing

1. The CONTRACTOR shall coordinate and schedule with the ENGINEER to take bacteriological samples of the water in the mains for analysis at two different times. The CONTRACTOR is responsible for taking samples and transporting them to the OWNER's laboratory under the accompaniment and supervision of the ENGINEER. The OWNER shall provide sample testing services for two rounds of sampling per pipe section tested, any additional sample testing shall be at the CONTRACTOR's expense. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hrs later. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or hydrants.

3. If analysis of any sample indicates that the water is unsafe for human consumption, the disinfection sampling and analysis procedures shall be repeated until samples obtained on two (2) consecutive days are found to be safe.

END OF SECTION

MATERIAL TO BE HANDLED:	Potable Water
SERVICE:	Process piping within pump station
TEMPERATURE RANGE:	32°F - 100°F
PRESSURE:	Operating 125 psig; test 200 psig
PIPE:	Ductile Iron Thickness Class 53
LINE JOINT:	Flanged
FITTINGS:	Flanged
GASKETS:	See pipe specifications
BOLTING:	See pipe specifications
LINING:	Bituminous seal coated double cement-mortar lining
NOTE:	Prime and paint pipe prior to installation

MATERIAL TO BE HANDLED:	Potable Water
SERVICE:	Custom process piping fittings within pump station
TEMPERATURE RANGE:	32°F - 100°F
PRESSURE:	Operating 125 psig; test 200 psig
PIPE:	Steel AWWA C200
FITTINGS:	Flanged
GASKETS:	See pipe specifications
BOLTING:	See pipe specifications
LINING:	AWWA C210 Liquid Epoxy
NOTE:	Prime and paint pipe prior to installation

MATERIAL TO BE HANDLED:	Potable Water
SERVICE:	Yard process piping at pump station
TEMPERATURE RANGE:	32°F - 100°F
PRESSURE:	Operating 125 psig; test 200 psig
PIPE:	Ductile Iron Thickness Class 53
LINE JOINT:	Mechanical Joint
FITTINGS:	Mechanical Joint
GASKETS:	See pipe specifications
BOLTING:	See pipe specifications
LINING:	Bituminous seal coated double cement-mortar lining
NOTE:	—

APPENDIX

APPENDIX A

Geotechnical Information

CTI and Associates, Inc.

51331 W. Pontiac Trail Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

February 8, 2013

Mr. Glen Wiczorek, P.E.
Stantec
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771

RE: Geotechnical Investigation
Storage Building –
Barton Pump Station
Ann Arbor, Michigan
CTI Project No. 3132040004

Dear Mr. Wiczorek:

CTI and Associates, Inc. (CTI) has completed a geotechnical investigation for the proposed storage building project at the Barton Pump Station in Ann Arbor, Michigan. The purpose of our investigation was to determine the general subsurface conditions at the proposed development area and to provide recommendations for foundation support. Our investigation was performed in general accordance with the scope of services outlined in CTI Proposal No. 113PRO2040-018 dated January 25, 2013 and authorized by Mr. Glen Wiczorek, P.E. of Stantec on January 25, 2013.

In general, the geotechnical investigation revealed near-surface fill, underlain by alternating layers of fine and coarse aggregate containing varying amounts of silt and clay. The encountered aggregate layers were underlain by clay to the final explored depth of the boring. Groundwater was encountered during drilling at a depth of 3½ feet below the existing ground surface. Care should be taken during foundation excavation to avoid encountering the groundwater table. Excavations should not extend to depths greater than 2 feet below the existing site grades, or approximately Elevation 779.5 feet. The overall stability of the subgrade will depend highly on the prevailing moisture content of the subgrade soils. For this reason, special precautions should be taken throughout the construction activities to limit disturbance of the subgrade soils, especially if they are wet. In order to give greater relief between the encountered groundwater and the anticipated foundation invert elevation, consideration should be given to raising the finished floor elevation to greater than Elevation 783 feet.

SITE AND PROJECT DESCRIPTION

The proposed development area is located at the Barton Pump Station, on the east side of Huron River Drive, approximately 200 feet north of Bird Road in Ann Arbor, Michigan. The proposed development site is situated between the pump station building and an existing storage building. A portion of the development area is currently covered by a reinforced concrete slab, while the remaining development area is vacant and covered by grass and/or a gravel driveway.

The proposed project consists of the construction of a new storage building. The proposed building will be approximately 3,200 square feet in plan area. We anticipate the building will be a single story, pre-engineered metal structure with timber framing, slab-on-grade construction

and no basement. We understand that the finished floor elevation has been set at Elevation 783 feet. Accordingly, we anticipate up to 1½ feet of fill will be required to achieve finished grade.

Structural loads were not provided to CTI. For the purpose of this report, and based on our experience with similar structures, we anticipate that the structure will have a maximum wall load of 2 kips per lineal foot.

INVESTIGATION PROCEDURES

Field Investigation

As requested due to the access limitations and anticipated underground utilities at the site, CTI performed one soil boring to a depth of 20 feet below grade. The boring location was selected and marked in the field by Stantec personnel. The approximate boring location is shown on the Boring Location Plan, included with this report.

Prior to the drilling operations, Mr. Jim Meehle of CTI located and marked the existing underground electrical lines in the vicinity of the proposed boring. The drilling operations were performed by Stearns Drilling on February 1, 2013. The soil boring was drilled with a rotary head drilling rig using continuous flight hollow-stem augers. Within the test boring, split spoon samples were obtained at intervals of 2½ feet to a depth of 10 feet and at 5-foot intervals thereafter. The soils samples were obtained by the Standard Penetration Test Method (ASTM D1586), whereby a 2-inch outside- diameter split-barrel sampler is driven into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler is generally driven three successive 6-inch increments, with the number of blows for each increment being recorded. The number of blows required to advance the sampler the second and third 6-inch increment is termed the Standard Penetration Resistance, N. The soil samples obtained with the split-barrel sampler were sealed in glass jar containers and transported to our laboratory for further classification and testing. After completion of the drilling operations, the borehole was backfilled with excavated soil. Selected soil samples were tested in the laboratory.

The laboratory testing program determined the general soil classification and physical properties of recovered samples. All laboratory testing was performed in general accordance with applicable ASTM test method standards. The laboratory testing program consisted of visually classifying each collected soil sample in general accordance with the Unified Soil Classification System (USCS), and natural moisture content testing of selected samples. The unconfined compressive strength of selected cohesive samples was also estimated based on the resistance to a calibrated spring-loaded hand penetrometer. The results of all laboratory tests are indicated on the boring log at the depths from which the samples were obtained.

Soil and groundwater conditions observed in the test boring have been evaluated and are presented on the boring log included with this report. To aid in understanding the data presented on the boring log, "General Notes for Soil Classification," describing nomenclature used in soil descriptions, are also included. The soil descriptions reported on the boring log are based upon the field log prepared by experienced drillers with modifications made by experienced engineers based on supplemental classification and on the results of laboratory testing.

SUBSURFACE CONDITIONS

Soil Conditions

Approximately 4 inches of topsoil fill was encountered at the boring location. The topsoil fill was underlain by gravel fill to a depth of about 1½ feet below the existing grade. Below the gravel fill, sandy clay identified as "possible fill" was encountered to a depth of about 3½ feet below the existing grade. In the absence of foreign debris it is difficult to distinguish between native soil and "clean" fill in a relatively small diameter borehole. Loss-on-Ignition testing indicated that the clay fill had an organic content of approximately 1.7 percent.

The possible clay fill layer was underlain by alternating layers of fine and coarse aggregate (sand and gravel) containing varying amounts of silt and clay to a depth of approximately 14 feet. Below the aggregate layers, clay with occasional wet silt seams and sand partings were encountered to the final explored depth of the boring.

Standard Penetration Test (SPT) resistance values (N-values) within the sand and gravel layers ranged from 17 to 31 blows per foot, indicating medium dense to dense relative densities. The sand and gravel samples appeared to be in a wet condition when examined in the laboratory.

N-values recorded within the native clay ranged from 8 to 17 blows per foot. The unconfined compressive strength of the tested clay samples ranged from 3,000 pounds per square foot (psf) to 7,000 psf, indicating stiff to very stiff consistencies. The moisture contents of representative native clay samples ranged from approximately 13 to 15 percent. The clay samples generally appeared to be in a moist condition when examined in the laboratory.

The stratification depths shown on the soil boring log represent the soil conditions at the specific boring location. Variations in the soil conditions may occur at locations other than the boring location.

Groundwater Conditions

Groundwater seepage was encountered within Boring B-1 during drilling at a depth of about 3½ feet, or approximately Elevation 778 feet. Collapse of the test boring upon auger removal precluded accurate measurement of the groundwater level upon completion of the drilling operations.

The groundwater conditions discussed herein and indicated on the soil boring log represent those encountered at the time of the field investigation. The groundwater levels, including perched groundwater accumulations, should be expected to fluctuate seasonally, based on variations in precipitation, evaporation, surface run-off, river management, and other factors not evident at the time of our investigation.

The above soil and groundwater conditions represent a generalized summary of the subsurface conditions and material characteristics. The individual boring log and Boring Location Plan should be reviewed for specific information and details relating to specific areas of the site.

ANALYSIS AND RECOMMENDATIONS

In general, the geotechnical investigation revealed near-surface fill, underlain by alternating layers of native fine and coarse sand and gravel containing varying amounts of silt and clay. Groundwater was encountered at a depth of 3½ feet below the existing grade. Due to the proximity of the Huron River, removal of the existing fill would require an extensive dewatering effort that may not be entirely adequate to allow for construction to progress. Care should be taken during foundation excavation to avoid encountering the groundwater table. Excavations should not extend to depths greater than 2 feet below the existing site grades, or approximately Elevation 779.5 feet. In order to give greater relief between the encountered groundwater and the anticipated foundation invert elevation, consideration should be given to raising the finished floor elevation to greater than Elevation 783 feet.

The overall stability of the subgrade will depend highly on the prevailing moisture content of the subgrade soils. For this reason, special precautions should be taken throughout the construction activities to limit disturbance of the subgrade soils, especially if they are wet

Site Preparation

Approximately 3½ feet of uncontrolled fill materials fill with trace amounts of organics intermixed were encountered at the test boring location. The presence and thickness of fill is anticipated to vary across the proposed development area. The Owner may elect to support the foundation and floor slab over the existing fill materials in order to avoid potential issues with dewatering the site, which would be required if the fill is removed. The Owner should realize that the recommendations presented below will reduce but not entirely eliminate the risk of foundation and slab distress if the existing fill soils are to remain below the proposed structure.

At the start of earthwork operations, the existing slab, all existing topsoil and any other deleterious materials should be removed in their entirety from the proposed building area. The presence and thickness of unsuitable soils may vary across the site. The depth of unsuitable soil to be removed should be determined by CTI at the time of stripping and rough grading. A CTI representative should also be on-site during the subgrade preparation operations to determine the suitability of the subgrade for floor slab and/or engineered fill support.

After rough grade has been achieved in cut areas and prior to fill placement in fill areas, the exposed subgrade should be thoroughly proofrolled. Proofrolling should be performed with a heavily loaded front-end loader, tandem-axle dump truck or other suitable rubber-tired vehicle. The purpose of proofrolling operations is to locate areas of excessively loose, soft or weak subgrade soils which may be present at the time of construction. Soils that are observed to rut or deflect excessively during proofrolling should be stabilized by conventional methods such as disking, drying and re- compacting.

If it is not feasible to dry and re-compact the unsuitable subgrade soils due to unfavorable weather conditions, scheduling, etc., it may be necessary to remove such soils and replace them with engineered fill. The thickness of the undercut will depend on the severity of the unstable soils encountered at specific locations. If significant subgrade instability is observed, a layer of crushed aggregate may be necessary to stabilize the subgrade before placement of the selected engineered fill material. The use of a woven geotextile material below the crushed aggregate layer could also be considered to provide additional subgrade stability.

Engineered Fill

After subgrade preparation and observation have been completed, engineered fill placement may begin. Any fill placed below the proposed foundations should be an approved material that is free of topsoil, organics, frozen soil or any other unsuitable material. The existing soils are not considered suitable for re-use as engineered fill.

If clay soils or granular soils containing greater than 12 percent clay are used as fill, close moisture content control will be required to achieve the recommended degree of compaction. Cohesive fill materials should be low to medium in plasticity, with a liquid limit less than 40 and plasticity index less than 20. It should be noted that wet cohesive soils are difficult to compact and that the specified compaction may not be achieved. Wet cohesive soils may require drying or mixing with dry soil to facilitate compaction. If water must be added to dry soil, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

The engineered fill should be placed in uniform horizontal layers not exceeding 8 to 12 inches in loose thickness for clean granular soils and 4 to 6 inches in loose thickness for clay soils (or clayey granular soils exhibiting cohesive characteristics), depending on the type and size of compaction equipment used. The lift thickness for sands that have an appreciable amount of fines should be decreased accordingly. The engineered fill should be compacted to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557). Also, the upper 12 inches of the subgrade soils should be compacted, prior to any fill placement, to achieve a density of not less than 95 percent of the maximum dry density as determined by the Modified Proctor test. The as-compacted moisture content of the engineered fill should be within 2 to 3 percent of the optimum moisture content for the soil, as determined by the Modified Proctor test. The placement and testing of engineered fill should be observed and properly documented in the field by CTI.

If site grading or other construction activity is planned during cold weather, it is recommended that proper winter construction practices are followed. All snow and ice should be removed from cut and fill areas prior to grading. Frozen materials should not be used as engineered fill and no fill, footings or slabs should be placed on soils that are frozen or contain frozen material.

Foundation Support

Based on the subsurface conditions encountered during our drilling operations, adequate foundation soils are available at this site on which to support conventional foundations at a low allowable bearing pressure. Due to the relatively shallow groundwater lever at this site, we recommend that the foundations bear on the stiff, sandy clay and be designed for a maximum allowable bearing pressure of 2,000 psf. All footings should be suitably reinforced to reduce the effects of differential settlement associated with local variations in subsoil conditions.

If the Owner is unwilling to accept increased risk of settlement (both total and differential) associated with designing the foundations to bear on the near-surface clay fill, he may elect to support the foundations on helical piers or similar deep foundation system.

The foundation should be founded a minimum of 42 inches below exterior finished grade for protection against frost penetration during normal winters. If foundation construction occurs during the winter, the foundations must be protected from frost action beneath the footings and

freezing of concrete by embedment and/or thermal heaters and proper insulation.

The foundation excavation should be observed and concrete placed as quickly as possible to avoid exposure of the foundation bearing soil to wetting and drying. Surface runoff water should be drained away from the excavations and not be allowed to pond. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

We recommend the foundation construction and concrete placement be observed by a CTI representative. Our representative will perform the appropriate type and number of field tests in order to verify that that the foundation bearing materials are suitable and ensure overall compliance with the construction specifications.

Based on the anticipated structural loads and the building foundations being designed and constructed in accordance with the recommendations of this report, total and differential settlement should be within tolerable limits. Total settlement on the order of 1-inch or less is estimated for the footings. Differential settlements are estimated to be about 75% of the total settlement (however, a complete settlement analysis was not possible based on the limited information available). The anticipated settlements provided herein are only estimates based on the available soil boring information, the assumed structural loads and our experience with similar soil conditions. Careful field control will contribute significantly in controlling the settlements.

Floor Slab Support

The subgrade soils for support of the floor slab should be prepared as described in the Site Preparation section of this report. Following site preparation activities, it appears the existing soils will be adequate to support the floor slab. Proper evaluation of the subgrade soils should be performed during construction to verify that suitable soil conditions exist for support of the floor slab.

If soft, loose or unsuitable soils are encountered at the subgrade level, we recommend that these materials be undercut to an adequate depth and replaced with properly compacted granular fill soil. Proofrolling, as discussed earlier in this report, should be performed to identify any soft or unsuitable soils, which should then be removed from the floor slab area prior to fill placement and/or floor slab construction.

The floor slab should be supported on a minimum 4 inch layer of clean granular material to help distribute concentrated loads and equalize moisture conditions beneath the slab. MDOT Class II sand, a dense-graded aggregate or other similar granular engineered fill is recommended for this purpose. A thicker layer of the granular or aggregate material may be required to provide a stable surface, depending on the condition of the subgrade soils and the type of construction equipment to traffic the building pad area.

Following the site preparation techniques described in this report, a modulus of subgrade reaction, k-value, of 120 pounds per square inch per inch of deflection (pci) can be used for floor slab design with engineered fill placed over the suitable soils. The floor slab subgrade soils should be protected from frost during winter construction. Any frozen soils should be thawed and re-compacted or removed and replaced prior to the placement of additional fill, floor slabs or pavement.

It is recommended that the floor slab be suitably reinforced and isolated from the elements of the structure that are supported on the foundations. This practice minimizes the possibility of cracking and displacement of the floor slab due to differential movements between the slab and foundation.

Groundwater Control

The finished floor elevation has been set at Elevation 783 feet, which is approximately 1½ feet above the existing ground surface at the boring location. The foundation is anticipated to bear at Elevation 779.5 feet. As indicated previously, groundwater was encountered within B-1 during the drilling operations at a depth of 3½ feet below the existing ground surface, or approximately Elevation 778 feet. Due to the proximity of the Huron River, removal of the existing fill would require an extensive dewatering effort that may not be entirely adequate to allow for construction to progress.

Based on the anticipated finished floor and foundation bearing elevations, we anticipate that excavations will extend to approximately Elevation 779.5 feet. Excavations should not extend to depths greater than this elevation, or about 2 feet below the existing ground surface. If signs of upheaval failure or instability of the bearing soils are observed, a qualified geotechnical engineer should be retained so that the best remedial measures can be determined.

GENERAL COMMENTS

The evaluations and recommendations discussed in this report are based on the anticipated design and the soil conditions encountered in the test boring performed at the approximate location indicated on the attached Boring Location Plan and on the date indicated on the boring log.

We appreciate the opportunity to be of service to you on this project. If we can be of further assistance, please contact our office.

Sincerely,

CTI and ASSOCIATES, INC.

Theresa M. Marsik, P.E., LEED AP
Senior Project Engineer

Kevin Foye, Ph.D., P.E.
Project Engineer

Attachments – Boring Location Plan
Boring Log (B-1)
Summary of Laboratory Results
General Notes for Soil Classification

NOTE: IMAGE REPRODUCED FROM GOOGLE EARTH.

LEGEND:

- APPROXIMATE BORING LOCATION

SCALE:	As Shown
PROJECT NUMBER:	3132040004
FILE NAME:	BORINGPLAN.CAD
DATE:	1-29-13

BORING LOCATION PLAN

PROPOSED STORAGE BUILDING -
BARTON PUMP STATION
ANN ARBOR, MICHIGAN

PLATE:
I

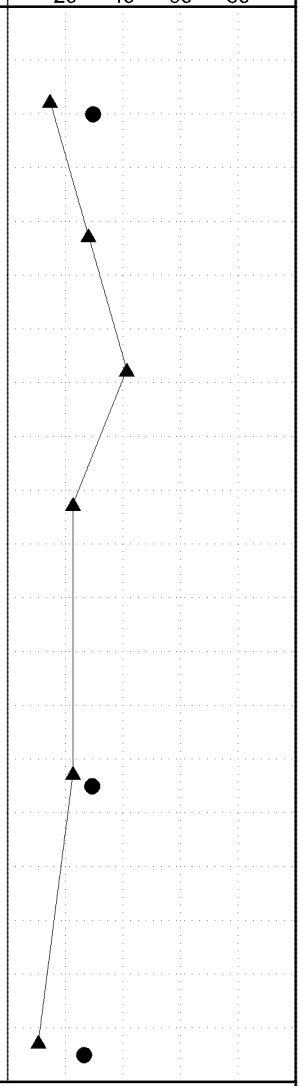
CTI and Associates Inc

BORING NUMBER B-1

CLIENT Stantec
PROJECT NAME Proposed Storage Building - Barton Pump Station
PROJECT NUMBER 3132040004
PROJECT LOCATION Ann Arbor, Michigan
DATE STARTED 2/1/13 **COMPLETED** 2/1/13
GROUND ELEVATION 781.5 ft +/-
DRILLING CONTRACTOR Stearns Drilling
GROUND WATER LEVELS:
DRILLING METHOD 4-1/4-inch HSA
DURING DRILLING 3' 6"
LOGGED BY D. Merideth **CHECKED BY** T. Marsik
AFTER DRILLING 3'
NOTES Boring backfilled with auger cuttings.
COLLAPSE DEPTH 4' 6"

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)
0		4 inches of dark brown moist silty TOPSOIL FILL					
		Brown moist fine GRAVEL with sand - (FILL)					
		Dark gray moist stiff sandy CLAY with silt and traces of gravel and organics - (CL/Possible FILL) Loss-on-Ignition (Organic Content) = 1.7%	SS 1	67	8-5-6 (11)		15
5		Brown wet medium dense silty fine to medium silty SAND with some gravel - (SM)	SS 2	67	2-7-14 (21)		
		Brown wet dense fine to coarse GRAVEL with sand and some clay - (GP-GC)	SS 3	67	9-14-17 (31)		
10		Brown wet silty fine to coarse SAND with gravel and occasional cobbles - (SM)	SS 4	89	10-8-9 (17)		
		Brown wet fine SAND with some silt - (SP-SM)					
15		Gray moist stiff CLAY with silt and traces of gravel and sand - (CL)	SS 5	67	5-7-10 (17)	1.5	15
		Gray moist to wet SILT with some sand - (ML)					
20		Gray moist very stiff silty CLAY with traces of gravel and sand and occasional wet sand partings - (CL-ML)	SS 6	89	4-4-4 (8)	3.5	13

Bottom of borehole at 20.0 feet.



CTI and Associates Inc

SUMMARY OF LABORATORY RESULTS

CLIENT Stantec **PROJECT NAME** Proposed Storage Building - Barton Pump Station

PROJECT NUMBER 3132040004 **PROJECT LOCATION** Ann Arbor, Michigan

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Unc. Strength (tsf)	Loss-on-Ignition (%)
B-1	2.5						FILL	15			1.7
B-1	15.0						CL	15		1.5	
B-1	20.0						CL-ML	13		3.5	

CTI and Associates, Inc.

GENERAL NOTES FOR SOIL CLASSIFICATION

51331 W. Pontiac Trail Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

STANDARD PENETRATION TEST: Driving a 2" outside diameter, 1-3/8" inside diameter sampler a distance of 18 inches into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. The sampler is driven three successive 6-inch increments. The number of blows required for the last 12 inches of penetration is termed the Standard Penetration Resistance (N).

GROUNDWATER: Observations are made at the times indicated on logs. Porosity of soil strata, weather conditions and site topography may cause changes in the water levels.

SOIL CLASSIFICATION PROCEDURE: Classification on the logs is generally made by visual inspection. For fine-grained soils (silt, clay and combinations thereof), the classification is primarily based upon plasticity. For coarse-grained soils (sand and gravel), the classification is based upon particle size distribution. Minor soil constituents are reported as "trace" (0-5%), "some" (5-12%) and "with" (15-29%). Where the minor constituents are in excess of 29%, an adjective is used preceding the major constituent name (i.e. for sands containing 35% silt, the soil is classified as silty sand).

PARTICLE SIZE DISTRIBUTION

Boulders	-	Greater than 12 inches average diameter
Cobbles	-	3 inches to 12 inches
Gravel –		
Coarse	-	¾ inches to 3 inches
Fine	-	No. 4 (4.75mm) to ¾ inches
Sand –		
Coarse	-	No. 10 (2.00mm) to No. 4 (4.75mm)
Medium	-	No. 40 (0.425mm) to No. 10 (2.00mm)
Fine	-	No. 200 (0.075mm) to No. 40 (0.425mm)
Silt and Clay	-	Less than 0.075mm, Classification based upon plasticity. Generally silt particles size ranges from 0.005mm to 0.075mm and clay particle size is less than 0.005mm.

CONSISTENCY OF FINE GRAINED SOILS IN TERMS OF UNCONFINED COMPRESSIVE STRENGTH AND N-VALUES

Consistency	Unconfined Compressive Strength (Tons per square foot)	Approximate range of N
Very Soft	Less than 0.25	0 - 2
Soft	0.25 to 0.5	3 - 4
Medium Stiff	0.5 to 1.0	5 - 8
Stiff	1.0 to 2.0	9 - 15
Very Stiff	2.0 to 4.0	16 - 30
Hard	over 4.0	over 31

RELATIVE DENSITY OF COARSE GRAINED SOILS ACCORDING TO N-VALUES

Density Classification	Relative Density, %	Approximate Range of N
Very Loose	0 – 15	0 – 4
Loose	16 – 35	5 – 10
Medium Dense	36 - 65	11 - 30
Dense	66 - 85	31 – 50
Very Dense	86 – 100	over 50

Relative density of cohesionless soils is based upon an evaluation of the Standard Penetration Resistance (N), modified as required for overburden pressure.

CONSULTING
GROUP

Data Report on Geotechnical Investigation

Barton Raw Water
Pump Station Improvements
City of Ann Arbor,
Washtenaw County, Michigan

Latitude 42.30802° N
Longitude 83.75411° W

Prepared for:

Stantec, Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108
G2 Project No. 173045
October 12, 2017

g2consultinggroup.com

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Chicagoland	3186 Heather Dr	Lake Zurich, IL 60047	P 847.353.8740	F 847.353.8742

CONSULTING
GROUP

October 12, 2017

Mr. Walid Al-Ani
Associate, Water Sector
Stantec, Inc.
3754 Ranchero Drive
Ann Arbor, Michigan 48108

Re: Data Report on Geotechnical Investigation
Barton Raw Water Pump Station Improvements
City of Ann Arbor, Washtenaw County, Michigan
G2 Project No. 173045

Dear Mr. Al-Ani:

We have completed the geotechnical investigation for the proposed improvements to the Barton Raw Water Pump Station intake located in Ann Arbor, Michigan. This report presents the results of our observations.

We appreciate the opportunity to be of service to Stantec and look forward to discussing the results presented. In the meantime, if you have any questions regarding the report or any other matter pertaining to the project, please call us.

Sincerely,

G2 Consulting Group, LLC

Matt M. Hambright, P.E.
Project Engineer

Mark S. Stapleton, P.E.
Project Manager

MMH/MSS

PROJECT DESCRIPTION

The proposed project consists of upgrades to the existing inlet within Barton Pond, located west of Baron Dam. The improvements include the installation of a new, larger diameter intake pipe that extends from Barton Pond to the Barton Pump Station. See attached Plate No. 1 for approximate alignment of the proposed intake.

SCOPE OF SERVICES

The field operations, laboratory testing, and data report preparation were performed under the direction and supervision of a licensed professional engineer. Our services were performed according to generally accepted standards and procedures in the practice of geotechnical engineering. Our scope of services for this project is as follows:

1. We performed a total of six (6) soil borings along the proposed intake alignment. Borings BH-03, BH-04, BH-06, and BH-11 were drilled to a depth of 40 feet each; boring BH-07 was drilled to a depth of 39 feet; boring BH-11 was drilled to a depth of 35 feet.

2. We performed a total of two (2) hand augers. Hand augers BH-08A and BH-08B were drilled to a depth of 1-1/2 feet each.

3. We installed a total of four (4) piezometers within boreholes BH-03, BH-04, BH-06, and BH-07.

4. We performed laboratory testing on representative samples obtained from the soil borings. Laboratory testing included visual engineering classification, natural moisture content, Atterberg limits, grain size distribution, unconfined compressive strength, and pH.

5. We prepared this data report. This report includes a summary of the results of our findings.

FIELD OPERATIONS

G2 Consulting Group, LLC (G2) in conjunction with Stantec selected the number, depth, and location of the soil borings. The as-drilled soil boring locations were surveyed after completion of drilling operations by Midwestern Consulting. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate No. 1.

Soil borings BH-03, BH-04, BH-07, BH-10, and BH-11 were drilled using all-terrain vehicle (ATV) mounted drilling rig. Continuous flight 4-1/4 inch inside diameter, hollow-stem augers were used to advance the boreholes to the explored depths. Soil boring BH-06 was drilled using a portable tripod rig. A 3-inch diameter "chop and wash" bit was used to advance the borehole to the explored depth. Within each soil boring, soil samples were generally obtained at intervals of 2-1/2 feet to the explored depth. The samples were obtained by the Standard Penetration Test method ASTM D 1586, which involves driving a 2-inch diameter split-spoon sampler into the soil with a 140-pound weight falling 30 inches. The sampler is generally driven three successive 6-inch increments with the number of blows for each increment recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). The blow counts for each 6-inch increment and the resulting N-value are presented on the individual soil boring logs. We also obtained 3-inch diameter thin-walled Shelby tube samples when requested by Stantec. Shelby tubes are hydraulically pushed approximately 30 inches to obtain a relatively undisturbed sample.

Hand-auger borings were performed using a 3-inch diameter hand auger. Within each hand-auger boring, soil samples were obtained and a Dynamic Cone Penetrometer (DCP) test was performed to evaluate the consistency of the in-situ soil. DCP testing involves driving a 1-1/2-inch diameter cone with

a 45° vertex angle into the ground using a 15-pound weight dropped 20 inches after the cone is seated into the bottom of the hand auger borehole. The Dynamic Cone Penetrometer is driven successive 1-3/4 increments. The blow counts for each 1-3/4 inch increment are presented on the individual hand-auger soil boring logs.

The soil samples were placed in sealed containers in the field and brought to the laboratory for testing and classification. During drilling operations, representatives from G2 and Stantec maintained logs of encountered subsurface conditions, including changes in stratigraphy and observed groundwater levels of the soil borings. The final boring logs are based on the field logs and laboratory soil classification of these results. After completion of the drilling operations, the boreholes were backfilled with bentonite grout.

LABORATORY TESTING

Under the direction of Stantec, soil samples were subjected to those laboratory tests noted below. An experienced geotechnical engineer classified the soils in general conformance with the Unified Soil Classification System.

Laboratory testing included determinations based on the following standards:

- ASTM D2216: Standard Test Methods for Laboratory Determination of Water Content of Soil and Rock by Mass
- ASTM D2166: Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
- ASTM D422: Standard Test Method for Particle-Size Analysis of Soils
- ASTM D4318: Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D854: Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer
- EPA Method 9040C: pH Electrometric Measurement

Additionally, unconfined compressive strengths were determined using a spring-loaded hand penetrometer. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring-loaded cylinder.

The results of the moisture content and unconfined compressive strength tests are presented on the logs at the depths samples were taken. The results of the unconfined compressive strength tests, Atterberg limits, grain size results, and specific gravity results are presented in the appendix. Logs of Well Installation for the installed piezometers are shown on Figure Nos. 21 through 24 in the appendix. Results of the pH corrosivity tests are presented in Appendix B. We will hold the soil samples for 60 days from the date of this report. If you would like us to retain the samples beyond this period, or you would like the soil samples, please let us know.

SITE DESCRIPTION

The site is within the Barton Nature Area, a 102-acre park located along Huron River on Huron River Drive, approximately 1-1/2 miles north of downtown Ann Arbor. The proposed intake alignment is located at the southeast corner of Barton Pond in Ann Arbor, Michigan. Barton Pond is a reservoir upstream from the Barton Dam on the Huron River. The alignment generally runs from the southeastern corner of Barton Pond to the southwest, crossing the existing railroad tracks, and then turns in a northwestern direction past the Huron River and ending near the City of Ann Arbor Pump Station.

SOIL CONDITIONS

Approximately 6 inches of topsoil are present at the ground surface of boring location BH-07. Fill material consisting of clayey sand and gravelly sand with occasional clay clods is present at the ground surface of borings BH-04, BH-07, and BH-10, and extends to depths ranging from 3 to 5-1/2 feet. In general, native gravelly sand or sand and gravel with occasional cobbles is at the ground surface of the remaining borings and hand augers, and underlies the topsoil and fill material within the remaining borings extending to depths ranging from 3-1/2 to 10 feet and to the explored depth of 1-1/2 feet within the hand augers. Alternating layers of silty clay, sandy clay, silty sand, and sandy silt underlie the gravelly sand and extends to the explored depths of 35 to 40 feet.

The clayey sand and gravelly sand fill is loose to medium compact with Standard Penetration Test (SPT) N-values ranging from 5 to 13 blows per foot (bpf). The native gravelly sand or sand and gravel is generally very loose to medium compact with SPT N-values ranging from 3 to 22 bpf; however, various SPT N-values within this material were greater than 50 bpf likely due to the presence of frequent cobbles. The native silty clay and sandy clay is generally very stiff to hard with unconfined compressive strengths ranging from 6,500 to 23,480 pounds per square foot (psf), natural moisture contents ranging from 5 to 13 percent, liquid limits ranging from 18 to 21 percent, plasticity index ranging from 6 to 9 percent, specific gravity ranging from 2.72 to 2.73. The native sand, silty sand, and sandy silt are generally medium compact to very compact with SPT N-values ranging from 12 to greater than 50 bpf.

The Soil Boring Location Plan, Plate No. 1 and Soil Boring Logs, Figure Nos. 1 through 7 are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes Terminology defining the nomenclature used on the boring logs and elsewhere in this report is presented on Figure No. 25.

GROUNDWATER CONDITIONS

Groundwater was encountered at depths ranging from 4-1/2 to 23-1/2 feet during drilling operations within borings BH-03, BH-04, BH-07, BH-10, and BH-11. Upon completion of drilling operations groundwater was measured at depths ranging from 2 to 11 feet within borings BH-10 and BH-11. Due to drilling operations which charged the borehole with water, groundwater measurements were not taken during drilling operations within BH-06, or upon completion of drilling operations within BH-03, BH-04, BH-06, and BH-07. Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation. It should be noted that groundwater observations made during drilling operations in predominantly cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow.

As previously noted, groundwater monitoring wells (piezometers) were installed within borings BH-03, BH-04, BH-06, and BH-07 upon completion of drilling operations. Please see attached Figure Nos. 21 through 24 for Logs of Well Installation.

GENERAL COMMENTS

The scope of the present investigation was limited to evaluation of subsurface conditions for the support of proposed structure and pavements and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation.

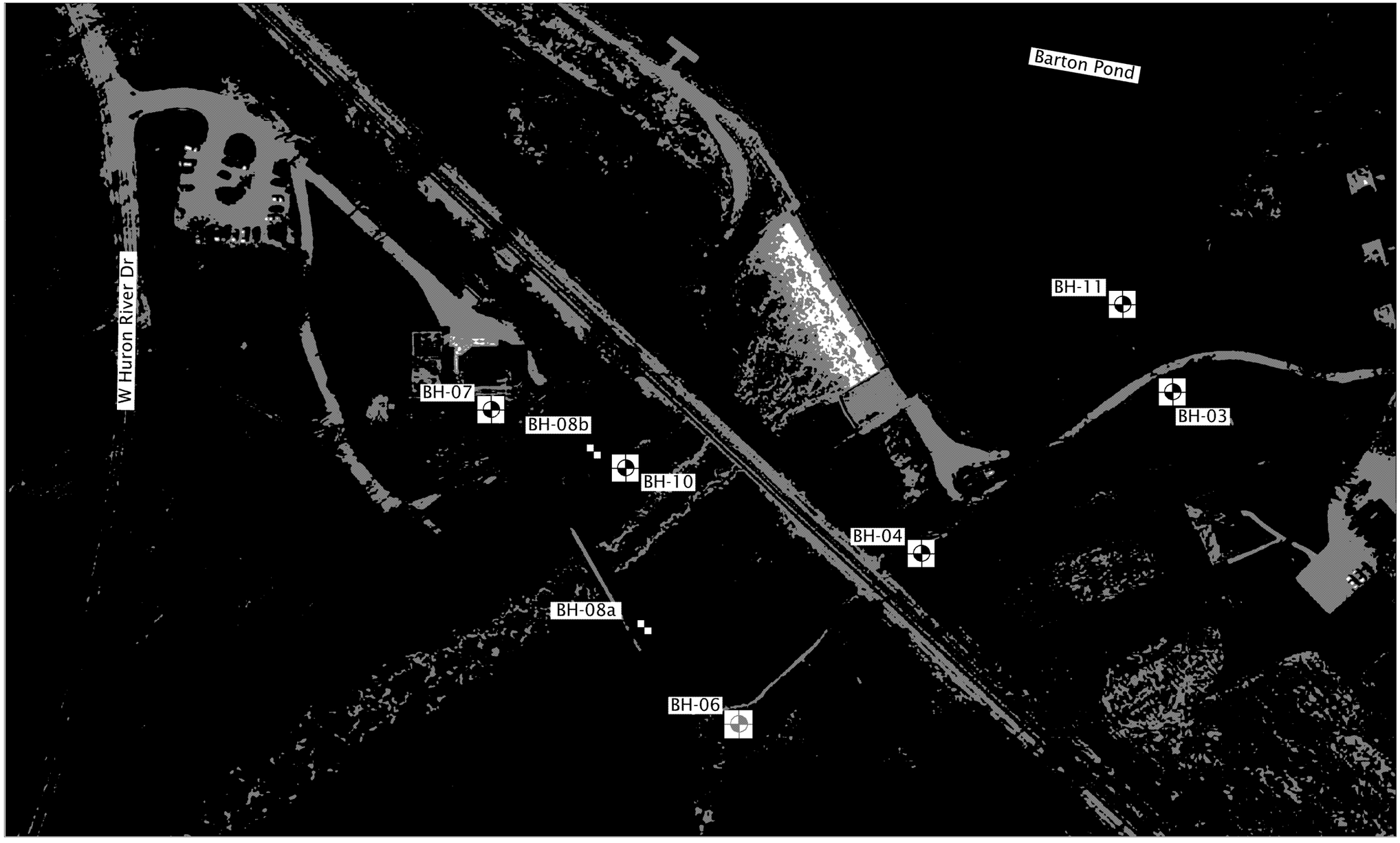
We base the analyses and recommendations submitted in this report upon the data from the soil borings performed at the approximate locations shown on the Soil Boring Location Plan, Plate No. 1. This report does not reflect variations that may occur between the actual boring locations and the actual structure

locations. The nature and extent of any such variations may not become clear until the time of construction. If significant variations then become evident, it may be necessary for us to re-evaluate our report recommendations.

We recommend a qualified geotechnical engineering firm observe all geotechnical related work. The consulting firm will perform the appropriate testing to confirm the geotechnical conditions given in the report are found during construction.

APPENDIX A

Soil Boring Location Plan	Plate No. 1
Soil Boring Logs	Figure Nos. 1 through 7
Hand Auger Logs	Figure Nos. 8 through 9
Grain Size Distribution	Figure Nos. 10 through 15
Atterberg Limits Results	Figure No. 16
Unconfined Compressive Strength Test	Figure Nos. 17 through 19
Specific Gravity Results	Figure No. 20
Log of Well Installation	Figure Nos. 21 through 24
General Notes Terminology	Figure No. 25



Legend

- Soil boring performed by Fibertec, Inc.
- Soil boring performed by DLZ, Inc.
- Hand auger performed by G2 Consulting Group, LLC

Notes

1. Piezometers installed within borings BH-03, BH-04, BH-06, and BH-07.

Soil Boring Location Plan

Barton RWPS Improvements
Ann Arbor, Michigan

G2 CONSULTING GROUP

Project No. 173045	
Drawn by: MMH	
Date: 8/28/17	Plate No. 1
Scale: NTS	

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: N/A Easting: N/A

Soil Boring No. BH-03A

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Loose to Medium Compact Brown Gravelly Sand with little silt and trace organic material		S-01	1 2 3	5			
5		5.0	5	S-02	5 8 13	21	4.0		
		End of Boring @ 5 ft, Auger Refusal							
10			10						
15			15						
20			20						
25			25						

Total Depth: 5 ft
Drilling Date: July 19, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
Dry during and upon completion of drilling operations.

Notes:
Borehole offset 5 feet west due to difficulty drilling through cobbles.

Excavation Backfilling Procedure:
Borehole backfilled with cuttings.

Figure No. 1

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295089.48 Easting: 13289363.12

Soil Boring No. BH-03B

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 805.2 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		See BH-03A							
800.2		5.0	5						
		Compact Brown Sand and Gravel with occasional cobbles		S-03	25 35 41	76			
		8.0							
795.2			10	S-04	4 6 8	14	13.2		6500*
				S-05	4 6 8	14	11.4	128	6780
790.2		Very Stiff to Hard Gray Sandy Clay with occasional gravelly clay seams	15	S-06	8 9 14	23			9000*
				S-07	18 20 22	42	5.1		9000*
785.2			20	S-08	13 15 17	32			9000*
		21.0							
		Very Compact Gray Sandy Silt		S-09	12 23 34	57			
780.2			25	S-10	22 33 43	76			

Total Depth: 40 ft
Drilling Date: July 19, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
23-1/2 feet during drilling operations. Not recorded upon completion due to drilling methods.

Notes:
See BH-03A for lithology of upper 5 feet.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 2a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295089.48 Easting: 13289363.12

Soil Boring No. BH-03B

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 805.2 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Very Compact Gray Sandy Silt *(continued)*		S-11	16 27 32	59			
775.2		30.0	30	S-12	23 27 30	57			
		Hard Gray Sandy Clay with trace gravel		S-13	15 18 23	41	9.5		9000*
770.2		35.0	35	S-14	15 18 23	41	9.5		9000*
		Hard Gray Silty Clay with trace sand and gravel		S-15	18 20 20	40	13.2	130	4480
765.2		40.0	40	S-16	10 12 14	26	11.1		9000*
		End of Boring @ 40 ft							
760.2			45						
755.2			50						

Total Depth: 40 ft
Drilling Date: July 19, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
23-1/2 feet during drilling operations. Not recorded upon completion due to drilling methods.

Notes:
See BH-03A for lithology of upper 5 feet.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 2b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 294906.5 Easting: 13289088.05

Soil Boring No. BH-04

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 796.1 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Fill: Loose Brown Clayey Sand with trace gravel and organic material		S-01	6 4 3	7			
		3.0							
791.1		Medium Compact Brown Silty Sand	5	S-02	5 8 11	19			
				S-03	8 16 14	30			
		8.0							
786.1		Hard Gray Sandy Clay with occasional silt seams	10	S-04	8 8 7	15	10.0		
				S-05	9 14 14	28			9000*
781.1			15	S-06	7 10 14	24			9000*
				S-07	9 13 16	29	10.3		9000*
		18.0							
776.1		Hard Gray Sandy Clay with trace gravel and occasional silt seams	20	S-08	10 15 22	37			9000*
				S-09	18 22 31	53			9000*
771.1			25	S-10	6 12 14	26			9000*

Total Depth: 40 ft
Drilling Date: July 20, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
21-1/2 feet during drilling operations. Not recorded upon completion due to drilling operations.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 3a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 294906.5 Easting: 13289088.05

Soil Boring No. BH-04

CONSULTING GROUP

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 796.1 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
				S-11	18 24 32	56			9000*
766.1		Hard Gray Sandy Clay with trace gravel and occasional silt seams *(continued)*	30	S-12	10 15 24	39	12.9		9000*
				S-13	23 84 42	126			
		33.0							
761.1		Hard Gray Sandy Clay with occasional silt seams	35	S-14	14 28 36	64	9.9	137	20900
				S-15	5 19 26	45			9000*
756.1		40.0	40	S-16	15 25 32	57	11.0		9000*
		End of Boring @ 40 ft							
751.1			45						
746.1			50						

Total Depth: 40 ft
Drilling Date: July 20, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
21-1/2 feet during drilling operations. Not recorded upon completion due to drilling operations.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 3b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 294714.22 Easting: 13288876.96

Soil Boring No. BH-06

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 788.3 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
				S-01	4 11 30	41			
783.3		Compact Brown Sand and Gravel with trace silt and occasional cobbles	5	S-02	50/6"	---			
		6.0		S-03	35 27 25	52	13.8		9000*
		Hard Brown Sandy Clay							
778.3		8.0 Stiff Gray Sandy Clay with trace gravel	10	S-04	7 9 9	18			2000*
		11.0		S-05	11 17 25	42	11.0		9000*
773.3			15	S-06	5 23 27	50			9000*
		Hard Gray Sandy Clay with trace gravel		S-07	29 58/6"	---	10.6		9000*
768.3		20.0	20	S-08	9 26 51	77	10.0	131	10830
		Brown Sand and Clay with little gravel		S-09	6 8 12	20	10.1		
		23.0							
763.3		Hard Gray Sandy Clay with trace gravel	25	S-10	38 65/6"	---			

Total Depth: 40 ft
Drilling Date: July 14, 2017
Inspector: R. Kurdyla
Contractor: DLZ
Driller: Harold

Drilling Method:
3 inch diameter chop and wash portable tripod

Water Level Observation:
Not recorded due to drilling operations.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 4a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 294714.22 Easting: 13288876.96

Soil Boring No. BH-06

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 788.3 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Hard Gray Sandy Clay with trace gravel *(continued)*		S-11	50 50/3"	---	9.5		9000*
758.3		30.0	30	S-12	15 44 48	92	10.9	131	9660
		Very Compact Gray Sandy Silt with trace gravel		S-13	100/6"	---	12.0		
753.3			35	S-14	77/6"	---			
		36.0 Hard Brown Gravelly Sand with a little silt		S-15	75/6"	---	15.0		
		38.0 Very Compact Brown Silty Sand with trace gravel							
748.3		40.0	40	S-16	15 44 68	112			
		End of Boring @ 40 ft							
743.3			45						
738.3			50						

Total Depth: 40 ft
Drilling Date: July 14, 2017
Inspector: R. Kurdyla
Contractor: DLZ
Driller: Harold

Drilling Method:
3 inch diameter chop and wash portable tripod

Water Level Observation:
Not recorded due to drilling operations.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 4b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295061.09 Easting: 13288593.92

Soil Boring No. BH-07

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 779.9 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand with trace gravel (6 inches) 0.5							
		Fill: Loose Dark Brown Clayey Sand with little silt, trace organics, occasional clay layers		S-01	3 2 3	5			
774.9			5	S-02	WOH 2 7	9	51.2		
		5.5 Medium Compact Brown Sandy Gravel with trace silt		S-03	6 5 7	12			
		8.0 Loose Brown Gravelly Sand with trace silt		S-04	3 2 3	5			
769.9		10.0	10						
		Very Stiff to Hard Gray Silty Clay with little sand		S-05	4 5 8	13	13.8	126	5680
				ST-06	--	---	11.4	130	9550
764.9		15.0	15						
		Hard Gray Sandy Clay with trace gravel		S-07	4 6 10	16	12.4		9000*
				S-08	12 21 38	59	9.8		9000*
759.9			20						
				S-09	17 32 40	72	10.8	137	8850
		22.0 Hard Gray Sandy Clay with trace gravel		S-10	13 21 21	42	9.7		
754.9		25.0	25						

Total Depth: 39 ft
Drilling Date: July 11, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
4 feet during drilling operations. Not recorded upon completion due to drilling methods.

Notes:
Heaving of borehole observed at depth of 27 feet - borehole charged with water at this depth.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 5a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295061.09 Easting: 13288593.92

Soil Boring No. BH-07

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 779.9 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
				S-11	5 11 13	24			
		Medium Compact Gray Silty Sand with trace gravel		S-12	10 6 6	12			
749.9		30.0	30	S-13	12 14 16	30			
		Medium Compact Gray Sand with trace clay		S-14	6 10 13	23			
744.9			35	S-15	7 11 12	23			
		39.0		S-16	8 10 10	20			
739.9		End of Boring @ 39 ft	40						
734.9			45						
729.9			50						

Total Depth: 39 ft
Drilling Date: July 11, 2017
Inspector: R. Kurdyla
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
4 feet during drilling operations. Not recorded upon completion due to drilling methods.

Notes:
Heaving of borehole observed at depth of 27 feet - borehole charged with water at this depth.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Piezometer installed upon completion.

Figure No. 5b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295003.92 Easting: 13288740.28

Soil Boring No. BH-10

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 776.2 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
				S-01	3 5 6	11			
771.2		Fill: Medium Compact Grayish Brown Gravelly Sand with trace silt and occasional clay clods	5	S-02	5 6 7	13	15.5		
		5.5		S-03	4 5 3	8			
766.2		Loose Grayish Brown Gravelly Sand with trace silt	10	S-04	5 10 8	18			5000*
		9.5		S-05	5 6 9	15	11.4	132	15590
761.2		Very Stiff to Hard Silty Clay with trace sand and gravel, occasional silt seams	15	S-06	6 12 15	27	12.0	130	13850
		17.0		S-07	12 23 17	40			9000*
				S-08	5 8 14	22			
756.2		Medium Compact Gray Sand and Gravel with trace silt	20	S-09	4 5 11	16			
		24.0		S-10	17 24 30	54	10.4	133	12360
751.2		Hard Gray Sandy Clay	25						

Total Depth: 35 ft
Drilling Date: August 17, 2017
Inspector: J. Crow
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
4-1/2 feet during drilling operations; 2 feet upon completion.

Notes:
Heaving of borehole observed at depth of 19 to 22 feet and 32 to 35 feet.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Borehole backfilled with bentonite.

Figure No. 6a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295003.92 Easting: 13288740.28

Soil Boring No. BH-10

CONSULTING GROUP

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 776.2 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
					SUBSURFACE PROFILE		SOIL SAMPLE DATA		
				S-11	18 25 18	43			9000*
		Hard Gray Sandy Clay *(continued)*							
746.2			30	S-12	14 24 30	54	10.4	133	23290
		30.5							
		Compact Gray Sand with trace silt and gravel		S-13	4 13 21	34			
		34.5							
741.2		Hard Gray Silty Clay with trace sand and gravel 35.0	35	S-14	5 13 18	31			9000*
		End of Boring @ 35 ft							
736.2			40						
731.2			45						
726.2			50						

Total Depth: 35 ft
Drilling Date: August 17, 2017
Inspector: J. Crow
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
4-1/2 feet during drilling operations; 2 feet upon completion.

Notes:
Heaving of borehole observed at depth of 19 to 22 feet and 32 to 35 feet.
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Borehole backfilled with bentonite.

Figure No. 6b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295185.24 Easting: 13289311.83

Soil Boring No. BH-11

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 798.4 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Very Loose Brown Gravelly Sand with trace silt and clay		S-01	2 2 1	3			
		3.5							
793.4		Stiff Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-02	1 3 4	7	12.5		3500*
		5.5							
		Very Stiff Gray Silty Clay with trace sand and gravel		S-03	6 8 8	16	11.0	129	6380
		8.5							
788.4			10	S-04	7 9 9	18			
		Medium Compact Gray Silty Sand with trace gravel		S-05	10 15 15	30			
		13.0							
783.4			15	S-06	9 17 23	40	10.1		9000*
		Hard Gray Sandy Clay with trace gravel, frequent sand seams		S-07	7 13 18	31	11.1	132	20100
778.4			20	S-08	12 14 14	28	11.0		9000*
		20.5							
		Hard Gray Sandy Clay		S-09	8 15 20	35	10.4	132	23480
		24.0							
773.4		Compact Gray Gravelly Sand with trace silt	25	S-10	16 19 23	42	11.4		9000*

Total Depth: 40 ft
Drilling Date: August 18, 2017
Inspector: J. Crow
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
7 feet during drilling operations; 11 feet upon completion.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Borehole backfilled with bentonite.

Figure No. 7a

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295185.24 Easting: 13289311.83

Soil Boring No. BH-11

CONSULTING GROUP

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 798.4 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Compact Gray Gravelly Sand with trace silt *(continued)* 26.0							
		Hard Gray Silty Clay with trace sand and gravel		S-11	11 14 20	34	11.0	130	16930
		28.0 Medium Compact Gray Silty Sand with trace gravel 29.0							
768.4		Hard Gray Sandy Clay	30	S-12	11 15 18	33	9.6	136	17840
		32.0 Compact Gray Silty Sand with trace gravel		S-13	20 30 24	54			9000*
763.4		34.0 Hard Gray Sandy Clay, occasional sand seams	35	S-14	13 20 23	43	10.0	133	17600
				S-15	9 15 18	33			9000*
758.4		40.0 End of Boring @ 40 ft	40	S-16	9 12 15	27	11.0		9000*
753.4			45						
748.4			50						

Total Depth: 40 ft
Drilling Date: August 18, 2017
Inspector: J. Crow
Contractor: Fibertec
Driller: R. Brown

Drilling Method:
4-1/4 inch inside diameter hollow-stem auger

Water Level Observation:
7 feet during drilling operations; 11 feet upon completion.

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Borehole backfilled with bentonite.

Figure No. 7b

BORING LOG WITH NORTHING / EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 294812.71 Easting: 13288758.49

Soil Boring No. BH-08A

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 776.8 ft	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Topsoil: Brown Silty Sand with little gravel, frequent cobbles, trace roots (10 inches)	0.8	BS-01	9			
		Loose Light Brown and Brown Sand with little gravel and frequent cobbles	1.5	BS-02	11			
		End of Boring @ 1.5 ft, Auger Refusal						
771.8			5					
766.8			10					
761.8			15					
756.8			20					
751.8			25					

Total Depth: 1.5 ft
Drilling Date: July 24, 2017
Inspector: M. Hambright
Contractor: G2 Consulting Group
Driller: M. Hambright

Water Level Observation:
Dry during and upon completion of drilling operations.

Excavation Backfilling Procedure:
Borehole backfilled with cuttings.

Drilling Method:
3 inch diameter hand auger

Figure No. 8

PAVEMENT CORE DCP NORTHING EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No. 173045

Northing: 295011.58 Easting: 13288720.28

Soil Boring No. BH-08B

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 776.4 ft	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Loose to Medium Compact Brown Sand with little gravel, frequent cobbles, trace silt and roots		BS-01	20			
			1.5	BS-02	10			
		End of Boring @ 1.5 ft, Auger Refusal						
771.4			5					
766.4			10					
761.4			15					
756.4			20					
751.4			25					

Total Depth: 1.5 ft
Drilling Date: July 24, 2017
Inspector: M. Hambright
Contractor: G2 Consulting Group
Driller: M. Hambright

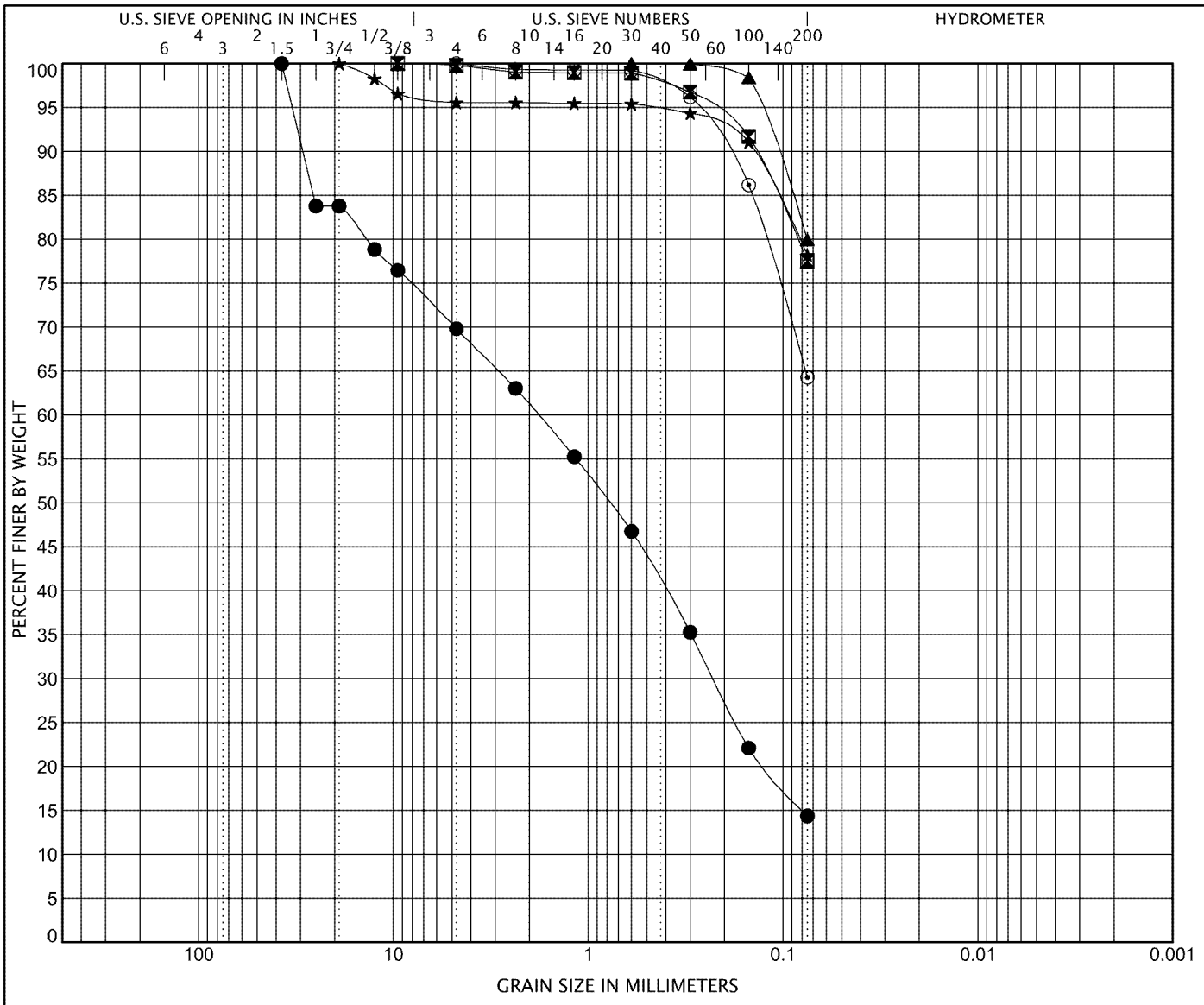
Drilling Method:
3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations.

Excavation Backfilling Procedure:
Borehole backfilled with cuttings.

Figure No. 9

PAVEMENT CORE DCP NORTHING EASTING 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-03A S-02	Brown Gravelly Sand with little silt					
⊠	BH-03B S-05	Gray Sandy Clay					
▲	BH-03B S-10	Gray Sandy Silt					
★	BH-03B S-14	Gray Sandy Clay with trace gravel					
⊙	BH-04 S-04	Gray Sandy Clay					

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-03A S-02	37.5	1.801	0.227		30.2	55.5	14.4	
⊠	BH-03B S-05	9.5				0.2	22.3	77.5	
▲	BH-03B S-10	0.6				0.0	20.1	79.9	
★	BH-03B S-14	19				4.4	17.4	78.2	
⊙	BH-04 S-04	4.75				0.0	35.7	64.3	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

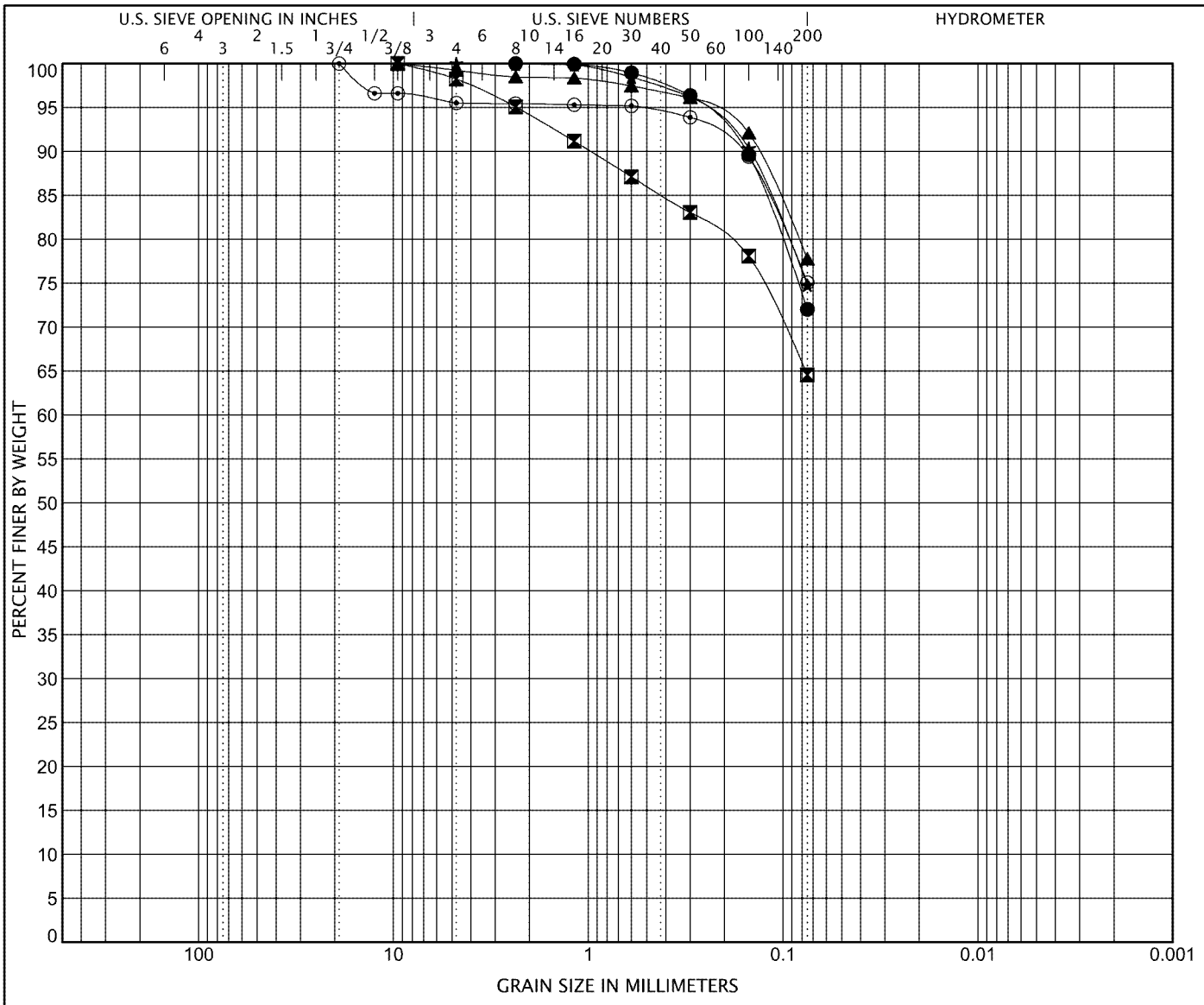
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 10

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-04 S-07	Gray Sandy Clay					
⊠	BH-04 S-12	Gray Sandy Clay with trace gravel					
▲	BH-04 S-14	Gray Sandy Clay					
★	BH-06 S-03	Brown Sandy Clay					
⊙	BH-06 S-05	Gray Sandy Clay with trace gravel					

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-04 S-07	2.36				0.0	28.0	72.0	
⊠	BH-04 S-12	9.5				1.8	33.7	64.6	
▲	BH-04 S-14	9.5				0.8	21.5	77.8	
★	BH-06 S-03	4.75				0.0	25.2	74.8	
⊙	BH-06 S-05	19				4.5	20.4	75.1	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

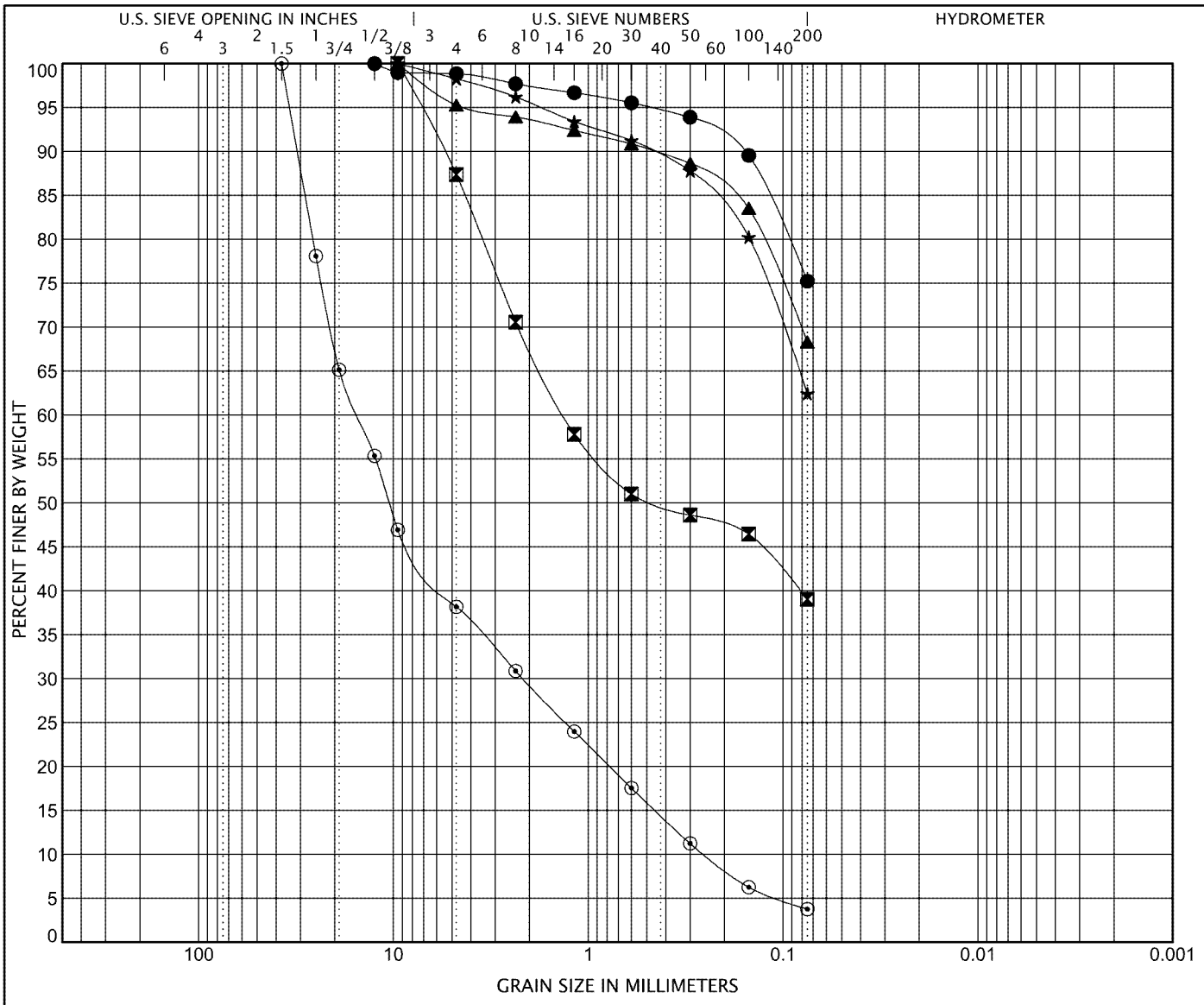
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 11

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-06 S-07	Gray Sandy Clay with trace gravel					
⊠	BH-06 S-09	Brown Sand and Clay with little gravel					
▲	BH-06 S-11	Gray Sandy Clay with trace gravel					
★	BH-06 S-13	Gray Sandy Silt with trace gravel					
⊙	BH-07 S-03	Brown Sandy Gravel with trace silt				1.22	60.39

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-06 S-07	12.5				1.1	23.6	75.2	
⊠	BH-06 S-09	9.5	1.329			12.6	48.3	39.0	
▲	BH-06 S-11	9.5				4.7	27.0	68.3	
★	BH-06 S-13	9.5				1.7	35.8	62.4	
⊙	BH-07 S-03	37.5	15.25	2.163	0.253	61.8	34.4	3.8	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

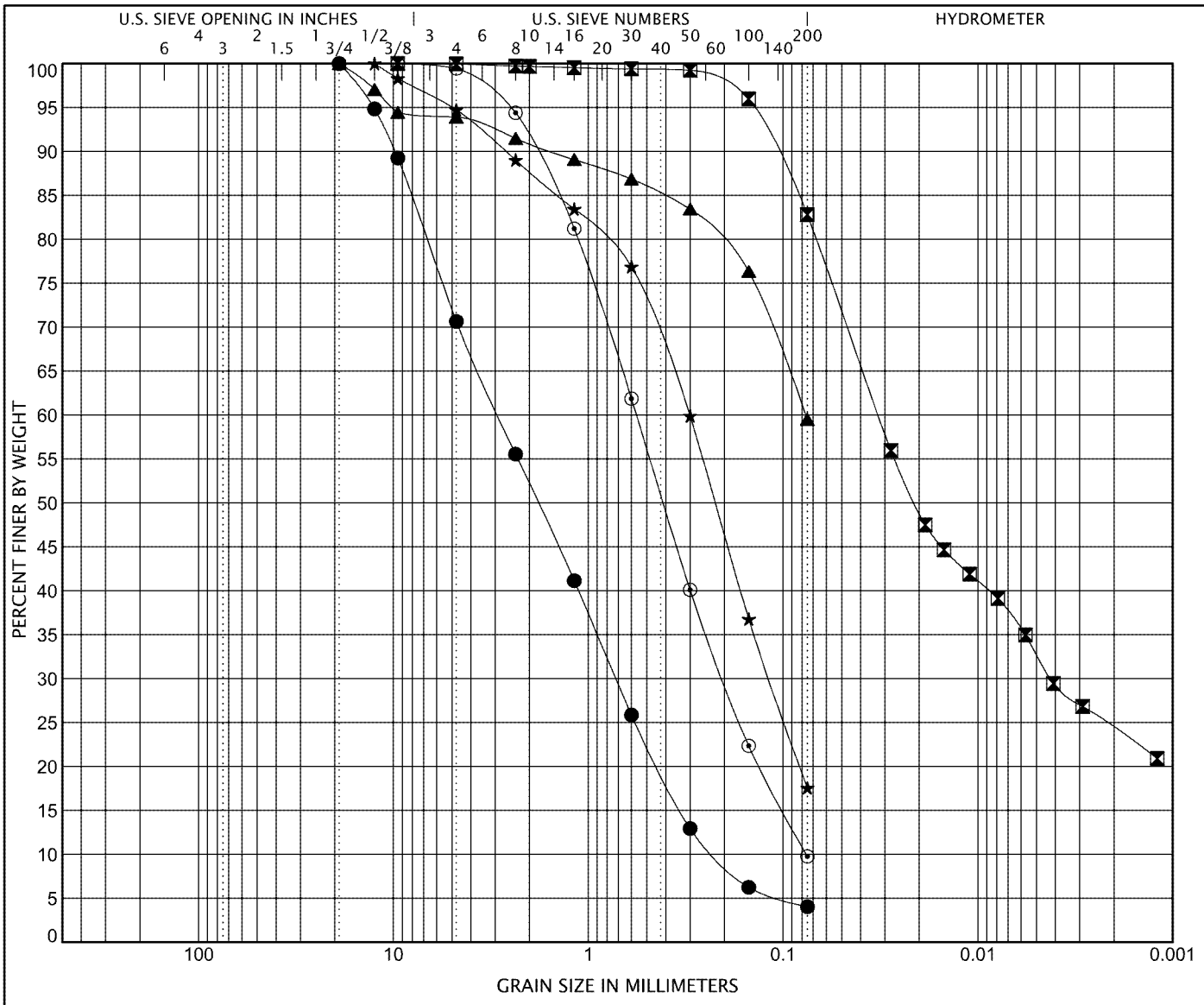
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 12

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-07 S-04	Brown Gravelly Sand with trace silt				0.81	13.11
⊠	BH-07 ST-06	Gray Clayey Silt with a little sand					
▲	BH-07 S-09	Gray Sandy Clay with trace gravel					
★	BH-07 S-11	Gray Silty Sand with trace gravel					
⊙	BH-07 S-13	Gray Sand with trace clay				0.95	7.44

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-07 S-04	19	2.9	0.721	0.221	29.4	66.6	4.0	
⊠	BH-07 ST-06	9.5	0.032	0.004		0.0	17.2	50.0	32.8
▲	BH-07 S-09	19	0.077			6.1	34.4	59.5	
★	BH-07 S-11	12.5	0.301	0.117		5.3	77.2	17.6	
⊙	BH-07 S-13	9.5	0.565	0.202	0.076	0.6	89.7	9.8	

GRAIN SIZE DISTRIBUTION

CONSULTING GROUP

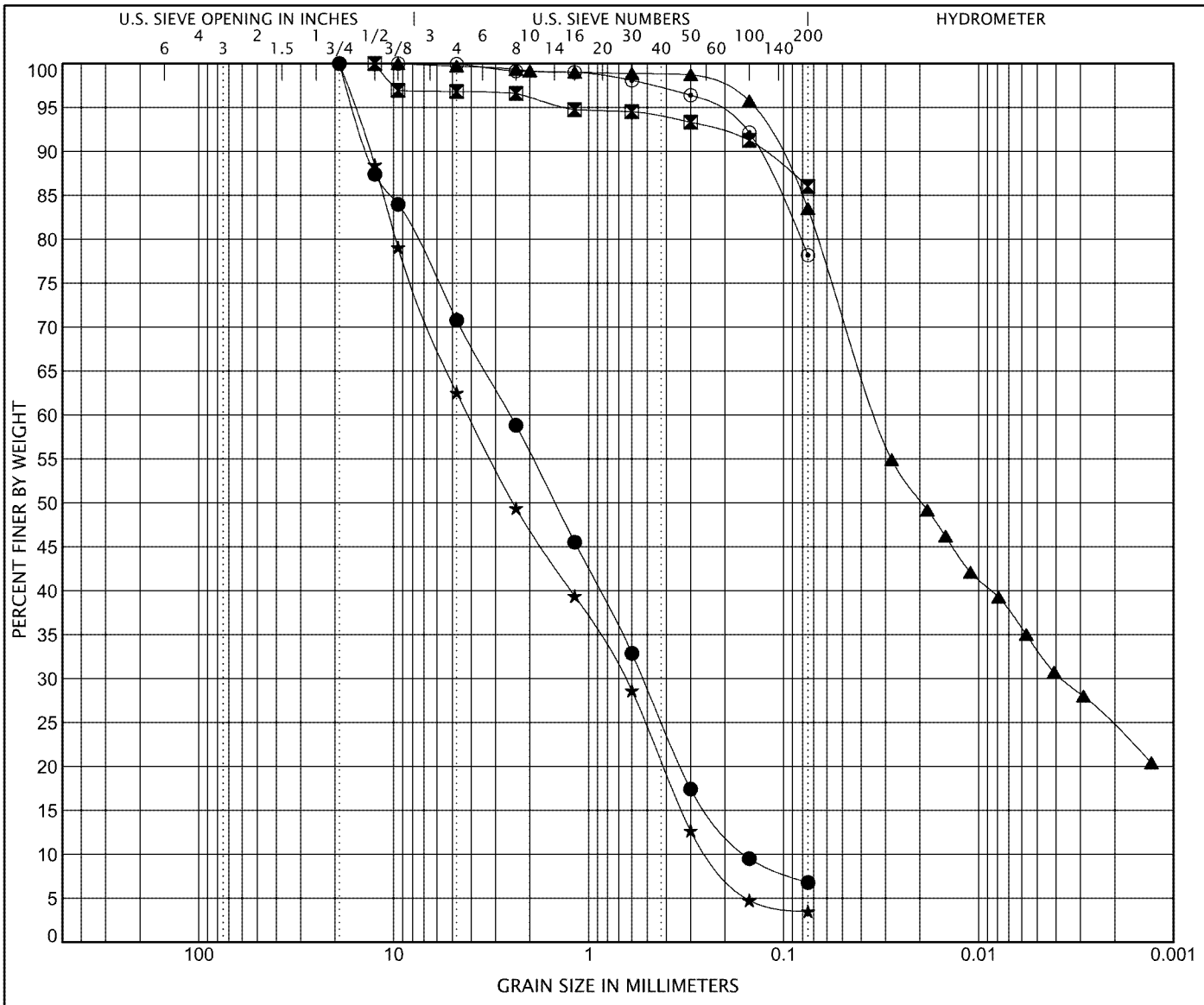
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 13

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-10 S-03	Grayish Brown Gravelly Sand				0.70	16.14
⊠	BH-10 S-04	Gray Silty Clay					
▲	BH-10 S-06	Gray Silty Clay					
★	BH-10 S-08	Gray Sand and Gravel				0.43	17.50
⊙	BH-10 S-12	Gray Sandy Clay					

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-10 S-03	19	2.526	0.527	0.157	29.2	64.0	6.8	
⊠	BH-10 S-04	12.5				3.2	10.8	86.0	
▲	BH-10 S-06	9.5	0.033	0.004		0.3	16.2	50.2	33.3
★	BH-10 S-08	19	4.154	0.654	0.237	37.5	59.0	3.5	
⊙	BH-10 S-12	9.5				0.1	21.7	78.2	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

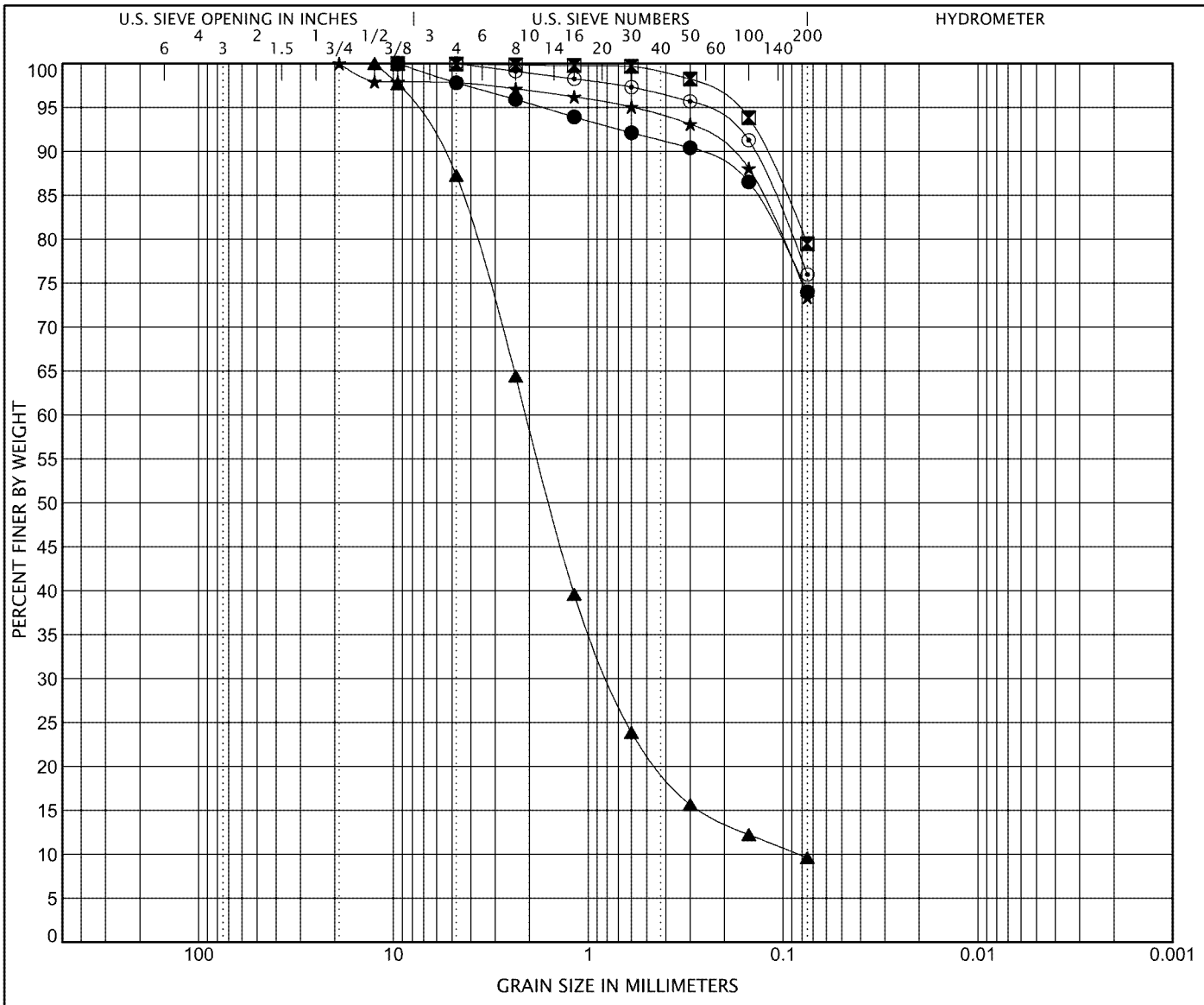
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 14

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Description	LL	PL	PI	Cc	Cu
●	BH-11 S-06	Gray Sandy Clay					
⊠	BH-11 S-09	Gray Sandy Clay					
▲	BH-11 S-10	Gray Gravelly Sand				3.52	25.09
★	BH-11 S-12	Gray Sandy Clay					
⊙	BH-11 S-14	Gray Sandy Clay					

	Specimen ID	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-11 S-06	9.5				2.2	23.8	74.0	
⊠	BH-11 S-09	9.5				0.1	20.4	79.5	
▲	BH-11 S-10	12.5	2.086	0.781	0.083	12.7	77.7	9.6	
★	BH-11 S-12	19				2.1	24.5	73.4	
⊙	BH-11 S-14	4.75				0.0	24.0	76.0	

CONSULTING GROUP

GRAIN SIZE DISTRIBUTION

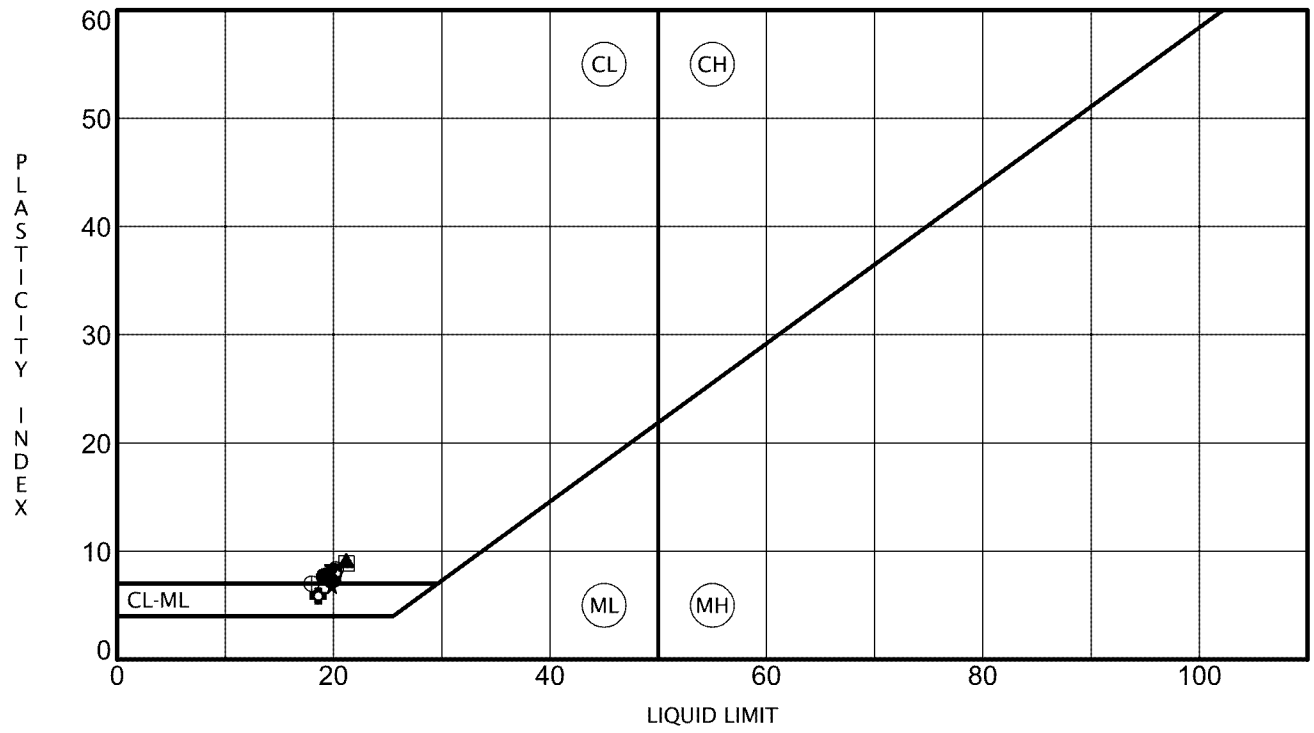
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 15

US_GRAIN_SIZE 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



Specimen Identification			LL	PL	PI	Fines	M %	Classification
●	BH-03B	S-06	19	11	8			Gray Sandy Clay
⊠	BH-03B	S-13	20	12	8		9	Gray Sandy Clay
▲	BH-04	S-06	21	12	9			Gray Sandy Clay
★	BH-04	S-15	20	13	7			Gray Sandy Clay
⊙	BH-06	S-06	20	12	8			Gray Sandy Clay
✿	BH-06	S-10	19	13	6			Gray Sandy Clay
○	BH-07	S-07	20	12	8		12	Gray Sandy Clay
△	BH-10	S-05	21	12	9		11	Gray Silty Clay
⊗	BH-11	S-07	20	12	8		11	Gray Sandy Clay
⊕	BH-11	S-10	18	11	7	10		Gray Gravelly Sand
□	BH-11	S-11	21	12	9		11	Gray Silty Clay

CONSULTING GROUP

ATTERBERG LIMITS RESULTS

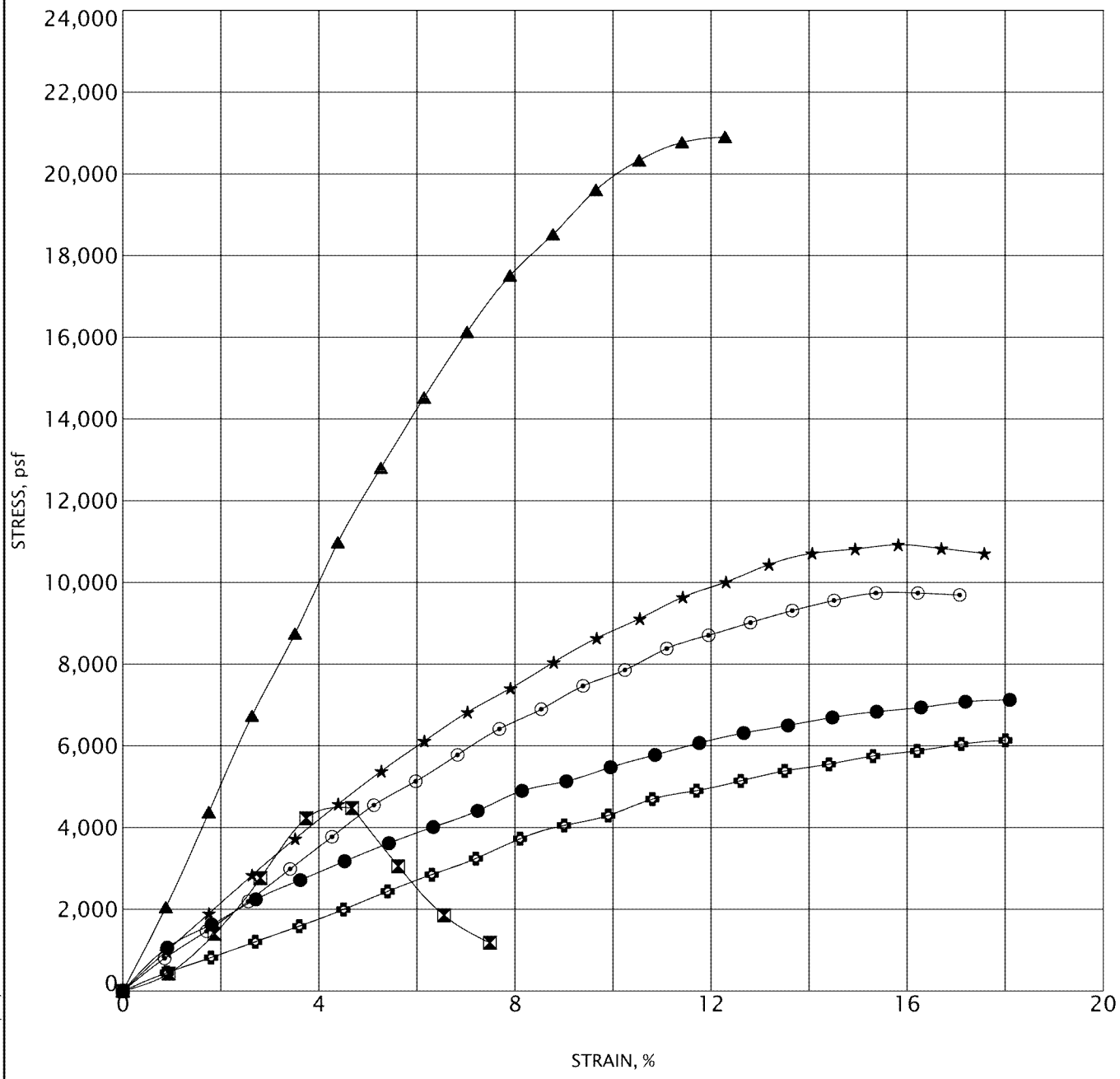
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 16

US_ATTERBERG_LIMITS 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



Specimen	EL (ft)	Classification	MC%	γ_d	UC
● BH-03B S-05	792.7	Gray Sandy Clay	11	128	6780
⊠ BH-03B S-15	767.7	Gray Silty Clay	13	130	4480
▲ BH-04 S-14	761.1	Gray Sandy Clay	10	137	20900
★ BH-06 S-08	768.3	Gray Sandy Clay	10	131	10830
⊙ BH-06 S-12	758.3	Gray Sandy Clay	11	131	9660
✿ BH-07 S-05	767.4	Gray Silty Clay	14	126	5680

G2 CONSULTING GROUP

UNCONFINED COMPRESSIVE STRENGTH TEST

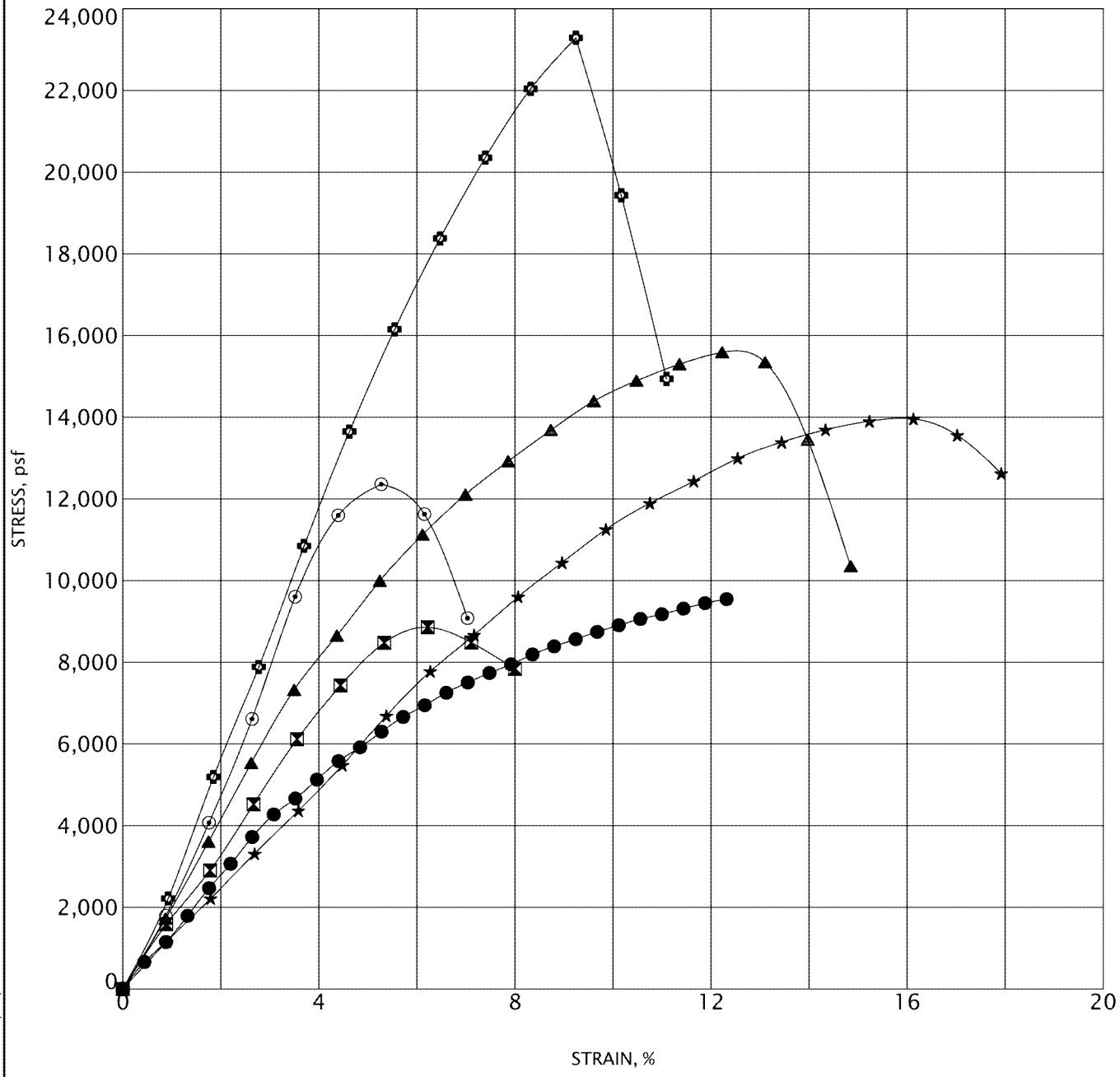
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 17

US_UNCONFINED 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



	Specimen	EL (ft)	Classification	MC%	γ_d	UC
●	BH-07 ST-06	765.4	Gray Clayey Silt with little sand	11	130	9550
⊠	BH-07 S-09	758.4	Gray Sandy Clay with trace gravel	9	137	8850
▲	BH-10 S-05	763.7	Gray Silty Clay	11	132	15590
★	BH-10 S-06	761.2	Gray Silty Clay	12	130	13850
⊙	BH-10 S-10	751.2	Gray Sandy Clay	10	133	12360
✿	BH-10 S-12	746.2	Gray Sandy Clay	10	133	23290

CONSULTING GROUP

UNCONFINED COMPRESSIVE STRENGTH TEST

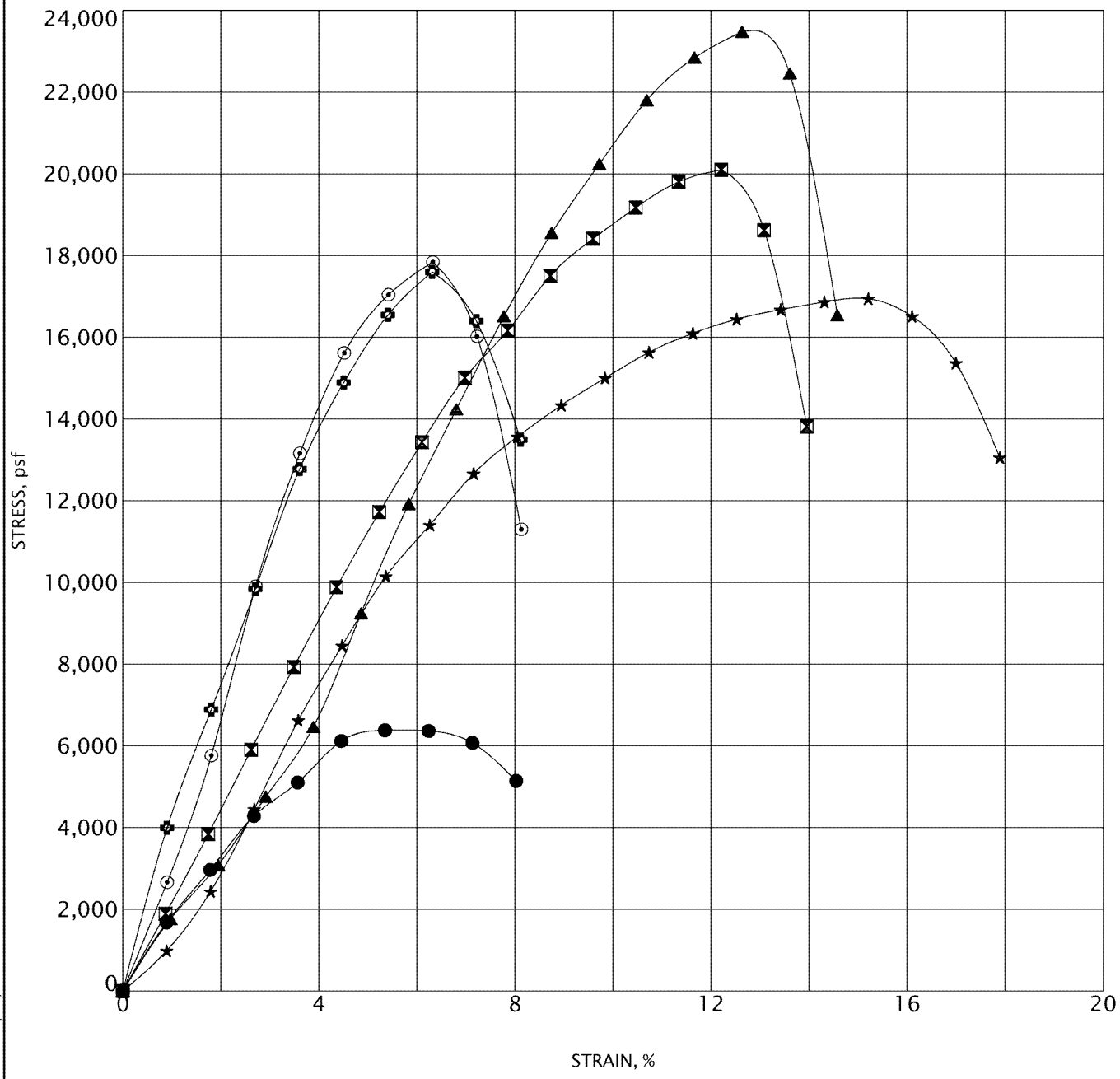
Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 18

US_UNCONFINED 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17



Specimen		EL (ft)	Classification	MC%	γ_d	UC
●	BH-11 S-03	790.9	Gray Silty Clay	11	129	6380
⊠	BH-11 S-07	780.9	Gray Sandy Clay	11	132	20100
▲	BH-11 S-09	775.9	Gray Sandy Clay	10	132	23480
★	BH-11 S-11	770.9	Gray Silty Clay	11	130	16930
⊙	BH-11 S-12	768.4	Gray Sandy Clay	10	136	17840
✿	BH-11 S-14	763.4	Gray Sandy Clay	10	133	17600

CONSULTING GROUP

UNCONFINED COMPRESSIVE STRENGTH TEST

Project Name: Barton RWPS Improvement

Project Location: Ann Arbor, Michigan 48105

G2 Project No.: 173045

Figure No. 19

US_UNCONFINED 173045.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/31/17

GeoTesting EXPRESS

Client:	G2 Consulting Group, LLC				
Project:	Barton RWPS				
Location:	Ann Arbor, MI			Project No:	GTX-306826
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	08/14/17	Checked By:	jsc
Depth :	---	Test Id:	419697		

Specific Gravity of Soils by ASTM D854

Boring ID	Sample ID	Depth	Visual Description	Specific Gravity	Comment
BH-03	S- 15	37.5 ft	Moist, brown silt	2.72	
BH-04	S- 13	32.5 ft	Moist, brown clay with sand	2.73	
BH-06	S- 08	20 ft	Moist, brown clay	2.72	
BH-07	ST- 06	13 ft	Moist, gray clay	2.72	

Notes: Specific Gravity performed by using method B (oven dried specimens) of ASTM D854
Moisture Content determined by ASTM D2216.

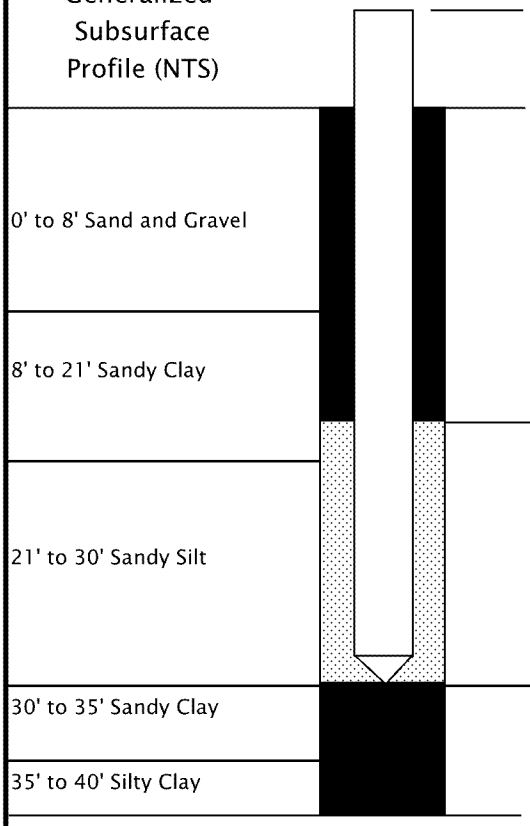
Log of Well Installation

CONSULTING GROUP

Project Name:	Barton RWPS	Date:	7/19/17
Project Number:	173045	Weather:	Mostly Sunny, 70-90° F

Well Number:	BH-03W	Top of Casing Elevation:	808.2 ft
Date of Installation:	7/19/17	Ground Surface Elevation:	805.2 ft
		Well Screen Elevation:	Bottom: 775.2 ft
			Top: 785.2 ft

Generalized Subsurface Profile (NTS)



Length of Casing Above Ground: 3 ft

Bottom Depth of Bentonite Chips: 18 ft

Bottom Depth of Well: 30 ft

Depth of Borehole: 40 ft

Well Casing

Diameter:	2 inch
Total Length:	33.5 ft
Material:	PVC
Cap? (Y/N):	Y

Well Screen

Diameter:	2 inch
Length:	10 ft
Mesh:	0.01 Slotted
Material:	PVC
Screen Plug?:	Y

Protective Casing

Material:	
Diameter:	
Length:	
Lock? (Y/N):	

DRILLING INFORMATION

Drilling Contractor:	Fibertec
Driller:	R. Brown
Inspector:	R. Kurdyla
Drilling Method:	Hollow-Stem Auger
Drilling: Start:	7/19/2017
Finish:	7/19/2017
Borehole Diameter:	8 inch

FIELD NOTES

Bags of Sand Used:	10
Bags of Cement Used:	0
Bags of Bentonite Used:	3 (bott.); 7 (top)

(**Pellets** or Powder)

Other Materials Used:

Water Level Info.

Date	Depth

FIELD LOG NOTES

AS-BUILT LOCATION

See attached Plate No. 1

Figure No. 21

Log of Well Installation

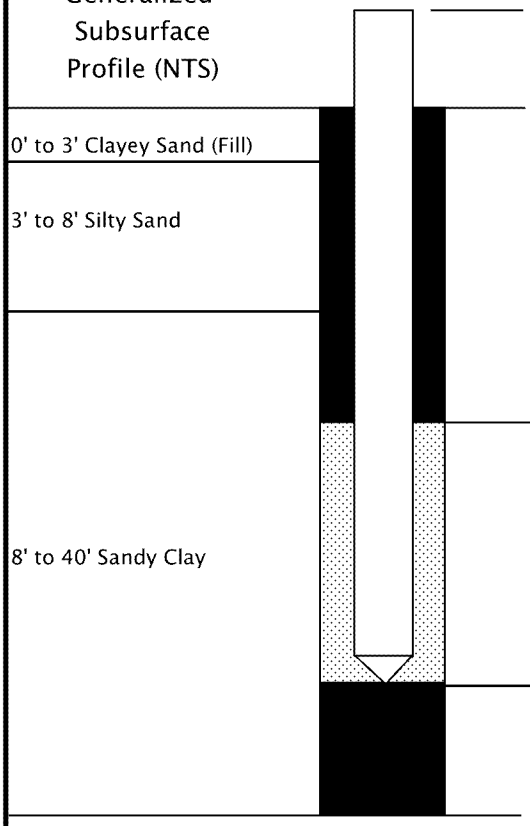
CONSULTING GROUP

Project Name: Barton RWPS
Project Number: 173045
Date: 7/20/17
Weather: Mostly Cloudy, 70-90° F

Well Number: BH-04W
Date of Installation: 7/20/17

Top of Casing Elevation: 798.6 ft
Ground Surface Elevation: 796.1 ft
Well Screen Elevation: Bottom: 765.1 ft
Top: 775.1 ft

Generalized Subsurface Profile (NTS)



Length of Casing Above Ground: 2.5 ft

Bottom Depth of Bentonite Chips: 19 ft

Bottom Depth of Well: 31 ft

Depth of Borehole: 40 ft

Well Casing

Diameter:	2 inch
Total Length:	33 ft
Material:	PVC
Cap? (Y/N):	Y

Well Screen

Diameter:	2 inch
Length:	10 ft
Mesh:	0.01 Slotted
Material:	PVC
Screen Plug?:	Y

Protective Casing

Material:	
Diameter:	
Length:	
Lock? (Y/N):	

DRILLING INFORMATION

Drilling Contractor:	Fibertec
Driller:	R. Brown
Inspector:	R. Kurdyla
Drilling Method:	Hollow-Stem Auger
Drilling: Start:	7/20/2017
Finish:	7/20/2017
Borehole Diameter:	8 inch

FIELD NOTES

Bags of Sand Used:	9
Bags of Cement Used:	0
Bags of Bentonite Used:	1 (bott.); 8 (top)

(**Pellets** or Powder)

Other Materials Used:

Water Level Info.

Date	Depth

FIELD LOG NOTES

AS-BUILT LOCATION

See attached Plate No. 1

Figure No. 22

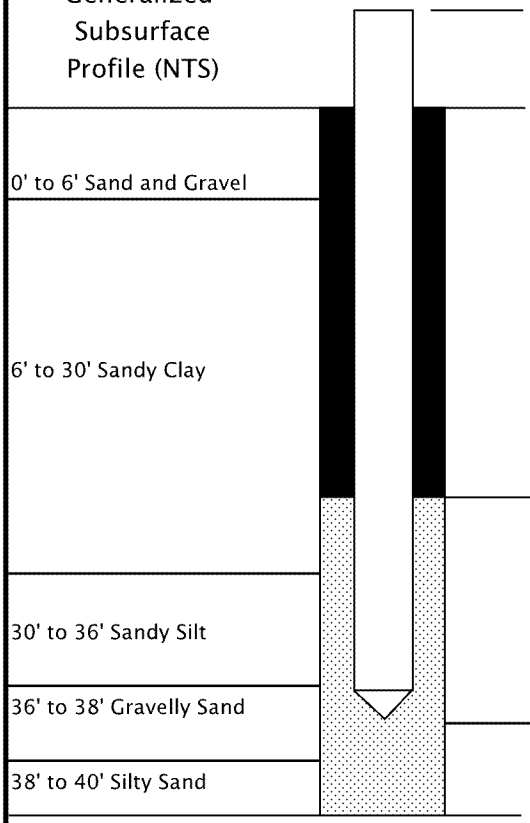
Log of Well Installation

CONSULTING GROUP

Project Name:	Barton RWPS	Date:	7/17/17
Project Number:	173045	Weather:	Mostly Sunny, 70-80° F

Well Number:	BH-06W	Top of Casing Elevation:	790.8 ft
Date of Installation:	7/17/17	Ground Surface Elevation:	788.3 ft

Generalized Subsurface Profile (NTS)



Length of Casing Above Ground: 2.5 ft

Bottom Depth of Bentonite Chips: 25.5 ft

Bottom Depth of Well: 37.5 ft

Depth of Borehole: 40 ft

Well Screen Elevation: Bottom: 750.8 ft, Top: 760.8 ft

Well Casing

Diameter:	1 inch
Total Length:	40 ft
Material:	PVC
Cap? (Y/N):	Y

Well Screen

Diameter:	1 inch
Length:	10 ft
Mesh:	0.01 Slotted
Material:	PVC
Screen Plug?:	Y

Protective Casing

Material:	
Diameter:	
Length:	
Lock? (Y/N):	

DRILLING INFORMATION

Drilling Contractor:	DLZ
Driller:	Harold
Inspector:	R. Kurdyla
Drilling Method:	Tripod Chop & Wash
Drilling: Start:	7/14/2017
Finish:	7/17/2017
Borehole Diameter:	3 inch

FIELD NOTES

Bags of Sand Used:	1 @ 80 lb
Bags of Cement Used:	0
Bags of Bentonite Used:	1 @ 50 lb

(**Pellets** or Powder)

Other Materials Used:

Water Level Info.

Date	Depth

FIELD LOG NOTES

AS-BUILT LOCATION

See attached Plate No. 1

Figure No. 23

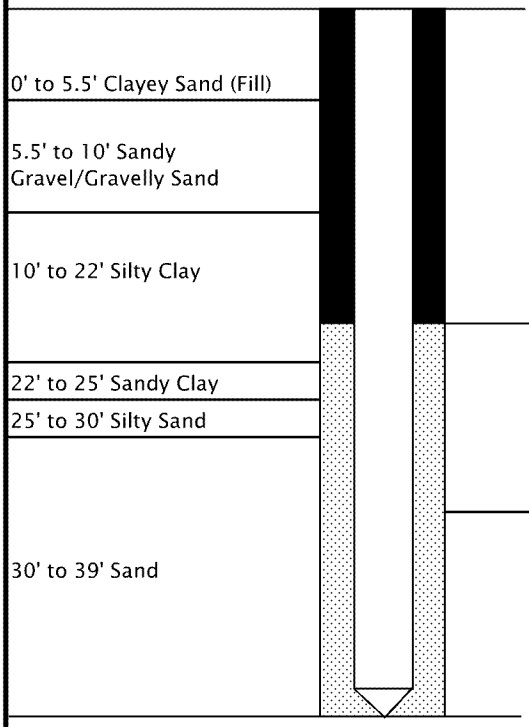
Log of Well Installation

CONSULTING GROUP

Project Name:	Barton RWPS	Date:	7/11/17
Project Number:	173045	Weather:	Mostly Cloudy, 70-80° F

Well Number:	BH-07W	Top of Casing Elevation:	779.9 ft
Date of Installation:	7/11/17	Ground Surface Elevation:	779.9 ft
		Well Screen Elevation:	Bottom: 747.9 ft
			Top: 757.9 ft

Generalized Subsurface Profile (NTS)



Length of Casing Above Ground: Flush

Bottom Depth of Bentonite Chips: 20 ft

Bottom Depth of Screen: 32 ft

Bottom Depth of Well = Depth of Borehole: 39 ft

Well Casing

Diameter:	2 inch
Total Length:	37.5 ft
Material:	PVC
Cap? (Y/N):	Y

Well Screen

Diameter:	2 inch
Length:	10 ft
Mesh:	0.01 Slotted
Material:	PVC
Screen Plug?:	Y

Protective Casing

Material:	Metal Cap/Plastic Skirt
Diameter:	8 inch
Length:	12 inch
Lock? (Y/N):	N

DRILLING INFORMATION

Drilling Contractor:	Fibertec
Driller:	R. Brown
Inspector:	R. Kurdyla
Drilling Method:	Hollow-stem Auger
Drilling: Start:	7/11/2017
Finish:	7/11/2017
Borehole Diameter:	8 inch

FIELD NOTES

Bags of Sand Used:	11
Bags of Cement Used:	3
Bags of Bentonite Used:	1

(**Pellets** or Powder)

Other Materials Used:

Water Level Info.

Date	Depth

FIELD LOG NOTES

AS-BUILT LOCATION

See attached Plate No. 1

Figure No. 24

CONSULTING GROUP

GENERAL NOTES TERMINOLOGY

Unless otherwise noted, all terms herein refer to the Standard Definitions presented in ASTM 653.

PARTICLE SIZE

Boulders		- greater than 12 inches
Cobbles		- 3 inches to 12 inches
Gravel	- Coarse	- 3/4 inches to 3 inches
	- Fine	- No. 4 to 3/4 inches
Sand	- Coarse	- No. 10 to No. 4
	- Medium	- No. 40 to No. 10
	- Fine	- No. 200 to No. 40
Silt		- 0.005mm to 0.074mm
Clay		- Less than 0.005mm

CLASSIFICATION

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituent (percent by weight)
Trace - 1 to 12%	Trace - 1 to 12%
Adjective - 12 to 35%	Little - 12 to 23%
And - over 35%	Some - 23 to 33%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e. sandy clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e. silty clay, trace sand, little gravel.

Consistency	Unconfined Compressive Strength (psf)	Approximate Range of (N)
Very Soft	Below 500	0 - 2
Soft	500 - 1,000	3 - 4
Medium	1,000 - 2,000	5 - 8
Stiff	2,000 - 4,000	9 - 15
Very Stiff	4,000 - 8,000	16 - 30
Hard	8,000 - 16,000	31 - 50
Very Hard	Over 16,000	Over 50

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

COHESIONLESS SOILS

Density Classification	Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

Relative Density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

AS - Auger Sample – Cuttings directly from auger flight
BS - Bottle or Bag Samples
S - Split Spoon Sample - ASTM D 1586
LS - Liner Sample with liner insert 3 inches in length
ST - Shelby Tube sample - 3 inch diameter unless otherwise noted
PS - Piston Sample - 3 inch diameter unless otherwise noted
RC - Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D 1586) - A 2.0 inch outside-diameter, 1-3/8 inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

APPENDIX B

Fibertec Analytical Laboratory Report – pH Electrometric

Fibertec
environmental
services

Wednesday, October 11, 2017

Fibertec Project Number: 81082
Project Identification: Barton RWPS /173045
Submittal Date: 10/04/2017

Mr. Matt Hambright
G2 Consulting Group, LLC
1866 Woodslee
Troy, MI 48083

Dear Mr. Hambright,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note TO-15 samples will be disposed of 10 calendar days after the reporting date. All other samples will be disposed of 30 days after the reporting date.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Emily Kennedy

By Emily Kennedy at 11:28 AM, Oct 11, 2017

For Daryl P. Strandbergh
Laboratory Director

Enclosures

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: 81082
Laboratory Sample Number: 81082-001

Client Identification:	**G2 Consulting Group, LLC**	Sample Description:	**Groundwater From Piezometer**	Chain of Custody:	**161651**
Client Project Name:	**Barton RWPS**	Sample No:	**BH-03**	Collect Date:	**07/19/17**
Client Project No:	**173045**	Sample Matrix:	**Ground Water**	Collect Time:	**17:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

pH, Electrometric **Aliquot ID: 81082-001** **Matrix: Ground Water**
Method: EPA 9040C **Description: Groundwater From Piezometer**

						Preparation		Analysis		
Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	P. Date	P. Batch	A. Date	A. Batch	Init.
1. pH	**7.97**	H	pH Units	-1.00	1.0	NA	NA	10/05/17 10:53	WD17J05B	AMG

Client Identification:	**G2 Consulting Group, LLC**	Sample Description:	**Groundwater From Piezometer**	Chain of Custody:	**161651**
Client Project Name:	**Barton RWPS**	Sample No:	**BH-06**	Collect Date:	**07/17/17**
Client Project No:	**173045**	Sample Matrix:	**Ground Water**	Collect Time:	**17:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

pH, Electrometric **Aliquot ID: 81082-002** **Matrix: Ground Water**
Method: EPA 9040C **Description: Groundwater From Piezometer**

						Preparation		Analysis		
Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	P. Date	P. Batch	A. Date	A. Batch	Init.
1. pH	**7.98**	H	pH Units	-1.00	1.0	NA	NA	10/05/17 10:55	WD17J05B	AMG

Client Identification:	**G2 Consulting Group, LLC**	Sample Description:	**Groundwater From Piezometer**	Chain of Custody:	**161651**
Client Project Name:	**Barton RWPS**	Sample No:	**BH-07**	Collect Date:	**07/11/17**
Client Project No:	**173045**	Sample Matrix:	**Ground Water**	Collect Time:	**17:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable ‡: Parameter not included in NELAC Scope of Analysis.

pH, Electrometric **Aliquot ID: 81082-003** **Matrix: Ground Water**
Method: EPA 9040C **Description: Groundwater From Piezometer**

						Preparation		Analysis		
Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	P. Date	P. Batch	A. Date	A. Batch	Init.
1. pH	**7.92**	H	pH Units	-1.00	1.0	NA	NA	10/05/17 10:56	WD17J05B	AMG

Definitions/ Qualifiers:

A: Spike recovery or precision unusable due to dilution.
B: The analyte was detected in the associated method blank.
E: The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J: The concentration is an estimated value.
M: Modified Method
U: The analyte was not detected at or above the reporting limit.
X: Matrix Interference has resulted in a raised reporting limit or distorted result.
W: Results reported on a wet-weight basis.
***:** Value reported is outside QC limits

Exception Summary:

H : Hold time exceeded.



Accreditation Number(s):

T104704518-17-6 (TX)

APPENDIX B

Lead Based Paint Testing Results

ANALYTICAL LABORATORY REPORT

Friday, November 10, 2017

CUSTOMER: Stantec
3754 Ranchero Drive
Ann Arbor, MI 48108

DATE RECEIVED: Tuesday, November 7, 2017
PO/PROJECT #: 2075139806
SUBMITTAL #: 2017-11-07-007

LAB NUMBER: AC45386

Sampled By: Neil J. Wager
Job Location: Ann Arbor, MI
Sample Identification: 1 - Process Piping 24' Supply Header

Date Sampled: November 3, 2017
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C-M (ICP-AES Method for Determination of Metals)
Date Analyzed: Wednesday, November 8, 2017

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Lead	**0.053 %**	0.0025 %

LAB NUMBER: AC45387

Sampled By: Neil J. Wager
Job Location: Ann Arbor, MI
Sample Identification: 2 - Process Piping 24' Discharge Header

Date Sampled: November 3, 2017
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C-M (ICP-AES Method for Determination of Metals)
Date Analyzed: Wednesday, November 8, 2017

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Lead	**0.013 %**	0.0025 %

LAB NUMBER: AC45388

Sampled By: Neil J. Wager
Job Location: Ann Arbor, MI
Sample Identification: 3 - Process Piping Pump No. 3 Discharge

Date Sampled: November 3, 2017
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C-M (ICP-AES Method for Determination of Metals)
Date Analyzed: Wednesday, November 8, 2017

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Lead	**0.032 %**	0.0025 %

GPI Laboratories, Inc. has obtained accreditation under the programs detailed on the final page of the laboratory report. The accreditations pertain only to the testing performed for the elements, and in accordance with the test methods, listed in the scope of accreditation table. Testing which is performed by GPI Laboratories, Inc. according to other test methods, or for elements which are not included in the table fall outside of the current scope of laboratory accreditation.

This report shall not be reproduced except in full, without written approval of GPI Laboratories, Inc..

ANALYTICAL LABORATORY REPORT

Friday, November 10, 2017

CUSTOMER: Stantec
3754 Ranchero Drive
Ann Arbor, MI 48108

DATE RECEIVED: Tuesday, November 7, 2017
PO/PROJECT #: 2075139806
SUBMITTAL #: 2017-11-07-007

Unless otherwise noted, the condition of each sample was acceptable upon receipt, all laboratory quality control requirements were met, and sample results have not been adjusted based on field blank or other analytical blank results. Individual sample results relate only to the sample as received by the laboratory.

Katie Root
2017.11.10 16:23:10
-05'00'

Tests Reviewed By: Katie Root, Analyst II

GPI Laboratories, Inc. has obtained accreditation under the following programs:

- **National Lead Laboratory Accreditation Program (NLLAP)**
  AIHA-LAP: Environmental Lead Laboratory Accreditation Program, Laboratory ID#101030 (www.aihaaccreditedlabs.org)
- **OH:** Ohio Department of Health Lead Poisoning Prevention Program, Approval #E10013 (www.odh.ohio.gov)
- **AIHA-LAP: Industrial Hygiene Laboratory Accreditation Program,** Laboratory ID#101030 (www.aihaaccreditedlabs.org)
- **National Environmental Laboratory Accreditation Program (NELAP)**
  NY: State of New York Department of Health, Laboratory ID#11609 (Serial # 56085-56089) (518-485-5570)
  LA: State of Louisiana Department of Environmental Quality, Laboratory ID#180321 (Certificate 05036) (www.deq.louisiana.gov)
  OK: Oklahoma Department of Environmental Quality, Laboratory ID#9993 (Certificate 2016-157) (www.deq.state.ok.us)

Testing which is performed by GPI Laboratories, Inc. according to test methods, or for elements which are not included in the table below fall outside of the current scope of laboratory accreditation. Customers are encouraged to verify the current accreditation status with the individual accreditation programs by calling or visiting the appropriate website for the applicable program.

SCOPE OF ACCREDITATION

Air and Emissions

Element/Test	Method	Accreditation(s)
Suspended Particulates: PM10 / TSP	40 CFR 50 Appendix J / 40 CFR 50 Appendix B	NY, LA
Lead in Airborne Dust	NIOSH 7300	ELLAP, OH, NY, LA
Lead in Airborne Dust	EPA 600/R-93/200/ EPA 6010C	ELLAP, OH
Metals in Airborne Dust	EPA 600/R-93/200/ NIOSH 7300/ EPA 6010C	IHLAP
Surface Coating: Density	ASTM D1475	NY
Surface Coating: Percent Solids	ASTM D2697	NY
Surface Coating: Percent Water	EPA 24	NY
Surface Coating: Volatile Content	EPA 24 / ASTM D2369	NY

Solid Chemical Materials

Element/Test	Method	Accreditation(s)
TCLP	EPA 1311(Sample Preparation Method)	NY, LA, OK
Lead in Soil	EPA 3050B/ EPA 6010C	ELLAP, OH, NY, LA, OK
Lead in Paint	EPA 3050B/ EPA 6010C	ELLAP, OH, NY, LA
Lead in Paint	ASTM D 3335-85A/ EPA 6010C	NY
Lead in Dust Wipes	EPA 3050B/ EPA 6010C	NY, LA
Lead in Dust Wipes	EPA 600/R-93/200/ EPA 6010C	ELLAP, OH
Ignitability	EPA 1010A	NY

	Non-Potable Water / Analysis by ICP		**Solid Chemical Materials**	
Element/Test	Method	Accreditation(s)	Method	Accreditation(s)
Arsenic	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Barium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Cadmium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Chromium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Copper	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Lead	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Mercury	EPA 245.1 Rev.3/ EPA 7470A	NY, LA, OK	EPA 7471B	NY, LA, OK
Nickel	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Selenium	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Silver	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Zinc	EPA 6010C/ EPA 200.7 Rev 4.4	NY, LA, OK	EPA 6010C	NY, LA, OK
Cobalt	----	----	EPA 6010C	NY, LA, OK
Manganese	----	----	EPA 6010C	NY, LA, OK
Acid Digestion	EPA 3010A	NY, LA	EPA 3050B	NY, LA

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CHAIN OF CUSTODY FORM

GPI

Send To:
GPI Laboratories, Inc.
4403 Donker Court, Grand Rapids MI 49512-4054
(616) 940-3112 | GRLabsInfo@gpinet.com | www.gpinet.com

FOR LAB USE ONLY			
Properly Contained	(YES)	NO	N/A
ASTM E1792 wipes	YES	NO	(N/A)
Adequate Ph Adjust	YES	NO	(N/A)
Lab acidified: By/Date:	N/A		

Company: Stantec Consulting Michigan, Inc.	Address: 3754 Ranchero Drive Ann Arbor, MI 48108	Company Contact: Neil J. Wager Telephone: 734-214-1831 E-Mail: neil.wager@stantec.com	P.O./Proj #: 2075139806 Location: Ann Arbor, MI

Matrix	TCLP (Waste)	Metals Content	Other Tests	Turnaround Time
☑ Paint Chips ☐ Wipe	☐ Lead	☑ Lead	☐ pH (Corrosivity)	☐ Same Day*
☐ Soil ☐ Filter	☐ RCRA (8) Metals	☐ Lead, Cad., Chrome.	☐ Ignitability	☐ Rush*
☐ Abrasive ☐ _____	☐ _____	☐ RCRA (8) Metals	☐ VOC (Method 24, etc)	☑ Standard
☐ Wastewater		☐ _____	☐ _____	☐ _____

Comments: Call contact for billing information.

GPI Labs accepts Visa, MasterCard, and American Express. *Accelerated Turnaround is not available for every test. Please call for information.

Laboratory ID	Sample Number	Date/Time Sampled	Sample Identification / Location:	Special Instructions:	Wipes: Area wiped (sq.ft.)	Air Sampling Filters: Minutes	Flow Rate	UNITS
AL45386	1	11/3/2017	Process Piping 24" Supply Header					
AL45387	2	11/3/2017	Process Piping 24" Discharge Header					
AL45388	3	11/3/2017	Process Piping Pump No. 3 Discharge					

Air Sampling Filters: ☐ TSP ☐ PM10 ☐ 37 mm Cassette

Sampled By (Please print): Neil J. Wager Date Submitted: 11/6/2017 Signature: Neil Wager

Received by: _____ Date/Time: _____ Relinquished Date/Time: _____

Received by: _____ Date/Time: _____ Relinquished Date/Time: _____

Method of Shipment: FedEx

Received for Laboratory by: Tobias Gussenhoven Date/Time: 11/7/17 14:56 Submittal #: 2017-11-07-007

1/18/17 Form #: 53-12

LA
11-7-17

APPENDIX C

Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT
BETWEEN _____
AND THE CITY OF ANN ARBOR

Whereas, the City of Ann Arbor, with municipal offices at 301 E. Huron Street, Ann Arbor 48107 ("City") is the owner of certain confidential information relating to its Water Treatment Plant, Barton Pump Station, Raw Water Mains and components thereof, certain confidential information relating to the locations of critical underground utilities located on or supplying the Plant, including all related facilities, and confidential information including drawings and reports regarding the Water Treatment Plant and Barton Pump Station facilities that may be determined through inspection of those facilities, all of which information is or may be classified as exempt or restricted information under the Michigan Freedom of Information Act and federal bioterrorism and homeland security laws (collectively referred to as "Confidential Information").

Whereas, _____ (referred to as "Receiver") is desirous of receiving, reviewing, and/or evaluating the Confidential Information for the sole and exclusive purpose of gathering information for the Barton Raw Water Main Condition Assessment and associated proposal.

Therefore, it is agreed this _____ day of _____, 2021:

That, the City shall, in its sole discretion, disclose to Receiver some or all of the Confidential Information based on Receiver's request for:

- *Barton Pump Station Valve Improvement Project Drawings and written information relating to water infrastructure.*

It is understood that Receiver will secure at its sole cost any and all licenses, authorizations or other intellectual property rights necessary for the transfer of Confidential Information in the format requested by Receiver. Receiver will be required to provide documentation of it having all necessary licenses, authorizations or rights prior to transfer of the Confidential Information in the requested format.

That, Receiver shall hold and use Confidential Information only for the above-stated purpose of this Agreement and shall restrict disclosure of such Confidential Information to its employees with a need to know. Each employee of Receiver identified as "need to know" in connection with the receipt, review or evaluation of the Confidential Information shall be required to execute a Non-Disclosure Agreement under the same terms as stated herein. The City shall be provided with a copy of the executed employee Non-Disclosure Agreements and a master list of the employees, their respective jobs, and the reason for their classification as "need to know."

That, Receiver will hold the Confidential Information or any part thereof in strict confidence and will not permit any disclosure thereof to any person or persons outside its organization and not use or derive any direct or indirect benefit from the Confidential Information or any part thereof without the prior written consent of the City. Receiver agrees that it will not disseminate in any manner any part of the Confidential Information.

If the Receiver receives a subpoena, request from an administrative agency or order from a court that requires Receiver to disclose all or any of the Confidential Information, the Receiver shall notify the City immediately, including a copy of the subpoena, request or order, and shall act in cooperation with the City to seek a protective order to prevent or limit disclosure and/or impose a non-disclosure obligation on the recipient(s). Recipient shall include a copy of this Non-Disclosure Agreement along with the Confidential Information it produces or discloses. Confidential Information disclosed in accordance with this paragraph shall remain Confidential Information for all other purposes.

That, Receiver will not make or authorize to be made any copies of any reports, plans, drawings or electronic data files supplied by the City and showing or describing or embodying the Confidential Information unless authorized by the City in writing. At any time and for any reason, prior to the completion of the work performed by the Receiver, the City may request and Receiver agrees it will return all of the said reports, plans, drawings or electronic data files together with any reports, drawings or electronic data files, including any independent notations of the Confidential Information, made by Receiver showing or describing or embodying the Confidential Information or any part thereof to the City immediately. After completion of the work, the Receiver shall return to the City any drawings, extracts, reproductions, or other documentation comprising the Confidential Information, in whatever format or media, including any independent notations of the Confidential Information made by Receiver showing or describing or embodying the Confidential Information or any part thereof. In addition, access shall be controlled by the Receiver to all Confidential Information generated as part of the work performed by the Receiver. Although the Receiver is permitted to maintain copies of their work, dissemination of this Confidential Information is not permitted without written authorization from the City.

That, the restrictions on the use or disclosure of Confidential Information by Receiver shall not include any information which:

1. at the time of disclosure to Receiver was known to Receiver free of restriction and such previous knowledge is evidenced by documentation in the possession of Receiver. A copy of which documentation will be provided to the City if requested by the City; or

2. is publicly known or later made publicly known by the City; or

3. is evidenced by documentation in the possession of Receiver as being received from a third party to this Agreement who: (a) has the legal right to so furnish such information to Receiver, and (b) is not obligated to the City to keep such information confidential; or

4. is approved for release in writing by the City.

That, nothing in this Agreement shall be construed as conferring to Receiver any right of ownership in the Confidential Information or license to use any, patents, industrial designs, copyrights or other intellectual property rights owned or licensed by the City.

That, nothing in this Agreement shall be construed as restricting the City's right to restrain use or dissemination of the Confidential Information in accordance with applicable federal, state or local law and regulation or at common law.

Receiver acknowledges that a breach by him/her of the provisions of this Agreement will cause the City irreparable damage for which the City cannot be reasonably or adequately compensated in damages. The City shall therefore be entitled, in addition to all other remedies available to it including, but not limited to, attorney fees and costs, to injunctive and/or other equitable relief to prevent a breach of this Agreement, or any part of it, and to secure its enforcement.

This Agreement shall be construed in accordance with the laws of the State of Michigan.

This Agreement and any amendments hereto may be executed by facsimile signature and in any number of counterparts, all of which taken together shall constitute one and the same instrument.

CITY OF ANN ARBOR

By: _____
Milton Dohoney Jr

Title: Interim City Administrator

Approved as to substance:

_____
Craig Hupy, P.E.
Public Services Area Administrator

Approved as to form:

_____
Stephen K. Postema
City Attorney

Contractor: _____

By: _____

Print Name:

Title:

Date:

Employee Agreement to be Bound by the Attached Non-Disclosure Agreement

The undersigned employee of _____ agrees he/she has read the attached Non-Disclosure Agreement between _____ and City of Ann Arbor and agrees to be bound by the terms and conditions thereof. The undersigned represents, by signing below, that he/she is receiving the Confidential Information on a "need to know" basis and will not disclose the Confidential Information except as provided in the Non-Disclosure Agreement.

Employee Name:

Position:

Employee Work Address & Phone Number:

_____
_____
_____

Employee Signature:

_____

Date: _____ __, 2020

ATTACHMENTS

CITY OF ANN ARBOR
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,

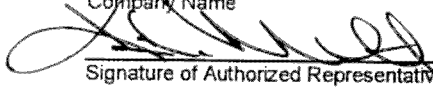
(b) To require each subcontractor performing work covered or funded by this contract with the City to pay each of its employees the applicable prescribed wage level under the conditions stated in subsection (a) or (b) above.

(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.

Weiss Construction Co. LLC
Company Name



January 20, 2022
Signature of Authorized Representative — Date

Kevin Markhardt, Vice President
Print Name and Title

41001 Grand River, Novi, MI 48375
Address, City, State, Zip

313.567.4500 kmarkhardt@weiss-construction.com
Phone/Email address

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500

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 $14.05/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 $15.66/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

[X] 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.

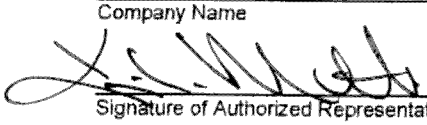
(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(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.

Weiss Construction Co. LLC
Company Name

41001 Grand River
Street Address



January 20, 2022
Signature of Authorized Representative — Date

Novi, MI 48375
City, State, Zip

Kevin Markhardt, Vice President
Print Name and Title

313.567.4500 kmarkhardt@weiss-construction.com
Phone/Email address

CITY OF ANN ARBOR
LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2021 - ENDING APRIL 29, 2022

$14.05 per hour
If the employer provides health care benefits*

$15.66 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 2/4/2021

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)
None	

*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:

Weiss Construction Co. LLC		313.567.4500
Vendor Name		**Vendor Phone Number**
	1.20.2022	Kevin Markhardt, Vice President
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

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.

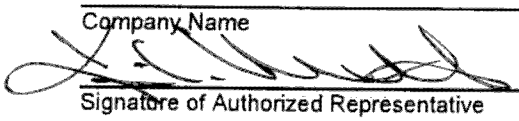
(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(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.

Weiss Construction Co. LLC
Company Name



January 20, 2022
Signature of Authorized Representative — Date

Kevin Markhardt, Vice President
Print Name and Title

41001 Grand River, Novi, MI 48375
Address, City, State, Zip

313.567.4500 kmarkhardt@weiss-construction.com
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

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											
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.