

Project Manual

Silver Lake Infrastructure Improvements Project

Silver Lake, Minnesota

SEH No. SILAK 171969

October 25, 2024



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Silver Lake Infrastructure Improvements Project

Silver Lake, Minnesota

SEH No. SILAK 171969

October 25, 2024

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DOCUMENT 00 01 05

CERTIFICATION

I hereby certify that this specification was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Brody Bratsch, PE

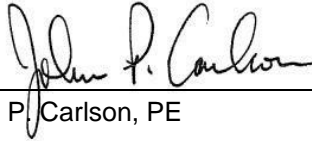
Date: October 25, 2024 License. No. 59529

Reviewed By: Sam Fink, PE

Date: October 25, 2024

I hereby certify that this specification was prepared by me or under direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Division 26, and Sections 40 90 00 and 40 90 10.

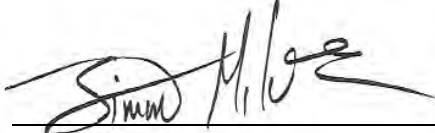


John P. Carlson, PE

Date: October 25, 2024 License. No. 24001

I hereby certify that this specification was prepared by me or under direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Divisions 07, 44, and Sections 08 16 00, 08 71 00, 09 97 21, 33 21 11, 33 28, 20, 40 23 50, and 43 22 51.



Simon McCormack, PE

Date: October 25, 2024 License. No. 56159

I hereby certify that this specification was prepared by me or under direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Divisions 05, 10, and Sections 01 25 13, 01 57 00, 01 60 00, 01 75 00, 01 78 23, 01 78 37, 02 41 19, 08 31 00, 09 91 50, 09 97 20, 31 23 16, 32 31 26, 40 05 59, 40 23 00, 40 23 10, 40 23 20, 40 23 30, 40 23 40, 40 23 60, and 43 24 10.10.



Colin Marcusen, PE

Date: October 25, 2024 License. No. 46273

END OF SECTION

PROJECT DIRECTORY

Project Name: Silver Lake Infrastructure Improvements Project **Location:** Silver Lake, Minnesota

Owner

Name: City of Silver Lake, Minnesota
Address: 308 Main Street W
Silver Lake, MN 55391
Contact: Diane Petersen, City Clerk
Phone: 320.327.2412
Fax: 320.327.2299
E-mail: cityclerk@cityofsilverlake.org

Water Engineer

Name: Short Elliott Hendrickson Inc.
Address: 3535 Vadnais Center Drive
Saint Paul, MN 55110
Contact: Simon McCormack
Phone: 651.765.2916
Fax: 888.908.8166
E-mail: cmccormack@sehinc.com

Project Engineer

Name: Short Elliott Hendrickson Inc.
Address: 1390 Hwy 15 South, Suite 200
PO Box 308
Hutchinson, MN 55350
Contact: Brody Bratsch
Phone: 320.223.8418
Fax: 888.908.8166
E-mail: bbratsch@sehinc.com

Electrical Engineer

Name: Short Elliott Hendrickson Inc.
Address: 3535 Vadnais Center Drive
Saint Paul, MN 55110
Contact: John Carlson
Phone: 651.490.2166
Fax: 888.908.8166
E-mail: jcarlson@sehinc.com

Project Manager/City Engineer

Name: Short Elliott Hendrickson Inc.
Address: 1390 Hwy 15 South, Suite 200
PO Box 308
Hutchinson, MN 55350
Contact: Sam Fink
Phone: 320.204.0217
Fax: 888.908.8166
E-mail: sfink@sehinc.com

Wastewater Engineer

Name: Short Elliott Hendrickson Inc.
Address: 2351 Connecticut Avenue, Suite 300
Sartell, MN 56377-2485
Contact: Colin Marcusen
Phone: 320.229.4359
Fax: 888.908.8166
E-mail: cmarcusen@sehinc.com

END OF DOCUMENT

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ADVERTISEMENT FOR BIDS
CITY OF SILVER LAKE, MINNESOTA
SILVER LAKE INFRASTRUCTURE IMPROVEMENTS PROJECT

General Notice

The City of Silver Lake (Owner) is requesting Bids for the construction of the following Project:

Silver Lake Infrastructure Improvements Project
SILAK 171969

Notice is hereby given that Online Bids will be received by the City Clerk until 10:00 a.m., Tuesday, January 14, 2025, via [QuestCDN](#) for the furnishing of all labor and material for the construction of Silver Lake Infrastructure Improvements Project. Paper copies of the bids can be submitted to City Clerk located at City of Silver Lake, 308 Main Street W, Silver Lake, MN 55381. The opening and reading of the Bids may be modified subject to COVID-19 preventative measures.

The bid opening will be conducted both in person at City Hall and via Microsoft Teams, at which time they will be publicly opened and read aloud.

Silver Lake Infrastructure Improvements Project Bid Opening
10:00 a.m. (CDT), Tuesday, January 14, 2025

Please join my meeting from your computer, tablet or smartphone: <https://bit.ly/4eTi60M>

Or call in (audio only)

+1 872-242-7640,, 515734614# United States, Chicago

Phone Conference ID: 515 734 614#

Any person monitoring the meeting remotely may be responsible for any documented costs. Message and data rates may apply.

The Project includes the following Work: Removals, Bituminous Pavement, Concrete Curb and Gutter, Concrete Sidewalks, Drain Tile with Sump Pump Services, Aggregate Base, Water Main, Sanitary Sewer, Storm Sewer, Lift Station and Well Rehab.

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

<http://www.sehinc.com>

The Bidding Documents may be viewed for no cost at <http://www.sehinc.com> by selecting the Project Bid Information link at the bottom of the page and the View Plans option from the menu at the top of the selected project page.

Digital image copies of the Bidding Documents are available at <http://www.sehinc.com> for a fee of \$30. These documents may be downloaded by selecting this project from the "Project Bid Information" link and by entering eBidDoc™ Number 9309572 on the SEARCH PROJECTS page. For assistance and free membership registration, contact QuestCDN at 952.233.1632 or info@questcdn.com.

In addition to digital plans, paper copies of the Bidding Documents may be obtained from Docunet Corp. located at 2435 Xenium Lane North, Plymouth, MN 55441 (763.475.9600) for a fee of \$100.

Partial sets of Bidding Documents will not be available. Neither Owner nor Engineer will be responsible for full or partial sets of Bidding Documents, including Addenda if any, obtained from sources other than indicated above.

For this project, bids will be received electronically or paper submittal. Contractors submitting an electronic bid will be charged an additional \$42 at the time of bid submission via the online electronic bid service QuestCDN.com. To access the electronic Bid Worksheet, download the project document and click the online bidding button at the top of the advertisement. Prospective bidders must be on the plan holders list through QuestCDN for bids to be accepted. Bids shall be completed according to the Bidding Requirements prepared by SEH dated October 25, 2024.

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

The Issuing Office for the Bidding Documents is:

Short Elliott Hendrickson, Inc.
1390 Hwy 15 S, Suite 200
PO Box 308
Hutchinson, MN 55350
Project Manager: Sam Fink, 320.204.0217, sfink@sehinc.com

Bid security in the amount of 5 percent of the Bid must accompany each Bid in accordance with the Instructions to Bidders.

A Contractor responding to these Bidding Documents must submit to the Owner a signed statement under oath by an owner or officer verifying compliance with each of the minimum criteria in Minnesota Statutes, section 16C.285, subdivision 3.

This Work shall be subject to minimum wages and labor standards in accordance with the Minnesota Department of Labor and Industry.

Pre-bid Conference

A pre-bid conference for the Project will be held on **Thursday, December 19, 2024, at 10:00 a.m.**, at **City of Silver Lake, 308 Main Street W, Silver Lake, MN 55381**. Attendance at the pre-bid conference is encouraged but not required.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

American Iron and Steel

Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference applies an American Iron and Steel requirement to this project. All iron and steel products used in this project must be produced in the United States. The term "iron and steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and Construction Materials.

The following waivers apply to this Contract:

De Minimis,
Minor Components, and
Pig iron and direct reduced iron

This Advertisement is issued by:

Owner: **City of Silver Lake, Minnesota**

By: **Diane Petersen**

Title: **City Clerk**

Date: **November 22, 2024**

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INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.
 - B. ***Bidder or Responsible Bidder*** – Terms used in these Bidding Documents that mean a ‘responsible contractor’ meeting the minimum criteria as defined in Minnesota Statutes, section 16C.285, subdivision 3.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder’s responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or

Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.06 *Electronic Documents*

- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version **10** or later. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.
- C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.
 - 1. Electronic Documents that are available in native file format include:
 - a. **CADD finished ground surface in dwg format.**
 - b. **Street alignments in dwg format.**
 - 2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.
 - 3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.
 - 4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within 5 days of Owner's request, Bidder must submit the following information:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 ~~Deleted. Prospective Bidders must submit required information regarding their qualifications by [insert deadline for prequalification submittals]. Owner will review the submitted information to determine which contractors are qualified to bid on the Work. Owner will issue an Addendum listing those contractors that Owner has determined to be qualified to construct the project. Bids will only be accepted from listed contractors. The information that each prospective Bidder must submit to seek prequalification includes the following:~~
- ~~A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.~~
 - ~~B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.~~
 - ~~C. Prospective Bidder's state or other contractor license number, if applicable.~~
 - ~~D. Subcontractor and Supplier qualification information.~~
 - E. Other required information regarding qualifications.
- 3.03 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.04 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

- 3.05 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.06 **Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.**

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 ~~Deleted. A pre-bid conference will not be conducted for this Project.~~
- 4.02 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.03 ~~Deleted. A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Proposals will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of qualified Bidders that attended the pre-bid conference and are eligible to submit a Bid for this Project will be issued in an Addendum.~~
- 4.04 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

- c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
- 2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- 4. *Geotechnical Baseline Report/Geotechnical Data Report*: The Bidding Documents contain a Geotechnical Baseline Report (GBR) and Geotechnical Data Report (GDR).
 - a. As set forth in the Supplementary Conditions, the GBR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations (“Baseline Conditions”). The GBR is a Contract Document.
 - b. The Baseline Conditions in the GBR are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the Baseline Conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the GBR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.
 - c. Nothing in the GBR is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.
 - d. As set forth in the Supplementary Conditions, the GDR is a Contract Document containing data prepared by or for the Owner in support of the GBR.
- B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:
 - 1. **Appendix A - Cleveland Lift Station Existing Pumps.**
 - 2. **Appendix B - Cleveland Lift Station Existing Control Panel.**

3. Appendix C - Main Lift Station and Wastewater Ponds Record Drawings.

Owner will make copies of these other Site-related documents available to any Bidder on request.

- B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.
- ~~C. The other Site-related documents are not part of the Contract Documents.~~
- D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.
- E. No other Site-related documents are available.

5.04 Site Visit and Testing by Bidders

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- ~~B. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.~~
- ~~C. A Site visit is scheduled for [designate, date, time and location]. Maps to the Site will be made available upon request.~~
- D. Bidders visiting the Site are required to arrange their own transportation to the Site.
- E. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Chris Penaz, 320.510.7213**. Bidder must conduct the required Site visit during normal working hours.
- F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- G. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- H. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- I. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:

- A. **Address all questions to Engineer via email: Sam Fink, sfink@sehinc.com.**

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General

Conditions. Such Bid bond will be issued in the form included in the Bidding Documents. **Bid security must be at least 5% of the Bidder's maximum Bid price.**

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 ~~Bidder must set forth in the Bid the time by which Bidder must achieve Substantial Completion, subject to the restrictions established in Paragraph 13.07 of these Instructions. The Owner will take Bidder's time commitment regarding Substantial Completion into consideration during the evaluation of Bids, and it will be necessary for the apparent Successful Bidder to satisfy Owner that it will be able to achieve Substantial Completion within the time such Bidder has designated in the Bid.~~ **[If applicable include the following: Bidder must also set forth in the Bid its commitments regarding the achievement of Milestones and readiness for final payment.]** The Successful Bidder's time commitments will be entered into the Agreement or incorporated in the Agreement by reference to the specific terms of the Bid.
- 9.03 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 ~~The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.~~

- 10.02 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those “or-equal” or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an “or-equal” or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within ~~10~~ **15** days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. **Each such request shall include the Manufacturer’s Certification for Compliance with AIS. Refer to the Manufacturer’s Certification form provided in these construction Contract Documents.** The burden of proof of the merit of the proposed item is upon Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner. **“Substitutes and “or-equal” materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.05 and 7.06 of the General Conditions after the Effective Date of the Contract. Each such request shall include Manufacturer’s Certification letter to document compliance with AIS requirements of Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference, if applicable. Refer to Manufacturer’s Certification Letter provided in these Contract Documents.”**
- 10.03 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 ~~Deleted. A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.~~
- 11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- A. Pipe Materials (Suppliers)**
 - 1. Storm Sewer
 - 2. Sanitary Sewer
 - 3. Water Main
 - B. Street Materials (Suppliers and Installers)**
 - 1. Aggregate Materials
 - 2. Bituminous Paving
 - 3. Concrete Flatwork and Curb

C. Well Rehabilitation (Supplier and Installer)

D. Lift Station (Supplier and Installer)

- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.
- 11.05 **The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.07A.**

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form ~~is~~ **and attachments are** included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- A. A Bid price shall be indicated for each section, Bid Item and unit price item listed on the QuestCDN Online Bid Worksheet. The Bid Worksheet is a part of and appurtenant to the Bid Form and Bid.**
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 Deleted. *Lump Sum*

~~A.—Bidders must submit a Bid on a lump sum basis as set forth in the Bid Form.~~

13.02 Deleted. *Base Bid with Alternates*

~~A.—Bidders must submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.~~

~~B.—In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.~~

13.03 Deleted. *Sectional Bids*

~~A.—Bidders may submit a Bid on any individual section or any combination of sections, as set forth in the Bid Form.~~

~~B.—Submission of a Bid on any section signifies Bidder's willingness to enter into a Contract for that section alone at the price offered.~~

- C. ~~If Bidder submits Bids on individual sections and a Bid based on a combination of those sections, such combined Bid need not be the sum of the Bids on the individual sections.~~
- D. ~~Bidders offering a Bid on one or more sections must be capable of completing the Work covered by those sections within the time period stated in the Agreement.~~

13.04 **Deleted.** *Cost-Plus-Fee Bids*

- A. ~~Bidders must submit a Bid on the Contractor's fee, which must be in addition to compensation for Cost of the Work. Such fee must be either (1) a fixed fee, (2) percentages of specified categories of costs, or (3) a percentage applicable to the Cost of the Work as a whole, as set forth in the Bid Form.~~
- B. ~~If the Contractor's fee, as set forth in the Bid Form, is to be based on percentages of categories of cost, or on a percentage applicable to the Cost of the Work as a whole, then Bidders must enter a maximum amount limiting the total fee if required by the Bid Form to do so.~~
- C. ~~Bidders must submit a Bid on the Guaranteed Maximum Price, setting a maximum amount on the compensable Cost of the Work plus Contractor's fee, if required by the Bid Form to do so.~~

13.05 *Unit Price*

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

13.06 **Deleted.** *Allowances*

- A. ~~For cash allowances the Bid price must include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.~~

13.07 **Deleted.** *Price-Plus-Time Bids*

- A. ~~The Owner will consider the time of Substantial Completion commitment made by the Bidder in the comparison of Bids.~~
- B. ~~Bidder must designate the number of days required to achieve Substantial Completion of the Work and enter that number in the Bid Form as the total number of calendar days to substantially complete the Work.~~
- C. ~~The total number of calendar days for Substantial Completion designated by Bidder must be less than or equal to a maximum of [number], but not less than the minimum of [number].~~

If Bidder purports to designate a time for Substantial Completion that is less than the allowed minimum, or greater than the allowed maximum, Owner will reject the Bid as nonresponsive.

- ~~D. The Agreement as executed will contain the Substantial Completion time designated in Successful Bidder's Bid, and the Contractor will be assessed liquidated damages at the rate stated in the Agreement for failure to attain Substantial Completion within that time.~~
- E. Bidder must also designate the time in which it will achieve Milestones, and achieve readiness for final payment. Such time commitments must be consistent with the "Time of Substantial Completion" to which Bidder commits. The Agreement as executed will contain, as binding Contract Times, Successful Bidder's time commitments regarding Milestones, as applicable, and readiness for final payment.

ARTICLE 14—SUBMITTAL OF BID

14.01 Paper Submittal:

- A. The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- B. A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.

14.02 Electronic Submittal:

- A. The Bid Form - Document 00 41 00 is to be completed and submitted with all the attachments as required to be submitted under the terms of Article 2 of the Bid Form.**
- B. The Bid Worksheet is to be completed and submitted under the terms of Article 3 of the Bid Form.**

14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

14.04 **The submitted Bid Bond shall be a copy of original signatures and the seal of the Surety. Request of actual copy upon award may be requested.**

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. **The opening and reading of the Bids may be modified subject to COVID-19 preventative measures.** An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids. **The abstract can be found by following the “Project Bid Information” link of www.sehinc.com then following the “Project Results” link on the top of the second page.**
- 16.02 ~~Deleted. Bids will be opened privately.~~

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a “Base Bid plus alternates” budget after receiving all Bids, but prior to opening

them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

- C. ~~Deleted. For determination of the apparent low Bidder(s) when sectional bids are submitted, Bids will be compared on the basis of the aggregate of the Bids for separate sections and the Bids for combined sections that result in the lowest total amount for all of the Work.~~
- D. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- E. ~~Deleted. For the determination of the apparent low Bidder when cost plus fee bids are submitted, Bids will be compared on the basis of the Guaranteed Maximum Price set forth by Bidder on the Bid Form.~~
- F. ~~Deleted Bid prices will be compared after adjusting for differences in time of Substantial Completion (total number of calendar days to substantially complete the Work) designated by Bidders. The adjusting amount will be determined at the rate set forth in the Agreement for liquidated damages for failing to achieve Substantial Completion, or such other amount that Owner has designated in the Bid Form.~~
 - 1. ~~The method for calculating the lowest bid for comparison will be the summation of the Bid price shown in the Bid Form plus the product of the Bidder specified time of Substantial Completion in calendar days times the rate for liquidated damages [or other Owner designated daily rate] in dollars per day.~~
 - 2. ~~This procedure is only used to determine the lowest bid for comparison and contractor selection purposes. The Contract Price for compensation and payment purposes remains the Bid price shown in the Bid Form.~~

18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—FEDERAL REQUIREMENTS

- 21.01 *If the contract price is in excess of \$100,000, provisions of the Contract Work Hours and Safety Standards Act at 29 CFR 5.5(b) apply.*
- 21.02 *Federal requirements at Article 19 of the Supplementary Conditions apply to this Contract.*
- 21.03 *American Iron and Steel requirements apply to this Project.*

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GEOTECHNICAL DATA

PART 1 GENERAL

1.01 FOUNDATION BORING NOTES

- A. Data shown on boring logs is for the Bidders' information. Bidder should be cognizant that materials between borings can vary from that shown on logs. Final and complete identification of all materials between borings can be verified only by Site excavation. Bidder shall assume full responsibility for excavating all materials encountered during construction regardless of density or groundwater condition.
- B. The boring logs are an exact copy of the originals made by photo process reproduction. This information was obtained for design purposes and is made available to Bidders so they may have the same information the designers used. This information is not intended as a substitute for Bidder's personal investigations, interpretations, or judgment. Bidder may make their own soils investigation, but they must first obtain Engineer's approval. Failure of Bidder to conduct his own investigation or to analyze available data shall not relieve Bidder of any responsibility in excavating difficult materials.
- C. Water levels indicated on the boring logs are subject to seasonal and/or annual variations.
- D. The original investigation report is available for Bidder's inspection at Engineer's office.

END OF DOCUMENT

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Geotechnical Evaluation Report

Silver Lake Street and Utility Improvements
Various Streets and Avenues
Silver Lake, Minnesota

Prepared for the

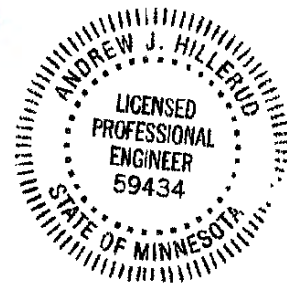
City of Silver Lake

Professional Certification:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Andrew J. Hillerud, PE
Project Engineer
License Number: 59434
July 24, 2023



Project B2304715

Braun Intertec Corporation

July 24, 2023

Project B2304715

Mr. Bruce Beebo
City of Silver Lake
308 Main Street
Silver Lake, MN 55381

Re: Geotechnical Evaluation
Silver Lake Street and Utility Improvements
Various Streets and Avenues
Silver Lake, Minnesota

Dear Mr. Beebo:

We are pleased to present this Geotechnical Evaluation Report for the street and utility improvement project in Silver Lake, Minnesota.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Andrew Hillerud at 218.260.0930 (ahillerud@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION



Andrew J. Hillerud, PE
Project Engineer



Steven A. Thayer, PE
Business Unit Manager, Senior Engineer

c: Sam Fink, PE; SEH
Brody Bratsch, PE; SEH
Justin Black, PE; SEH
John Rodeberg; SEH

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets ST-1 through ST-29 and PZ-1 through PZ-4

Descriptive Terminology of Soils

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses construction of a new sanitary sewer lift station, installation of new sanitary sewer, water main, and storm sewer utilities, and reconstruction of the bituminous-surfaced pavements along portions of various streets and avenues in Silver Lake, Minnesota.

The new sanitary sewer lift station will be constructed on the northeast quadrant of the intersection of Cleveland Street and Lake Avenue. Table 1 provides a summary of the project.

Table 1. Project Details

Aspect	Description
Lift Station	Bearing depth – 25 to 30 feet deep (Provided) Open-cut construction method
Watermain, Sanitary Sewer, and Storm Sewer Depths	Range from 5 to 12 feet (Provided)
Pavement type	Bituminous
Average Daily Traffic	Grove Street South from Main Street to Gehlen Drive – 1,250 to 1,300 (MnDOT 2017) All other streets and avenues - less than 500 (Assumed)
Grade changes	Less than 1 foot (Assumed)

Currently, the roadways are bituminous surfaced roads with existing utilities and curb and gutter. The figure below shows the existing alignments and our approximate boring locations. The portions of roadways highlighted pink are planned for improvements as discussed above.

Figure 1. Site Layout



Figure provided by Google Earth®.

A.2. Purpose

The purpose of our geotechnical evaluation is to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of the lift station, utilities, and bituminous pavements.

A.3. Background Information and Reference Documents

We reviewed the following information:

- An Open Cut Proposed Utilities Figure Number 7 showing the project location and planned utility invert depths, prepared by Short Elliott Hendrickson, Inc (SEH), and dated November 5, 2020.
- Communications with Sam Fink, PE; SEH, regarding the proposed construction.
- A Geologic Map of Minnesota, prepared by Howard C. Hobbs and Joseph E. Goebel, 1982.
- Aerial photographs of the project areas using Google Earth®.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.

A.4. Scope of Services

We performed our scope of services for the project in accordance with our Proposal QTB177723 to Mr. Beebo dated May 10, 2023, and authorized on May 15. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and clearing the exploration locations of underground utilities. Braun Intertec selected and staked the exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.
- Performing 29 standard penetration test (SPT) borings, denoted as ST-1 to ST-29, to nominal depths of 10 to 50 feet below grade.
- Installing 4 temporary monitoring wells, denoted at PZ-1 to PZ-4, to nominal depths ranging from 14 1/2 and 40 feet deep to measure groundwater levels.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.
- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for utility and pavement subgrade preparation and the design of pavements, and the lift station.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

B. Results

B.1. Geologic Overview

We based the geologic origins used in this report on the soil types, laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.

B.2. Boring Results

Table 2 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in Table 2.

Table 2. Subsurface Profile Summary*

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
Pavement section	---	---	<ul style="list-style-type: none"> ▪ Overall thickness ranges from 11 to 19 inches. ▪ Bituminous thickness ranges from 2 1/2 to 12 inches ▪ Degraded bituminous encountered below the intact bituminous in Borings ST-1, ST-3, ST-16, and ST-20 with thicknesses ranging from 4 to 8 inches. ▪ Apparent aggregate base thickness ranges from 8 to 14 inches.
Topsoil	CL	---	<ul style="list-style-type: none"> ▪ Only encountered in Boring ST-24. ▪ Predominantly black CL extending to a depth of about 1 foot. ▪ Moisture condition generally moist.
Fill	SP, SM, SC, CL, OL	---	<ul style="list-style-type: none"> ▪ Not encountered in Boring ST-13, ST-16, ST-20, and ST-24. ▪ Moisture condition generally moist. ▪ Extended to depths ranging from 3 to 10 feet. ▪ Portions of all of the fill soils in Borings ST-2, ST-4, ST-5, ST-6, ST-9, ST-11, ST-12, ST-17, ST-18, ST-19, ST-23, ST-26, ST-27, and ST-29 were black and contained organic materials and variable amounts of roots and shells. ▪ In Boring ST-11, the fill from 6 1/2 to 10 feet contained clay pipe debris.
Glacial deposits	SP	8 BPF	<ul style="list-style-type: none"> ▪ General penetration resistance of 6 to 12 BPF. ▪ Variable amounts of gravel; may contain cobbles and boulders.

Strata	Soil Type - ASTM Classification	Range of Penetration Resistances	Commentary and Details
	SM, SC, CL	3 to 20 BPF	<ul style="list-style-type: none"> ▪ Contained lenses and layers of sand and periodically gravel throughout the clayey sand and sandy lean clay soils. ▪ The sandy lean clay soils in Boring ST-20 contained silt and lenses of very fine-grained silty sand and the silty sand soils in Boring ST-13 are very fine grained. ▪ Moisture condition generally moist or wet.

*Abbreviations defined in the attached Descriptive Terminology sheets.

We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification.

For simplicity in this report, we define existing fill to mean existing, uncontrolled or undocumented fill.

B.3. Groundwater

Table 3 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Table 3. Groundwater Summary

Location	Surface Elevation	Measured or Estimated Depth to Groundwater (ft)	Corresponding Groundwater Elevation (ft)
ST-1	1048.5	Not Observed	---
ST-2	1049.6	Not Observed	---
ST-3	1052.8	Not Observed	---
ST-4	1051.9	Not Observed	---
ST-5	1048.3	10	1038 1/2
ST-6	1052.4	Not Observed	---
ST-7	1052.6	Not Observed	---
ST-8	1061.0	8	1053
ST-9	1058.5	Not Observed	---
ST-10	1059.6	Not Observed	---
ST-11	1063.6	8 1/2	1055 1/2
ST-12	1063.2	Not Observed	---

Location	Surface Elevation	Measured or Estimated Depth to Groundwater (ft)	Corresponding Groundwater Elevation (ft)
ST-13	1067.7	11	1057
ST-14	1063.1	Not Observed	---
ST-15	1068.0	10 1/2	1057 1/2
ST-16	1066.1	Not Observed	---
ST-17	1061.5	Not Observed	---
ST-18	1068.1	Not Observed	---
ST-19	1056.6	Not Observed	---
ST-20	1066.4	Not Observed	---
ST-21	1060.3	Not Observed	---
ST-22	1060.7	Not Observed	---
ST-23	1050.6	Not Observed	---
ST-24	1052.3	35	1017 1/2
ST-25	1046.9	8 1/2	1038 1/2
ST-26	1047.3	Not Observed	---
ST-27	1047.1	Not Observed	---
ST-28	1050.3	Not Observed	---
ST-29	1044.2	Not Observed	---
PZ-1	1050.0	At Installation – Not Observed	---
		24-Hours after Installation – 6.7	1043.3
		48-Hours after Installation – 6.7	1043.3
		72-Hours after Installation – 6.7	1043.3
PZ-2	1058.7	At Installation – Not Observed	---
		24-Hours after Installation – 6.3	1052.4
		48-Hours after Installation – 6.3	1052.4
		72-Hours after Installation – 6.4	1052.3
PZ-3	1067.3	At Installation – Not Observed	---
		24-Hours after Installation – 5.9	1061.4
		48-Hours after Installation – 6.0	1061.3
		72-Hours after Installation – 6.1	1061.2
PZ-4	1051.8	At Installation – 35	1016.8
		24-Hours after Installation – 33.8	1018.0
		48-Hours after Installation – 10.1	1041.7
		72-Hours after Installation – 10.2	1041.6

The soil borings indicate a layered soil profile that is conducive for encountering perched water conditions. Groundwater may leach into excavations through sand and gravel lenses and layers in the clayey soils. Project planning should anticipate leaching groundwater and seasonal and annual fluctuations of groundwater in relation to Silver Lake.

B.4. Laboratory Test Results

The boring logs show the results of moisture content, organic content, and percent-passing-200-sieve testing we performed, next to the tested sample depth.

C. Recommendations

C.1. Design and Construction Discussion

C.1.a. Lift Station

Based on Boring ST-24, the lift station will bear on native sandy lean clay soils. These soils are suitable for support of the lift station. Dewatering will be required during installation of the lift station.

C.1.b. Utility Installation

Based on the anticipated utility invert depths and our soil borings, it appears most of the utility subgrades will consist of clayey sand and sandy lean clay with some areas of poorly graded sand, silty sand, and organic clay. Besides the organic clay, the soils generally appear suitable for support of the utilities. Portions of the project will have subgrades consisting of organic soils and fill soils that will need to be removed and replaced with suitable soils. Portions of the project will also have wet, soft subgrade soils requiring stabilizing aggregate below the pipes. Leaching groundwater will also cause suitable subgrades to become soft and unsuitable if allowed to collect in excavation bottoms.

C.1.c. Roadway Reconstruction

The borings indicate the roadway subgrade soils will mostly consist of silty sand, clayey sand, and sandy lean clay. A few borings encountered poorly graded sand and organic clay. The non-organic soils are suitable for the pavement subgrades but are considered marginal since they will become unstable when wet and will require moisture conditioning for proper compaction. About half of the borings encountered black sandy lean clay and organic clay soils below the existing pavement section. The black soils should be considered unsuitable and should be removed from the upper 3 feet of the pavement subgrade.

Consideration should be given to including a sand subbase in the pavement section and a geotextile fabric below the sand for increased subgrade strength.

C.1.d. Reuse of On-Site Soils and Construction Disturbance

The existing, non-organic, debris-free, soils are suitable for reuse as fill and backfill for the lift station, utilities, and roadways. Relatively significant amounts of the existing fill may contain debris or organic material, likely more than revealed by the borings. We do not recommend reusing existing fill that contains debris or organic material below the lift station, utilities, and roadways.

Most of the existing soils appear to have moisture contents above their anticipated optimum moisture content. In order to achieve adequate compaction, drying of soils prior to filling, backfilling, and compacting should be anticipated.

The contractor should note the on-site soils are susceptible to disturbances. Disturbance of these soils may cause areas that were previously prepared, or that were suitable for pavement or utility support, to become unstable and require moisture conditioning and compaction. Subcutting and replacing the disturbed material with crushed, coarse gravel, free of fines is also an alternative. The contractor should use means and methods to limit disturbance of the soils.

The existing soils containing fine grained silty sand and silt, such as those encountered in Borings ST-13 and ST-20 are extremely sensitive to moisture and disturbance. It is our opinion these soils will be very difficult to re-use as backfill and fill, unless they are segregated during excavation and dried.

C.2. Lift Station

C.2.a. Excavation and Subgrade Preparation

We anticipate the subgrade soils at bottom of the lift station excavation will consist of sandy lean clay. These soils are adequate for support of the lift station. Dewatering, as described below, will be necessary to maintain a stable subgrade.

C.2.b. Excavation Side Slopes

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states that excavation safety is the responsibility of the contractor. Reference to these OSHA requirements should be included in the project specifications.

The boring indicates that at the anticipated excavation depth the soils in the sidewalls of the excavations will be Type C soils under the Department of Labor Occupational Safety and Health Administration (OSHA) guidelines. Excavations in excess of 20 feet are required to be designed by a licensed engineer. These recommendations are not intended to be that design.

C.2.c. Excavation Dewatering

Groundwater will leach into the excavation through sand lenses and layers in the sandy lean clay soils. Dewatering will be required to maintain a suitable subgrade for the new lift station. Groundwater can be dewatered with sumps and pumps from within the excavation.

C.2.d. Bearing Capacity and Settlement

If the subgrade is stable and dewatering is completed as described above, we recommend designing the lift station for a net allowable bearing capacity of 1,500 pounds per square foot (psf). We anticipate total settlement of the base slab will be less than 1 inch.

C.2.e. Lateral Earth Pressure

Based on the groundwater measurements, we recommend assuming groundwater is at a depth of 5 feet below the ground surface (elevation 1047 1/2).

We recommend assuming the total unit weight of the backfill soils above the groundwater will be 110 pounds per cubic foot and the effective (submerged) unit weight of the backfill below the groundwater level will be 50 pcf.

We recommend assuming the coefficient of lateral pressure will be 0.56 for sandy lean clays. The hydrostatic pressure of the water should be added to the lateral earth pressure.

C.2.f. Resistance to Hydrostatic Uplift

Resistance to hydrostatic uplift is provided by the weight of the lift station and either (1) soil backfill over any projection of the base slab or, if the base slab does not project outside the sides of the lift station, (2) friction between the backfill and the sides of the lift station.

If the base slab projects outside the sides of the lift station, backfill within the frustum of an inverted cone extending upward and outward from the top edge of the base slab at an angle of 20 degrees can be assumed to provide resistance to uplift.

If the base slab does not project outside the sides of the lift station, the coefficient of friction between the backfill and the lift station (assumed to be formed concrete) can be assumed to be 0.45 for sands and 0.35 for clays. The coefficient of friction should be multiplied by the total lateral earth force against the sides of the lift station to determine the frictional resistance to uplift.

The value determined by either of the above calculations should be considered the ultimate value of uplift resistance. We recommend it be divided by a factor of safety of two to determine the allowable resistance of the backfill to uplift. For uplift resistance, we recommend assuming the groundwater is at a depth of 5 feet below the ground surface.

C.2.g. Backfilling

The onsite sandy lean clay soils may be used as backfill if they are dry enough to facilitate adequate compaction. The sanitary sewer pipes will be supported on several feet of wet well backfill material. Structures supported on backfill material are a common area of problems arising due to structure settlement. This occurs from consolidation of the backfill.

Structural fill and backfill material shall be compacted to a minimum of 100 percent of standard Proctor maximum dry density (ASTM International D 698). Moisture conditioning will be necessary to achieve this value. Care should be taken to compact against the structures using hand equipment. A geotechnical engineer or geotechnical engineering assistant should closely monitor backfill placement and compaction. We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.3. Utility Installation

C.3.a. Excavations

It is our opinion that the soils encountered by the borings can be excavated using a typical open-cut method with a backhoe. At the anticipated excavation depths, the soils in the sidewalls of the excavations will be Type C soils under the Department of Labor Occupational Safety and Health Administration (OSHA) guidelines.

C.3.b. Excavation Subgrades

Based on the borings and anticipated invert depths, the utility subgrades will generally consist of native and fill clayey sand and sandy lean clay with some areas of poorly graded sand, silty sand, and organic clay. We anticipate the non-organic, debris free subgrade soils will generally be suitable for support of the proposed utilities.

Organic clay soils were encountered in Borings ST-9 and ST-27 and fill soil containing debris was encountered Boring ST-11 extending near or below anticipated utility invert depths. These soils are unsuitable for support of the utilities and should be removed and replaced with suitable compacted fill.

Areas with wet subgrades or subgrades that are allowed to become wet will require surficial stabilization as described below.

C.3.c. Subgrade Stabilization

If construction encounters unfavorable conditions such as wet subgrades, additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support may be necessary. We recommend 6 to 12 inches of coarse sand or gravel having less than 50 percent of the particles by weight passing a number 40 sieve, and less than 5 percent of the particles passing a number 200 sieve. We anticipate that this material will need to be imported. Alternately, 1 1/2-inch crushed rock (or Class 2 Ballast) could be used.

Borings ST-1, ST-5, ST-7, ST-17, ST-25, ST-27, and ST-29 encountered soft soils with penetration resistances of 4 or less near the anticipated utility invert depths. Subgrade stabilization will likely be necessary in these areas. In other areas, we anticipate the soils at typical invert elevations will be suitable for utility support.

C.3.d. Excavation Dewatering

We recommend anticipating sand seams containing groundwater will be encountered during excavation. We recommend removing groundwater from utility trench excavations. Groundwater can be removed with sumps and pumps from within the excavation.

C.3.e. Selecting Excavation Backfill

Onsite soils that do not contain black soils, organic material, or debris may be used as backfill material. We recommend crushed rock or poorly graded sands be used for bedding. Bedding soils will likely need to be imported.

C.3.f. Placement and Compaction of Backfill

We recommend spreading backfill and fill in loose lifts of 8 to 12 inches prior to compacting. We recommend compacting backfill and fill in accordance with the criteria presented below in Table 4. The relative compaction of utility backfill should be evaluated based on the structure below which it is installed, and vertical proximity to that structure.

We anticipate drying of some the native soils will be required to facilitate stability and compaction.

Table 4. Compaction Recommendations Summary

Area of Backfill Placement	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (typically SP, SP-SM)	> 12% Passing #200 Sieve (typically SC, SM, CL)
Within 1:1 oversize zone of pavements, within 3 feet of subgrade elevations	100	±3	-1 to +3
Within 1:1 oversize zone of pavements, more than 3 feet of subgrade elevations	95	±3	-1 to +3
Below landscaped surfaces	90	±5	±4

C.3.g. Corrosion Potential

A majority of the soil borings indicated the site predominantly consists of clayey soils. We consider these soils corrosive to metallic conduits. We recommend bedding the utilities in sandy soil free of any clay lumps or constructing the utilities with non-corrosive materials.

C.4. Pavement Reconstruction

C.4.a. Subgrade Preparation

We recommend the following steps for pavement subgrade preparation, understanding the site will have a grade change of 1 foot or less.

1. Strip unsuitable soils consisting of black organic soils from the area, within 3 feet of the surface of the proposed pavement grade. Borings ST-2, ST-4, ST-5, ST-6, ST-9, ST-11, ST-12, ST-17, ST-18, ST-19, ST-23, ST-26, ST-27, and ST-29 contained black organic soils. Areas with subgrade soils consisting of organic clay, such as Borings ST-9, ST-23, and possibly ST-27 may require an addition foot of removal to facilitate construction of the pavement.
2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.

3. Slope subgrade soils to areas of sand or drain tile to allow the removal of accumulating water.
4. Scarify, moisture condition and surface compact the subgrade with at least 5 passes of a large roller with a minimum drum diameter of 3 1/2 feet.
5. Place pavement engineered fill to grade and compact in accordance with Section C.4.c. to bottom of pavement.
6. Proofroll the pavement subgrade as described in Section C.4.d.

To improve long-term pavement performance, we recommend incorporating a sand subbase into the pavement section. We recommend sloping subgrade soils to promote drainage and removal of accumulated water. To aid in constructability with the potential wet or soft clayey subgrades, we also recommend considering placement of a geotextile fabric below the sand section.

C.4.b. Selecting Excavation Backfill and Additional Required Fill

On-site soils that are free of black, organic or foreign materials and debris can be reused as backfill. Soils with less than 12 percent silt and clay should be used for backfill placed below water or on wet subgrades, or immediately below the aggregate base section.

C.4.c. Placement and Compaction of Backfill and Fill

We recommend compacting fill and backfill material within the pavement subgrades to a minimum of 100 percent of their standard Proctor maximum dry density. At depths greater than 3 feet below the street subgrade, the minimum compaction requirement may be decreased to 95 percent of standard Proctor maximum dry density. Fill and backfill soils should be placed at moisture contents as indicated in Table 4 above.

C.4.d. Pavement Subgrade Proofroll

After preparing the subgrades as described above and prior to the placement of the aggregate base, we recommend proofrolling the subgrade soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement.

C.5. Pavements

C.5.a. Design R Value

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar clayey sand and sandy lean clay soils anticipated at the pavement subgrade elevation, we recommend pavement design assume an R-value of 10.

C.5.b. Design Section

Table 5 provides our recommended pavement section, based on the soils support and traffic loads.

Table 5. Recommended Bituminous Pavement Sections

Use	Light Duty
Minimum asphalt thickness (inches)	4
Minimum aggregate base thickness (inches)	8
Minimum granular subbase (inches)	24*

* We recommend placing a geotextile fabric below the granular subbase in areas with wet or soft clay subgrades.

C.5.c. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We can provide recommendations for pavement material selection during final pavement design.

C.5.d. Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas and along pavement edges where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes in small trenches, extended at least 8 inches below the granular subbase layer.

C.5.e. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

Many conditions affect the overall performance of the pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement, and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

D. Procedures

D.1. Penetration Test Borings

We drilled the penetration test borings with a truck-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance to ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout.

D.2. Exploration Logs

D.2.a. Log of Boring Sheets

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

D.3. Material Classification and Testing

D.3.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The Appendix includes a chart explaining the classification system we used.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with ASTM procedures.

D.4. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or installed temporary wells for an extended period of observation, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.

E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

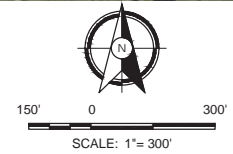
In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix



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- DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING
- DENOTES APPROXIMATE LOCATION OF PIEZOMETER



Drawing Information

Project No:
B2304715
Drawing No:
B2304715
Drawn By: JAG
Date Drawn: 6/1/23
Checked By: AH
Last Modified: 6/2/23

Project Information

Silver Lake Street and
Utility Improvements

Various Streets

Silver Lake, Minnesota

**Soil Boring
Location Sketch**

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota						BORING: ST-1	
						LOCATION: See attached sketch	
						DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
						NORTHING: 264136	EASTING: 611114
DRILLER: D. Michalski		LOGGED BY: A. Hillerud		START DATE: 06/02/23		END DATE: 06/02/23	
SURFACE ELEVATION: 1048.5 ft		RIG: 7516B		METHOD: 3 1/4" HSA		SURFACING: Bituminous WEATHER: Clear	
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1048.2		BITUMINOUS, 4 inches					
0-3		DEGRADED BITUMINOUS, 5 1/2 inches		AU			
1047.7		APPARENT AGGREGATE BASE, 8 inches					
0.8		FILL: SILTY SAND (SM), fine to coarse-grained, little Gravel, brown, moist		3-8-5			
1047.0				(13)			
1.5				12"			
1044.5		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, soft to medium (GLACIAL TILL)		1-1-2			
4.0			5	(3)			
					10"		
				2-3-3			
				(6)			
				18"			
1039.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)		2-3-3		19	
9.0			10	(6)			
					16"		
				2-4-4-6			
				(8)			
				18"			
1034.0		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

Project Number B2304715				BORING: ST-2	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263718	EASTING: 611126
Silver Lake, Minnesota				START DATE: 05/31/23	END DATE: 05/31/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1049.6 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1049.3		BITUMINOUS, 4 inches		AU			
0.3		APPARENT AGGREGATE BASE, 12 inches					
1048.3		FILL: LEAN CLAY (CL), black, moist		2-3-6 (9) 12"		19	P200=94%
1.3							
1045.1		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, with lenses of Sand, brown and gray, moist to wet, stiff to medium (GLACIAL TILL)	5	3-4-6 (10) 12"			
4.5				3-4-7 (11) 16"			
1039.6		<i>layer of Sand</i>	10	3-3-4 (7) 18"			
10.0		LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)					
				3-5-7-8 (12) 18"			
1035.1		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: ST-3			
				LOCATION: See attached sketch			
				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)			
				NORTHING: 263424	EASTING: 611128		
DRILLER: D. Michalski		LOGGED BY: A. Hillerud		START DATE: 06/01/23	END DATE: 06/01/23		
SURFACE ELEVATION: 1052.8 ft		RIG: 7516B	METHOD: 3 1/4" HSA	SURFACING: Bituminous	WEATHER: Clear		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1052.5 0.3		BITUMINOUS, 3 1/2 inches					
1051.8		DEGRADED BITUMINOUS, 8 inches		AU			
1051.0		APPARENT AGGREGATE BASE, 10 inches					
1048.8		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist		4-4-6 (10) 9"			
1044.3		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-2-3 (5) 15"			
8.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	10	2-3-5 (8) 17"			
1038.3				3-4-7 (11) 18"			
14.5				2-6-8-9 (14) 18"			
		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

Project Number B2304715				BORING: ST-4	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263613	EASTING: 611439
Silver Lake, Minnesota				START DATE: 06/01/23	END DATE: 06/01/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud	SURFACE ELEVATION: 1051.9 ft		RIG: 7516B	METHOD: 3 1/4" HSA
			SURFACING: Bituminous		WEATHER: Clear

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1051.6		BITUMINOUS, 4 inches					
0.3		APPARENT AGGREGATE BASE, 8 1/2 inches		AU			
1050.9		FILL: SANDY LEAN CLAY (CL), trace Gravel, black and gray, moist		4-5-9 (14) 14"			
1047.9		SANDY LEAN CLAY (CL), Gravel, brown and gray, moist, medium to stiff (GLACIAL TILL)	5	2-2-4 (6) 15"			
1042.9		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)	10	2-4-5 (9) 18"			
9.0				2-5-7 (12) 18"			
1037.4				3-7-10-10 (17) 18"			
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota					BORING: ST-5		
					LOCATION: See attached sketch		
					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
					NORTHING: 263944	EASTING: 611452	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		START DATE: 05/31/23	END DATE: 05/31/23			
SURFACE ELEVATION: 1048.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA	SURFACING: Bituminous	WEATHER: Clear			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q_p tsf	MC %	Tests or Remarks
1047.9 0.4		BITUMINOUS, 4 1/2 inches					
1047.0 1.3		APPARENT AGGREGATE BASE, 11 inches		AU			
1045.3 3.0		FILL: SANDY LEAN CLAY (CL), black, moist		2-3-4 (7) 10"			
		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown and gray, moist, medium to soft (GLACIAL TILL)	5	2-2-2 (4) 14"		17	
1041.8 6.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		2-3-4 (7) 18"			
			10	3-6-9 (15) 18"			
1036.3 12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff (GLACIAL TILL)		3-4-6-4 (10) 18"			
1033.8 14.5		END OF BORING	15				Water observed at 10.0 feet at end of drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-6	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263954	EASTING: 611870
Silver Lake, Minnesota				START DATE: 05/31/23	END DATE: 05/31/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1052.4 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1052.0		BITUMINOUS, 5 inches					
0.4		APPARENT AGGREGATE BASE, 14 inches		AU			
1050.8							
1.6		FILL: SANDY LEAN CLAY (CL), black, moist		3-4-5 (9) 10"			
1048.4							
4.0		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-3-4 (7) 14"			
				3-3-4 (7) 16"			
			10	4-4-4 (8) 18"			
1040.4							
12.0		SANDY LEAN CLAY (CL), trace Gravel, with lenses of Sand, gray, moist, medium (GLACIAL TILL)		3-4-4-6 (8) 18"			
1037.9							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-7		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 263613		EASTING: 611875
Silver Lake, Minnesota					START DATE: 06/01/23		END DATE: 06/01/23
DRILLER: D. Michalski		LOGGED BY: A. Hillerud			SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1052.6 ft	RIG: 7516B		METHOD: 3 1/4" HSA				
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1052.3 0.3		BITUMINOUS, 3 inches		AU			
1051.7 0.9		APPARENT AGGREGATE BASE, 8 inches FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown and brown, moist		4-5-6 (11) 11"			
1048.6 4.0		SANDY LEAN CLAY (CL), trace Gravel, with lenses of Sand, brown and gray, moist, soft (GLACIAL TILL)	5	1-1-2 (3) 14"			
1043.6 9.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)	10	2-1-2 (3) 18"			
1040.6 12.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff (GLACIAL TILL)		3-4-5 (9) 18"			
1038.1 14.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, stiff (GLACIAL TILL)		3-4-8-10 (12) 18"			
		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-8		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 263895	EASTING: 612087	
Silver Lake, Minnesota					START DATE: 05/31/23	END DATE: 05/31/23	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACE ELEVATION: 1061.0 ft		RIG: 7516B	METHOD: 3 1/4" HSA	
			SURFACING: Bituminous		WEATHER: Clear		
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1060.5		BITUMINOUS, 5 1/2 inches					
0.5		APPARENT AGGREGATE BASE, 13 inches		AU			
1059.5							
1.5		FILL: CLAYEY SAND (SC), fine to medium-grained, with Gravel, dark brown and brown, moist		3-2-3 (5) 12"		10	
			5	3-3-2 (5) 12"			
1054.5							
6.5		FILL: SILTY SAND (SM), fine to medium-grained, little Gravel, brown, wet		3-2-4 (6) 4"			
1052.0							
9.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		4-3-7 (10) 18"			
			10				
				3-5-6-10 (11) 18"			
1046.5		END OF BORING	15				Water observed at 8.0 feet while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-9	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263326	EASTING: 612102
Silver Lake, Minnesota				START DATE: 05/31/23	END DATE: 05/31/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud			SURFACING: Bituminous	WEATHER: Clear
SURFACE ELEVATION: 1058.5 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1058.2		BITUMINOUS, 4 inches					
0.3		APPARENT AGGREGATE BASE, 9 1/2 inches		AU			
1057.4		FILL: ORGANIC CLAY (OL), with fibers, and roots, black, wet		1-1-2 (3) 6"		39	OC=9%
1053.5		SANDY LEAN CLAY (CL), trace Gravel, dark gray, moist, medium (GLACIAL TILL)	5	2-3-4 (7) 14"			
1052.0		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, stiff to medium (GLACIAL TILL)		2-4-5 (9) 14"			
			10	3-3-4 (7) 18"			
1046.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium (GLACIAL TILL)		3-3-4-4 (7) 18"			
1044.0		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-10		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 264337		EASTING: 612405
Silver Lake, Minnesota					START DATE: 05/31/23		END DATE: 05/31/23
DRILLER: D. Michalski		LOGGED BY: A. Hillerud		SURFACE ELEVATION: 1059.6 ft		RIG: 7516B	METHOD: 3 1/4" HSA
				SURFACING: Bituminous		WEATHER: Clear	
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1059.3 0.3		BITUMINOUS, 4 inches		AU			
1058.3 1.3		APPARENT AGGREGATE BASE, 11 inches					
		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown and brown, moist		2-3-4 (7) 8"		19	P200=54%
1055.6 4.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	5	2-3-4 (7) 13"			
				2-3-6 (9) 18"			
			10	4-5-5 (10) 16"			
		<i>lense of Sand</i>		3-4-6-7 (10) 18"			
1045.1 14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

Project Number B2304715				BORING: ST-11	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263777	EASTING: 612414
Silver Lake, Minnesota				START DATE: 05/31/23	END DATE: 05/31/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1063.6 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1063.3 0.3		BITUMINOUS, 3 1/2 inches		AU			
1062.5 1.1		APPARENT AGGREGATE BASE, 10 inches		2-4-4 (8) 11"			
		FILL: SANDY LEAN CLAY (CL), little Gravel, black and brown, moist		1-2-2 (4) 5"			
1057.1 6.5		FILL: SANDY LEAN CLAY (CL), trace Gravel, with clay pipe debris, dark brown and brown, moist to wet		1-2-2 (4) 5"			
1053.6 10.0		SANDY LEAN CLAY (CL), trace Gravel, with lenses of Sand, brown, moist, stiff (GLACIAL TILL)		3-4-9 (13) 16"			
1049.1 14.5		END OF BORING		4-5-4-7 (9) 18"			
		Boring then backfilled with auger cuttings					Water observed at 8.5 feet while drilling.

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: ST-12			
DRILLER: D. Michalski				LOGGED BY: A. Hillerud			
SURFACE ELEVATION: 1063.2 ft				RIG: 7516B			
METHOD: 3 1/4" HSA				SURFACING: Bituminous			
START DATE: 05/31/23				END DATE: 05/31/23			
DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)				NORTHING: 263481			
				EASTING: 612418			
WEATHER: Clear							
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1062.9 0.3		BITUMINOUS, 3 1/2 inches					
1062.2 1.0		APPARENT AGGREGATE BASE, 8 1/2 inches		AU			
		FILL: SANDY LEAN CLAY (CL), trace Gravel, black, moist		3-4-5 (9) 10"			
1059.2 4.0		CLAYEY SAND (SC), fine-grained, trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-2-3 (5) 13"		23	
1056.7 6.5		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL OUTWASH)		3-5-7 (12) 18"			
			10	3-5-7 (12) 18"			
				2-5-7 (12) 18"			
1049.2 14.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium (GLACIAL TILL)	15	3-3-4 (7) 16"			
				2-3-4 (7) 18"			
1042.2 21.0		END OF BORING					
		Boring immediately backfilled with bentonite grout					Water not observed while drilling.
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: ST-13			
DRILLER: D. Michalski				LOGGED BY: A. Hillerud			
SURFACE ELEVATION: 1067.7 ft				RIG: 7516B			
METHOD: 3 1/4" HSA				SURFACING: Bituminous			
DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)				NORTHING: 263990			
				EASTING: 612509			
START DATE: 06/01/23				END DATE: 06/01/23			
WEATHER: Clear							
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1067.4		BITUMINOUS, 3 1/2 inches					
0.3		APPARENT AGGREGATE BASE, 11 inches		AU			
1066.5		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown and gray, moist, stiff (GLACIAL TILL)		3-4-5 (9) 14"			
1.2							
			5	4-4-8 (12) 17"			
1061.2		SILTY SAND (SM), fine-grained, trace Gravel, with lenses of Lean Clay, brown, moist, medium (GLACIAL TILL)		4-7-8 (15) 16"			
6.5							
			10	2-9-12 (21) 15"			
1056.2		SANDY LEAN CLAY (CL), trace Gravel, with lenses of Sand, brown, moist to wet, stiff to very stiff (GLACIAL TILL)		4-8-12 (20) 17"			
11.5		<i>layer of Sand</i>					
		<i>layer of Sand</i>					
			15	4-9-10 (19) 18"			
				4-5-7 (12) 18"			
			20	4-5-7 (12) 18"			
1046.7		END OF BORING					Water observed at 12.5 feet while drilling.
21.0		Boring immediately backfilled with bentonite grout					Water observed at 11.0 feet at end of drilling.
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-15		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 263766	EASTING: 612665	
Silver Lake, Minnesota					START DATE: 06/01/23	END DATE: 06/01/23	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear		
SURFACE ELEVATION: 1068.0 ft	RIG: 7516B	METHOD: 3 1/4" HSA					
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1067.7 0.3		BITUMINOUS, 3 1/2 inches		AU			
1066.7 1.3		APPARENT AGGREGATE BASE, 12 inches					
		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist		2-2-3 (5) 13"		20	P200=57%
1063.5 4.5		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-2-3 (5) 18"			
1061.5 6.5		CLAYEY SAND (SC), fine to coarse-grained, little Gravel, with layers of coarse Sand and Gravel, brown, moist to wet, stiff to very stiff (GLACIAL TILL)		2-4-12 (16) 18"			
			10	2-4-6 (10) 15"			
				2-5-9 (14) 15"			
			15	1-3-6 (9) 5"			
1051.5 16.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium (GLACIAL TILL)		2-3-5 (8) 18"			
			20	1-3-4 (7) 12"			
1047.0 21.0		END OF BORING					Water observed at 10.5 feet while drilling.
		Boring then backfilled with bentonite grout					Water observed at 12.5 feet at end of drilling.
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-16	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 262995	EASTING: 612624
Silver Lake, Minnesota				START DATE: 06/02/23	END DATE: 06/02/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1066.1 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1065.8		BITUMINOUS, 4 inches					
0.3		DEGRADED BITUMINOUS, 4 inches		AU			
1065.4		APPARENT AGGREGATE BASE, 8 inches					
0.7		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)		1-2-3		17	P200=55%
1064.8			(5)				
1.3			12"				
			5				
				2-2-3			
				(5)			
				15"			
				3-4-4			
				(8)			
				18"			
				3-4-7			
				(11)			
				18"			
				2-6-7-8			
				(13)			
				18"			
1051.6		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-17	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 262886	EASTING: 612488
Silver Lake, Minnesota				START DATE: 06/02/23	END DATE: 06/02/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1061.4 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1061.0		BITUMINOUS, 5 1/2 inches					
0.4		APPARENT AGGREGATE BASE, 9 inches		AU			
1060.2		FILL: SANDY LEAN CLAY (CL), black, moist		1-1-3 (4) 10"			
1057.0		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, grayish brown, moist, soft (GLACIAL TILL)	5	1-2-1 (3) 8"		22	
1055.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)		2-3-6 (9) 18"			
			10	3-6-8 (14) 18"			
				4-5-11-9 (16) 18"			
1047.0		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-18	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263925	EASTING: 612867
Silver Lake, Minnesota				START DATE: 06/05/23	END DATE: 06/05/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1068.1 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1067.8 0.3		BITUMINOUS, 4 inches		AU			
1067.0 1.1		APPARENT AGGREGATE BASE, 9 inches		2-3-4 (7) 12"			
1064.1 4.0		FILL: SANDY LEAN CLAY (CL), black, moist		3-4-6 (10) 14"			
1061.6 6.5		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown and gray, moist, medium to stiff (GLACIAL TILL)	5	2-2-3 (5) 14"		19	
1053.6 14.5		SANDY LEAN CLAY (CL), trace Gravel, with lenses of Sand and Gravel, brown, moist, stiff to very stiff (GLACIAL TILL)	10	4-10-10 (20) 12"			
				4-6-8-9 (14) 18"			
		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: ST-19			
DRILLER: D. Michalski				LOGGED BY: A. Hillerud			
SURFACE ELEVATION: 1056.6 ft				RIG: 7516B			
METHOD: 3 1/4" HSA				SURFACING: Bituminous			
DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)				WEATHER: Clear			
START DATE: 06/13/23				END DATE: 06/13/23			
NORTHING: 262860				EASTING: 613076			
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1056.3		BITUMINOUS, 4 inches					
0.3		APPARENT AGGREGATE BASE, 12 inches		AU			
1055.3		FILL: SANDY LEAN CLAY (CL), black, moist		2-4-4 (8) 9"			
1.3							
1052.6		SANDY LEAN CLAY (CL), gray, moist, medium (GLACIAL TILL)	5	2-3-3 (6) 10"			
4.0							
1050.1		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, gray, moist, medium (GLACIAL TILL)		1-2-4 (6) 12"			
6.5							
1047.6		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium (GLACIAL TILL)	10	2-2-3 (5) 15"			
9.0							
1044.6		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, soft to very stiff (GLACIAL TILL)		3-3-4 (7) 18"			
12.0							
			15	4-2-3 (5) 18"			
				2-2-2 (4) 18"			
			20	7-10-8 (18) 2"			
1035.6		END OF BORING					
21.0		Boring then backfilled with bentonite grout					Water observed at 20.0 feet while drilling.
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-20	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263843	EASTING: 613101
Silver Lake, Minnesota				START DATE: 06/05/23	END DATE: 06/05/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1066.4 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1066.1		BITUMINOUS, 3 inches					
0.3		DEGRADED BITUMINOUS, 4 1/2 inches		AU			
1065.8		APPARENT AGGREGATE BASE, 7 1/2 inches					
0.6		SANDY LEAN CLAY (CL), trace Gravel, with lenses of fine Silty Sand, brown and gray, moist, medium to stiff (GLACIAL TILL)		1-2-4 (6) 11"			
1065.1							
1.3							
			5	1-2-3 (5) 18"			
1059.9		SANDY LEAN CLAY (CL), with Silt, trace Gravel, brown, moist, stiff (GLACIAL TILL)		3-5-5 (10) 18"		19	
6.5							
1057.4		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		3-4-7 (11) 18"			
9.0			10				
				2-5-7-9 (12) 18"			
1051.9		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota					BORING: ST-21		
					LOCATION: See attached sketch		
					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
					NORTHING: 264001	EASTING: 613316	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud	START DATE: 06/05/23	END DATE: 06/05/23				
SURFACE ELEVATION: 1060.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA	SURFACING: Bituminous	WEATHER: Clear			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1060.0 0.3		BITUMINOUS, 4 inches					
1059.3 1.0		APPARENT AGGREGATE BASE, 8 inches		AU			
		FILL: CLAYEY SAND (SC), fine to medium-grained, trace Gravel, dark brown and brown, moist		2-2-3 (5) 13"			
1056.3 4.0		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	4-3-4 (7) 16"			
				2-3-5 (8) 18"			
1051.3 9.0		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)	10	3-5-7 (12) 15"			
				2-5-6-7 (11) 18"			
1045.8 14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota					BORING: ST-22		
					LOCATION: See attached sketch		
					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
					NORTHING: 263169	EASTING: 613418	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud	START DATE: 06/02/23	END DATE: 06/02/23				
SURFACE ELEVATION: 1060.7 ft	RIG: 7516B	METHOD: 3 1/4" HSA	SURFACING: Bituminous	WEATHER: Clear			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1059.7 1.0		BITUMINOUS, 12 inches		AU			
1059.1 1.6		APPARENT AGGREGATE BASE, 7 inches		2-3-3 (6) 5"			
1056.7 4.0		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist		2-2-3 (5) 12"			
		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, medium to stiff (GLACIAL TILL)	5	2-3-4 (7) 18"			
			10	2-3-4 (7) 18"			
				2-5-5-6 (10) 18"			
1046.2 14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: ST-23			
DRILLER: D. Michalski				LOGGED BY: A. Hillerud			
SURFACE ELEVATION: 1050.6 ft				RIG: 7516B			
METHOD: 3 1/4" HSA				SURFACING: Bituminous			
START DATE: 06/01/23				END DATE: 06/01/23			
DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)				NORTHING: 262814			
				EASTING: 613423			
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1049.8		BITUMINOUS, 9 inches					
0.8		APPARENT AGGREGATE BASE, 8 inches		AU			
1049.2		FILL: ORGANIC CLAY (OL), with roots, black, wet		2-3-3 (6) 10"		31	OC=8%
1046.6		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-3-4 (7) 14"		15	
1044.1		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		2-4-5 (9) 18"			
			10	3-6-6 (12) 18"			
				3-6-8 (14) 17"			
1036.6		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium (GLACIAL TILL)	15	3-3-4 (7) 18"			
				2-3-5 (8) 18"			
			20	2-3-4-5 (7) 18"			
1029.6		END OF BORING					Water not observed while drilling.
21.0		Boring then backfilled with bentonite grout					
			25				

Project Number B2304715				BORING: ST-24	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 262940	EASTING: 613521
Silver Lake, Minnesota				START DATE: 05/30/23	END DATE: 05/30/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Grass		WEATHER: Clear
SURFACE ELEVATION: 1052.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1051.3 1.0		SANDY LEAN CLAY (CL), with roots, black, moist (TOPSOIL)		AU			
		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown and gray, moist, medium to stiff (GLACIAL TILL)		1-3-3 (6) 6"			
			5	1-3-5 (8) 17"		17	P200=54%
				3-3-5 (8) 18"			
			10	3-6-9 (15) 18"			
1040.8 11.5		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, medium to stiff (GLACIAL TILL)		3-5-7 (12) 18"	2.75		
			15	3-4-6 (10) 18"	2.5	15	P200=55%
				3-5-6 (11) 18"	3		
			20	3-6-7 (13) 18"	3		
			25	1-3-6 (9) 18"	2.5		

Continued on next page

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-24	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 262940	EASTING: 613521
Silver Lake, Minnesota				START DATE: 05/30/23	END DATE: 05/30/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Grass		WEATHER: Clear
SURFACE ELEVATION: 1052.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
		SANDY LEAN CLAY (CL), trace Gravel, gray, moist to wet, medium to stiff (GLACIAL TILL)					
			30	3-5-8 (13) 18"	3	15	
		layer of fine to coarse Sand					
			35	5-5-8 (13) 18"			
			40	3-4-6 (10) 18"	2.5	16	
			45	3-3-5 (8) 18"	2	17	
			50	4-7-8 (15) 18"	3.5		
1001.3		END OF BORING					Water observed at 35.0 feet while drilling.
51.0							

Boring then backfilled with bentonite grout

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-25		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 262526	EASTING: 613699	
Silver Lake, Minnesota					START DATE: 06/02/23	END DATE: 06/02/23	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear		
SURFACE ELEVATION: 1046.9 ft	RIG: 7516B	METHOD: 3 1/4" HSA					
Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1046.6 0.3		BITUMINOUS, 4 inches		AU			
1045.6 1.3		APPARENT AGGREGATE BASE, 12 inches					
		FILL: CLAYEY SAND (SC), fine to medium-grained, little Gravel, dark brown and brown, moist to wet		3-4-3 (7) 10"			
			5	1-2-3 (5) 6"			
				0-1-1 (2) 7"		18	
1037.9 9.0		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, medium to stiff (GLACIAL TILL)		3-3-4 (7) 13"		16	
				2-4-5-5 (9) 18"			
1032.4 14.5		END OF BORING	15				Water observed at 8.5 feet while drilling.
		Boring then backfilled with auger cuttings					Water observed at 10.0 feet at end of drilling.
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715					BORING: ST-26		
Geotechnical Evaluation					LOCATION: See attached sketch		
Silver Lake Street & Utility Improvements					DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)		
Various Streets					NORTHING: 263979	EASTING: 614086	
Silver Lake, Minnesota					START DATE: 06/05/23	END DATE: 06/05/23	
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACE ELEVATION: 1047.3 ft		RIG: 7516B	METHOD: 3 1/4" HSA	
			SURFACING: Bituminous		WEATHER: Clear		
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1047.1 0.2		BITUMINOUS, 2 1/2 inches APPARENT AGGREGATE BASE, 14 inches		AU			
1045.9 1.4		FILL: SANDY LEAN CLAY (CL), trace Gravel, black and dark brown, moist		3-3-4 (7) 12"			
1042.8 4.5		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)	5	2-2-3 (5) 10"			
				2-2-3 (5) 15"			
1036.3 11.0		END OF BORING	10	2-3-4 (7) 18"			
		Boring then backfilled with auger cuttings					Water not observed while drilling.
			15				
			20				
			25				

Project Number B2304715				BORING: ST-27	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263777	EASTING: 614312
Silver Lake, Minnesota				START DATE: 06/05/23	END DATE: 06/05/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1047.1 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1046.8 0.3		BITUMINOUS, 3 inches		AU			
1046.0 1.1		APPARENT AGGREGATE BASE, 11 1/2 inches					
		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist		6-5-3 (8) 12"			
1043.6 3.5		FILL: ORGANIC CLAY (OL), trace shells, black, wet	5	2-2-3 (5) 12"		42	
1039.6 7.5		SANDY LEAN CLAY (CL), trace Gravel, gray to grayish brown, moist, soft to stiff (GLACIAL TILL)		1-2-2 (4) 12"		23	
			10	1-2-3 (5) 18"			
				2-4-6-6 (10) 18"			
1032.6 14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2304715				BORING: ST-28	
Geotechnical Evaluation				LOCATION: See attached sketch	
Silver Lake Street & Utility Improvements				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
Various Streets				NORTHING: 263644	EASTING: 614117
Silver Lake, Minnesota				START DATE: 06/02/23	END DATE: 06/02/23
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 1050.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
1050.0		BITUMINOUS, 4 inches					
0.3		APPARENT AGGREGATE BASE, 8 inches		AU			
1049.3		FILL: CLAYEY SAND (SC), fine to medium-grained, little Gravel, dark brown, moist		3-3-3 (6) 14"		15	P200=34%
1046.3		FILL: SANDY LEAN CLAY (CL), trace Gravel, dark brown, moist	5	1-1-1 (2) 9"		23	
1043.8		SANDY LEAN CLAY (CL), trace Gravel, brown and gray, moist, medium (GLACIAL TILL)		2-3-3 (6) 18"		19	
			10	2-3-5 (8) 18"			
1038.3		SANDY LEAN CLAY (CL), trace Gravel, brown, moist, stiff (GLACIAL TILL)		3-6-7-12 (13) 18"			
1035.8		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: PZ-1	
				LOCATION: See attached sketch	
				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
				NORTHING: 263681	EASTING: 611103
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		WEATHER: Clear		
SURFACE ELEVATION: 1050.0 ft	RIG: 7516B	METHOD: 3 1/4" HSA		<input checked="" type="checkbox"/> During Drilling	
START DATE: 05/30/23	END DATE: 05/30/23	SURFACING: Grass		<input checked="" type="checkbox"/> After Drilling	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Recovery %	PID ppm	Temp. Well	Tests or Remarks
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">14.5</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">1</div> </div>	<input checked="" type="checkbox"/>					<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">14.5</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">1</div> </div>	<p>Temporary well installed to 14.5 feet</p> <p>1 inch PVC riser installed to 4 1/2 feet</p> <p>1 inch 10-slot PVC screen installed at 4 1/2 to 14 1/2 feet</p> <p>Water not observed at time of installation.</p> <p>Water observed at 6.7 feet when rechecked 24 hours after installation in temporary piezometer.</p> <p>Water observed at 6.7 feet when rechecked 48 hours after installation in temporary piezometer.</p> <p>Water observed at 6.7 feet when rechecked 72 hours after installation in temporary piezometer.</p> <p>Temporary well removed and backfilled at 72 hours.</p>
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">19</div> <div style="margin-bottom: 10px;">18</div> <div style="margin-bottom: 10px;">17</div> <div style="margin-bottom: 10px;">16</div> <div style="margin-bottom: 10px;">15</div> </div>							

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: PZ-2	
				LOCATION: See attached sketch	
				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
				NORTHING: 263326	EASTING: 612116
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		WEATHER: Clear		
SURFACE ELEVATION: 1058.7 ft	RIG: 7516B	METHOD: 3 1/4" HSA		<input checked="" type="checkbox"/> During Drilling	
START DATE: 05/30/23	END DATE: 05/30/23	SURFACING: Grass		<input checked="" type="checkbox"/> After Drilling	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Recovery %	PID ppm	Temp. Well	Tests or Remarks
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">16</div> <div style="margin-bottom: 10px;">17</div> <div style="margin-bottom: 10px;">18</div> <div style="margin-bottom: 10px;">19</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">30</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">16</div> <div style="margin-bottom: 10px;">17</div> <div style="margin-bottom: 10px;">18</div> <div style="margin-bottom: 10px;">19</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">30</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">16</div> <div style="margin-bottom: 10px;">17</div> <div style="margin-bottom: 10px;">18</div> <div style="margin-bottom: 10px;">19</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">30</div> </div>	<div style="display: flex; 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flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">16</div> <div style="margin-bottom: 10px;">17</div> <div style="margin-bottom: 10px;">18</div> <div style="margin-bottom: 10px;">19</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">21</div> <div style="margin-bottom: 10px;">22</div> <div style="margin-bottom: 10px;">23</div> <div style="margin-bottom: 10px;">24</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">26</div> <div style="margin-bottom: 10px;">27</div> <div style="margin-bottom: 10px;">28</div> <div style="margin-bottom: 10px;">29</div> <div style="margin-bottom: 10px;">30</div> </div>	<p>Temporary well installed to 14.5 feet</p> <p>1 inch PVC riser installed to 4 1/2 feet</p> <p>1 inch 10-slot PVC screen installed at 4 1/2 to 14 1/2 feet</p> <p>Water not observed at time of installation.</p> <p>Water observed at 6.3 feet when rechecked 24 hours after installation in temporary piezometer.</p> <p>Water observed at 6.3 feet when rechecked 72 hours after installation in temporary piezometer.</p> <p>Water observed at 6.4 feet when rechecked 48 hours after installation in temporary piezometer.</p> <p>Temporary well removed and backfilled at 72 hours.</p>	

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: PZ-3	
				LOCATION: See attached sketch	
				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
				NORTHING: 263566	EASTING: 612698
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		WEATHER: Clear		
SURFACE ELEVATION: 1067.3 ft	RIG: 7516B	METHOD: 3 1/4" HSA		<input checked="" type="checkbox"/> During Drilling	
START DATE: 05/30/23	END DATE: 05/30/23	SURFACING: Grass		<input checked="" type="checkbox"/> After Drilling	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Recovery %	PID ppm	Temp. Well	Tests or Remarks
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">14.5</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">13.5</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">12.5</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">11.5</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">10.5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">9.5</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">8.5</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">7.5</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">6.5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">5.5</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">4.5</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">3.5</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">2.5</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">1.5</div> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">0.5</div> <div style="margin-bottom: 10px;">0</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">14.5</div> <div style="margin-bottom: 10px;">14</div> <div style="margin-bottom: 10px;">13.5</div> <div style="margin-bottom: 10px;">13</div> <div style="margin-bottom: 10px;">12.5</div> <div style="margin-bottom: 10px;">12</div> <div style="margin-bottom: 10px;">11.5</div> <div style="margin-bottom: 10px;">11</div> <div style="margin-bottom: 10px;">10.5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">9.5</div> <div style="margin-bottom: 10px;">9</div> <div style="margin-bottom: 10px;">8.5</div> <div style="margin-bottom: 10px;">8</div> <div style="margin-bottom: 10px;">7.5</div> <div style="margin-bottom: 10px;">7</div> <div style="margin-bottom: 10px;">6.5</div> <div style="margin-bottom: 10px;">6</div> <div style="margin-bottom: 10px;">5.5</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">4.5</div> <div style="margin-bottom: 10px;">4</div> <div style="margin-bottom: 10px;">3.5</div> <div style="margin-bottom: 10px;">3</div> <div style="margin-bottom: 10px;">2.5</div> <div style="margin-bottom: 10px;">2</div> <div style="margin-bottom: 10px;">1.5</div> <div style="margin-bottom: 10px;">1</div> <div style="margin-bottom: 10px;">0.5</div> <div style="margin-bottom: 10px;">0</div> </div>	<div style="display: flex; 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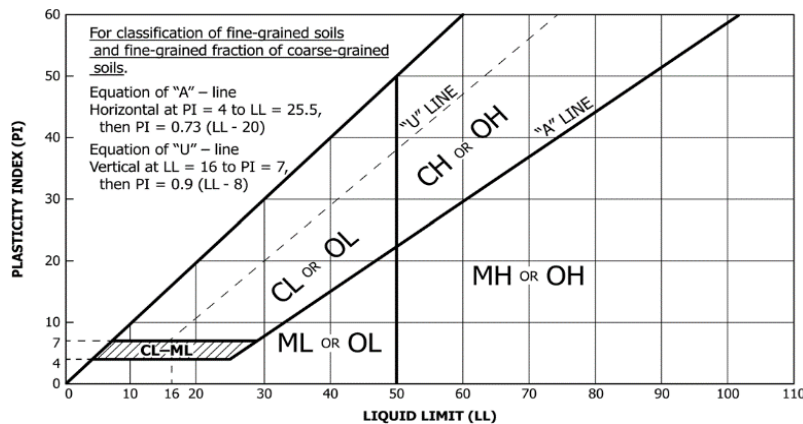
Environmental Boring Log - Not For Geotechnical Design

Project Number B2304715 Geotechnical Evaluation Silver Lake Street & Utility Improvements Various Streets Silver Lake, Minnesota				BORING: PZ-4	
				LOCATION: See attached sketch	
				DATUM: NAD 1983 HARN Adj MN McLeod (US Feet)	
				NORTHING: 262940	EASTING: 613528
DRILLER: D. Michalski	LOGGED BY: A. Hillerud		WEATHER: Clear		
SURFACE ELEVATION: 1051.8 ft	RIG: 7516B	METHOD: 3 1/4" HSA	<input checked="" type="checkbox"/> During Drilling 35.0 ft/Elev 1016.8 ft <input checked="" type="checkbox"/> After Drilling		
START DATE: 05/30/23	END DATE: 05/30/23	SURFACING: Grass			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Recovery %	PID ppm	Temp. Well	Tests or Remarks
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">0</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">40</div> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> <div style="margin-bottom: 10px;">55</div> </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">0</div> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">20</div> <div style="margin-bottom: 10px;">25</div> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">40</div> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> <div style="margin-bottom: 10px;">55</div> </div>						<p>Temporary well installed to 40 feet</p> <p>1 inch PVC riser installed to 30 feet</p> <p>1 inch 10-slot PVC screen installed 30 to 40 feet</p> <p>Water observed at 35 feet while drilling</p> <p>Water observed at 33.8 feet when rechecked 24 hours after installation in temporary piezometer.</p> <p>Water observed at 10.1 feet when rechecked 48 hours after installation in temporary piezometer.</p> <p>Water observed at 10.2 feet when rechecked 72 hours after installation in temporary piezometer.</p> <p>Temporary well removed and backfilled at 72 hours</p>

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A			Soil Classification		
			Group Symbol	Group Name ^B	
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines ^C)	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel ^E
		Gravels with Fines (More than 12% fines ^C)	$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3^D$)	GP	Poorly graded gravel ^E
			Fines classify as ML or MH	GM	Silty gravel ^{EFG}
		Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines ^H)	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW
	Sands with Fines (More than 12% fines ^H)		$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3^D$)	SP	Poorly graded sand ^I
			Fines classify as ML or MH	SM	Silty sand ^{FGI}
	Fines classify as CL or CH		SC	Clayey sand ^{FGI}	
	Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line ^J	CL
PI < 4 or plots below "A" line ^J				ML	Silt ^{KLM}
Organic			Liquid Limit - oven dried	OH	Organic clay ^{KLMN}
			Liquid Limit - not dried < 0.75		
Silts and Clays (Liquid limit 50 or more)		Inorganic	PI plots on or above "A" line	CH	Fat clay ^{KLM}
			PI plots below "A" line	MH	Elastic silt ^{KLM}
		Organic	Liquid Limit - oven dried	OH	Organic clay ^{KLMN}
			Liquid Limit - not dried < 0.75		
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat	

- A. Based on the material passing the 3-inch (75-mm) sieve.
- B. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- C. Gravels with 5 to 12% fines require dual symbols:
 GW-GM well-graded gravel with silt
 GW-GC well-graded gravel with clay
 GP-GM poorly graded gravel with silt
 GP-GC poorly graded gravel with clay
- D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
- E. If soil contains $\geq 15\%$ sand, add "with sand" to group name.
- F. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
- G. If fines are organic, add "with organic fines" to group name.
- H. Sands with 5 to 12% fines require dual symbols:
 SW-SM well-graded sand with silt
 SW-SC well-graded sand with clay
 SP-SM poorly graded sand with silt
 SP-SC poorly graded sand with clay
- I. If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
- J. If Atterberg limits plot in hatched area, soil is CL-ML, silty clay.
- K. If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
- L. If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
- M. If soil contains $\geq 30\%$ plus No. 200 predominantly gravel, add "gravelly" to group name.
- N. PI ≥ 4 and plots on or above "A" line.
- O. PI < 4 or plots below "A" line.
- P. PI plots on or above "A" line.
- Q. PI plots below "A" line.



DD Dry density, pcf	q_p Pocket penetrometer strength, tsf
WD Wet density, pcf	q_u Unconfined compression test, tsf
P200 % Passing #200 sieve	LL Liquid limit
MC Moisture content, %	PL Plastic limit
OC Organic content, %	PI Plasticity index

Particle Size Identification

- Boulders..... over 12"
- Cobbles..... 3" to 12"
- Gravel
 - Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
 - Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
- Sand
 - Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
 - Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
 - Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
- Silt..... No. 200 (0.075 mm) to .005 mm
- Clay..... < .005 mm

Relative Proportions^{L-M}

- trace..... 0 to 5%
- little..... 6 to 14%
- with..... $\geq 15\%$

Inclusion Thicknesses

- lens..... 0 to 1/8"
- seam..... 1/8" to 1"
- layer..... over 1"

Apparent Relative Density of Cohesionless Soils

- Very loose 0 to 4 BPF
- Loose 5 to 10 BPF
- Medium dense..... 11 to 30 BPF
- Dense..... 31 to 50 BPF
- Very dense..... over 50 BPF

Consistency of Cohesive Soils Blows Per Foot Approximate Unconfined Compressive Strength

- Very soft..... 0 to 1 BPF..... < 0.25 tsf
- Soft..... 2 to 4 BPF..... 0.25 to 0.5 tsf
- Medium..... 5 to 8 BPF..... 0.5 to 1 tsf
- Stiff..... 9 to 15 BPF..... 1 to 2 tsf
- Very Stiff..... 16 to 30 BPF..... 2 to 4 tsf
- Hard..... over 30 BPF..... > 4 tsf

Moisture Content:

- Dry:** Absence of moisture, dusty, dry to the touch.
- Moist:** Damp but no visible water.
- Wet:** Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (), at the end of drilling (), or at some time after drilling ().

Sample Symbols

Standard Penetration Test	Rock Core
Modified California (MC)	Thinwall (TW)/Shelby Tube (SH)
Auger	Texas Cone Penetrometer
Grab Sample	Dynamic Cone Penetrometer

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BID FORM FOR CONSTRUCTION CONTRACT

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to:
- A. Paper Submittal:
 - 1. **City of Silver Lake, 308 Main Street W, Silver Lake, MN 55381**
 - B. Electronic Submittal:
 - 1. [QuestCDN Online](#).
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid **and shall be uploaded via QuestCDN Online or attached to the paper bid submittal:**
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Required Bidder Qualification Statement with supporting data; ~~and~~
 - G. **If Bid amount exceeds \$10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplementary Conditions of the Construction Contract (EJCDC C-800);**
 - H. **If Bid amount exceeds \$25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions (AD-1048);**
 - I. **If Bid amount exceeds \$100,000, signed RD Instruction 1940-Q Exhibit A-1, Certification for Contracts, Grants, and Loans;"**
 - J. **RD 1900-D Guide 2;**
 - K. **Affidavit of Non-Collusion;**
 - L. **Verification of Compliance with Minnesota Statue 16C.285; and**

M. Certification of Compliance with Minnesota Statutes 363A.36.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Unit Price Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the prices as indicated on the [QuestCDN](#) Online Bid Worksheet. The Bid Worksheet is a part of and appurtenant to the Bid Form and Bid.
- B. Bidder will perform the following Work at the indicated unit prices for paper submittal:

UNIT PRICE BID

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
BASE BID						
STREET, CURB AND GUTTER, DRIVEWAYS, SIDEWALKS, SIGNS, PAVEMENT MARKINGS						
1	2021.501	MOBILIZATION	LUMP SUM	1.0	\$ _____	\$ _____
2	2101.502	CLEARING (15" TREE OR SMALLER)	TREE	10.0	\$ _____	\$ _____
3	2101.502	CLEARING (16" TREE OR LARGER)	TREE	43.0	\$ _____	\$ _____
4	2101.502	GRUBBING (15" TREE OR SMALLER)	TREE	10.0	\$ _____	\$ _____
5	2101.502	GRUBBING (16" TREE OR LARGER)	TREE	44.0	\$ _____	\$ _____
6	2101.505	CLEARING AND GRUBBING	ACRE	0.05	\$ _____	\$ _____
7	2104.502	REMOVE TENT TIEDOWNS	EACH	16.0	\$ _____	\$ _____
8	2104.502	REMOVE CONCRETE BOLLARD	EACH	2.0	\$ _____	\$ _____
9	2104.502	REMOVE SIGN	EACH	81.0	\$ _____	\$ _____
10	2104.502	SALVAGE SIGN	EACH	6.0	\$ _____	\$ _____
11	2104.502	REMOVE CONCRETE STEP (RISER)	EACH	24.0	\$ _____	\$ _____
12	2104.503	REMOVE CONCRETE CURB AND GUTTER	LIN FT	22,149.0	\$ _____	\$ _____
13	2104.503	REMOVE PIPE DRAIN (DRAIN TILE)	LIN FT	3,245.0	\$ _____	\$ _____
14	2104.503	REMOVE OR SALVAGE DRIVEWAY EDGING	LIN FT	151.0	\$ _____	\$ _____
15	2104.503	SALVAGE WOOD FENCE	LIN FT	89.0	\$ _____	\$ _____
16	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	1,422.0	\$ _____	\$ _____
17	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	210.0	\$ _____	\$ _____
18	2104.504	REMOVE CONCRETE WALK	SQ YD	10,533.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
19	2104.504	REMOVE BITUMINOUS PAVEMENT (P)	SQ YD	48,439.0	\$ _____	\$ _____
20	2104.505	REMOVE DRIVEWAY PAVEMENT	SQ YD	1,822.0	\$ _____	\$ _____
21	2104.618	SALVAGE BRICK PAVERS (WALK)	SQ FT	156.0	\$ _____	\$ _____
22	2105.504	GEOTEXTILE FABRIC, TYPE 7 (NON-WOVEN)	SQ YD	56,478.0	\$ _____	\$ _____
23	2105.604	TRIAXIAL GEOGRID	SQ YD	3,953.0	\$ _____	\$ _____
24	2105.507	COMMON EXCAVATION (EV) (P)	CU YD	66,741.0	\$ _____	\$ _____
25	2105.507	SUBGRADE EXCAVATION (EV)	CU YD	4,672.0	\$ _____	\$ _____
26	2105.507	SELECT GRANULAR BORROW (CV) (P)	CU YD	29,888.0	\$ _____	\$ _____
27	2112.519	SUBGRADE PREPARATION	RD ST	114.0	\$ _____	\$ _____
28	2118.509	AGGREGATE SURFACING, CLASS 5 (TEMPORARY)	TON	5,648.0	\$ _____	\$ _____
29	2118.509	AGGREGATE SURFACING, CLASS 5 (RESIDENTIAL DRIVEWAYS)	TON	62.0	\$ _____	\$ _____
30	2118.509	AGGREGATE SURFACING, CLASS 5 (LIFT STATION ACCESS ROADS)	TON	383.0	\$ _____	\$ _____
31	2123.610	MACHINE TIME	HOUR	42.0	\$ _____	\$ _____
32	2123.610	STREET SWEEPER (WITH BROOM PICKUP)	HOUR	282.0	\$ _____	\$ _____
33	2130.523	WATER (FOR DUST CONTROL)	MGAL	48.0	\$ _____	\$ _____
34	2130.523	WATER (FOR TURF ESTABLISHMENT)	MGAL	68.0	\$ _____	\$ _____
35	2211.507	AGGREGATE BASE, CLASS 5 (CV) (P)	CU YD	9,962.0	\$ _____	\$ _____
36	2215.504	FULL DEPTH RECLAMATION	SQ YD	363.0	\$ _____	\$ _____
37	2357.506	BITUMINOUS MATERIAL FOR TACK COAT (CSS-1H)	GAL	2,228.0	\$ _____	\$ _____
38	2360.504	TYPE SP 9.5 WEARING COURSE MIX (2,B) 4.0" THICK (SPWEA240B) (PATCHING)	SQ YD	61.0	\$ _____	\$ _____
39	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,B) 3.0" THICK (SPWEA240B) (DRIVEWAYS W/8" AGGREGATE BASE)	SY	569.0	\$ _____	\$ _____
40	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,B) 3.0" THICK (SPWEA240B) (TRAIL W/8" AGGREGATE BASE)	SY	665.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
41	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,C) (SPWEA240C)	TON	4,951.0	\$ _____	\$ _____
42	2360.509	TYPE SP 12.5 NON-WEARING COURSE MIX (2,B) (SPNWB230B)	TON	7,231.0	\$ _____	\$ _____
43	2451.507	AGGREGATE (GRANULAR) BACKFILL (CV)	CU YD	4,672.0	\$ _____	\$ _____
44	2502.503	4" PERF PIPE DRAIN W/GEOTEXTILE WRAP AND AGGREGATE MATERIAL	LIN FT	22,672.0	\$ _____	\$ _____
45	2502.602	CONNECT DRAINTILE TO EXISTING STRUCTURE (CORE DRILL)	EACH	8.0	\$ _____	\$ _____
46	2502.602	4" CLEANOUT (DRAIN TILE)	EACH	58.0	\$ _____	\$ _____
47	2502.602	SUMP PUMP SERVICE LINE	EACH	148.0	\$ _____	\$ _____
48	2521.518	4" CONCRETE WALK W/4" AGGREGATE BASE	SQ FT	31,542.0	\$ _____	\$ _____
49	2521.518	6" CONCRETE WALK W/4" AGGREGATE BASE (PEDESTRIAN RAMP)	SQ FT	5,767.0	\$ _____	\$ _____
50	2521.518	INSTALL SALVAGED OR NEW BRICK PAVERS (WALK)	SQ FT	125.0	\$ _____	\$ _____
51	2521.518	CONCRETE STEP (RISER)	EACH	6.0	\$ _____	\$ _____
52	2531.503	CONCRETE CURB & GUTTER, DESIGN B618	LIN FT	22,075.0	\$ _____	\$ _____
53	2531.503	CONCRETE CURB & GUTTER, DESIGN B618 (MOD)	LIN FT	1,210.0	\$ _____	\$ _____
54	2531.503	CONCRETE CURB & GUTTER, DESIGN B418 (MOD)	LIN FT	138.0	\$ _____	\$ _____
55	2531.503	CONCRETE CURB & GUTTER, DESIGN S418 (MOD)	LIN FT	133.0	\$ _____	\$ _____
56	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/6" AGGREGATE BASE (RESIDENTIAL)	SQ YD	2,744.0	\$ _____	\$ _____
57	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/12" AGGREGATE BASE (COMMERCIAL)	SQ YD	745.0	\$ _____	\$ _____
58	2531.603	INSTALL SALVAGED DRIVEWAY EDGING	LIN FT	88.0	\$ _____	\$ _____
59	2531.604	8" CONCRETE VALLEY GUTTER	SQ YD	47.0	\$ _____	\$ _____
60	2531.618	TRUNCATED DOMES	SQ FT	574.0	\$ _____	\$ _____
61	2540.602	RELOCATE MAILBOX SUPPORT	EACH	3.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
62	2554.502	INSTALL TENT TIEDOWNS	EACH	16.0	\$ _____	\$ _____
63	2557.603	INSTALL SALVAGED WOOD FENCE	LIN FT	22.0	\$ _____	\$ _____
64	2563.601	TRAFFIC CONTROL	LUMP SUM	1.0	\$ _____	\$ _____
65	2563.601	ALTERNATIVE PEDESTRIAN ROUTE	LUMP SUM	1.0	\$ _____	\$ _____
66	2564.502	INSTALL SALVAGED TYPE C SIGN	EACH	7.0	\$ _____	\$ _____
67	2564.502	INSTALL SIGN TYPE SPECIAL	EACH	30.0	\$ _____	\$ _____
68	2564.518	SIGN PANELS TYPE C	SQ FT	646.0	\$ _____	\$ _____
69	2564.601	FURNISH AND INSTALL PROJECT SIGN	LUMP SUM	1.0	\$ _____	\$ _____
70	2573.502	STABILIZED CONSTRUCTION EXIT	EACH	25.0	\$ _____	\$ _____
71	2573.503	SEDIMENT CONTROL LOG, TYPE WOOD FIBER	LIN FT	17,130.0	\$ _____	\$ _____
72	2575.604	TURF ESTABLISHMENT	SQ YD	30,600.0	\$ _____	\$ _____
73	2575.604	OVER-SEEDING	SQ YD	12,500.0	\$ _____	\$ _____
74	2575.607	SELECT TOPSOIL BORROW (LV)	CU YD	3,400.0	\$ _____	\$ _____
75	2575.609	LANDSCAPE ROCK	TON	30.0	\$ _____	\$ _____
76	2582.503	12" SOLID LINE PAINT, WHITE (CROSSWALK)	LIN FT	438.0	\$ _____	\$ _____
77	2582.503	4" BROKEN LINE PAINT, YELLOW (CENTERLINE)	LIN FT	80.0	\$ _____	\$ _____
78	2582.503	4" DOUBLE LINE PAINT, YELLOW (CENTERLINE)	LIN FT	68.0	\$ _____	\$ _____
79	2582.503	4" SOLID LINE PAINT, YELLOW (DROP OFF)	LIN FT	1,481.0	\$ _____	\$ _____
80	2582.503	12" SOLID LINE PAINT, YELLOW (NO PARKING)	LIN FT	1,528.0	\$ _____	\$ _____
81	2582.503	24" SOLID LINE PAINT, WHITE (STOP BAR)	LIN FT	133.0	\$ _____	\$ _____
82	2582.518	CROSSWALK BLOCKS PAINT, WHITE	SQ FT	432.0	\$ _____	\$ _____
Street, Curb and Gutter, Driveways, Sidewalks, Signs, Pavement Markings Subtotal					_____	_____
STORM SEWER						
83	2104.502	REMOVE STORM STRUCTURE (CATCH BASIN)	EACH	69.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
84	2104.502	REMOVE STORM STRUCTURE (MANHOLE)	EACH	27.0	\$ _____	\$ _____
85	2104.503	REMOVE PIPE SEWER (STORM)	LIN FT	69.0	\$ _____	\$ _____
86	2405.502	ADJUST FRAME AND RING CASTING (STORM)	EACH	27.0	\$ _____	\$ _____
87	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (STORM)	EACH	6,662.0	\$ _____	\$ _____
88	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	2.0	\$ _____	\$ _____
89	2501.502	12" STORM APRON	EACH	26.0	\$ _____	\$ _____
90	2501.502	30" STORM APRON	EACH	491.0	\$ _____	\$ _____
91	2503.503	6" STORM PIPE SEWER	LIN FT	1.0	\$ _____	\$ _____
92	2503.503	8" STORM PIPE SEWER	LIN FT	1.0	\$ _____	\$ _____
93	2503.503	12" STORM PIPE SEWER	LIN FT	15.0	\$ _____	\$ _____
94	2503.503	15" STORM PIPE SEWER	LIN FT	15.0	\$ _____	\$ _____
95	2503.503	18" STORM PIPE SEWER	LIN FT	4,024.0	\$ _____	\$ _____
96	2503.503	21" STORM PIPE SEWER	LIN FT	3,584.0	\$ _____	\$ _____
97	2503.503	24" STORM PIPE SEWER	LIN FT	773.0	\$ _____	\$ _____
98	2503.503	30" STORM PIPE SEWER	LIN FT	1,003.0	\$ _____	\$ _____
99	2503.602	CONNECT TO EXISTING STORM SEWER (PIPE)	EACH	445.0	\$ _____	\$ _____
100	2503.602	CONNECT TO EXISTING STORM SEWER (STRUCTURE)	EACH	16.0	\$ _____	\$ _____
101	2503.602	CONNECT TO EXISTING PIPE DRAIN (DRAIN TILE)	EACH	3.0	\$ _____	\$ _____
102	2503.602	CONNECT TO EXISTING PIPE DRAIN (SUMP PUMP)	EACH	11.0	\$ _____	\$ _____
103	2503.602	CONSTRUCT BULKHEAD (STORM)	EACH	22.0	\$ _____	\$ _____
104	2506.502	CASTING ASSEMBLY (STORM)	EACH	21.0	\$ _____	\$ _____
105	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	LIN FT	137.0	\$ _____	\$ _____
106	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 60-4020	LIN FT	214.0	\$ _____	\$ _____
107	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 72-4020	LIN FT	69.0	\$ _____	\$ _____
108	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 84-4020	LIN FT	10.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
109	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 96-4020	LIN FT	10.0	\$ _____	\$ _____
110	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL (TYPE 2)	LIN FT	10.0	\$ _____	\$ _____
111	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN H	LIN FT	490.0	\$ _____	\$ _____
112	2511.507	RANDOM RIPRAP CLASS III	CU YD	10.0	\$ _____	\$ _____
113	2573.502	STORM DRAIN INLET PROTECTION	EACH	25.0	\$ _____	\$ _____
114	2573.503	SILT FENCE	LIN FT	131.0	\$ _____	\$ _____
115	2573.503	FLOATATION SILT CURTAIN TYPE STILL	LIN FT	100.0	\$ _____	\$ _____
Storm Sewer Subtotal					_____	_____
SANITARY SEWER						
116	2104.502	REMOVE MANHOLE (SANITARY)	EACH	38.0	\$ _____	\$ _____
117	2104.503	REMOVE PIPE SEWER (SANITARY)	LIN FT	3,205.0	\$ _____	\$ _____
118	2104.603	ABANDON SANITARY SEWER PIPE (FILL WITH FLOWABLE FILL)	CU YD	27.0	\$ _____	\$ _____
119	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (SANITARY)	EACH	36.0	\$ _____	\$ _____
120	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	486.0	\$ _____	\$ _____
121	2503.601	SANITARY SEWER BYPASS	LUMP SUM	1.0	\$ _____	\$ _____
122	2503.602	CONNECT TO EXISTING SANITARY SEWER MAIN	EACH	16.0	\$ _____	\$ _____
123	2503.602	CONNECT TO EXISTING SANITARY SEWER MANHOLE	EACH	2.0	\$ _____	\$ _____
124	2503.602	CONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	150.0	\$ _____	\$ _____
125	2503.602	8" X 4" WYE	EACH	142.0	\$ _____	\$ _____
126	2503.602	8" X 6" WYE	EACH	1.0	\$ _____	\$ _____
127	2503.602	10" X 4" WYE	EACH	7.0	\$ _____	\$ _____
128	2503.602	VIDEO INSPECTION SEWER SERVICES (PRELIMINARY)	EACH	198.0	\$ _____	\$ _____
129	2503.602	CLEAN LATERAL	EACH	48.0	\$ _____	\$ _____
130	2503.602	SANITARY SEWER SPOT REPAIR	EACH	6.0	\$ _____	\$ _____
131	2503.602	CHEMICAL GROUT POINT REPAIR	EACH	11.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
132	2503.602	4" CURED-IN-PLACE SANITARY SEWER SERVICE PIPE	EACH	48.0	\$ _____	\$ _____
133	2503.602	CONSTRUCT BULKHEAD (SANITARY)	EACH	8.0	\$ _____	\$ _____
134	2503.603	MANHOLE LINER	LIN FT	52.0	\$ _____	\$ _____
135	2503.603	4" SANITARY SEWER SERVICE PIPE (OPEN CUT)	LIN FT	4,234.0	\$ _____	\$ _____
136	2503.603	6" SANITARY SEWER SERVICE PIPE (OPEN CUT)	LIN FT	45.0	\$ _____	\$ _____
137	2503.603	8" SANITARY SEWER PIPE (REGARDLESS OF DEPTH)	LIN FT	9,730.0	\$ _____	\$ _____
138	2503.603	10" SANITARY SEWER PIPE (REGARDLESS OF DEPTH)	LIN FT	892.0	\$ _____	\$ _____
139	2503.603	8" CURED-IN-PLACE-PIPE (CIPP)	LIN FT	252.0	\$ _____	\$ _____
140	2503.603	10" CURED-IN-PLACE-PIPE (CIPP)	LIN FT	2,279.0	\$ _____	\$ _____
141	2503.603	8" SANITARY SEWER FORCEMAIN (REGARDLESS OF DEPTH)	LIN FT	416.0	\$ _____	\$ _____
142	2504.604	4" POLYSTYRENE INSULATION (SANITARY)	SQ YD	1,039.0	\$ _____	\$ _____
143	2506.502	CASTING ASSEMBLY (SANITARY W/CONCEALED PICK HOLES)	EACH	40.0	\$ _____	\$ _____
144	2506.502	ADJUST FRAME AND RING CASTING (SANITARY)	EACH	6.0	\$ _____	\$ _____
145	2506.602	4" SANITARY SERVICE CLEANOUT	EACH	149.0	\$ _____	\$ _____
146	2506.602	6" SANITARY SERVICE CLEANOUT	EACH	1.0	\$ _____	\$ _____
147	2506.602	EXTERNAL MANHOLE SEAL (SANITARY)	EACH	40.0	\$ _____	\$ _____
148	2506.602	CONSTRUCT 8" INSIDE DROP	EACH	2.0	\$ _____	\$ _____
149	2506.603	CONSTRUCT SANITARY MANHOLE DESIGN 4007 - 48"	LIN FT	369.0	\$ _____	\$ _____
Sanitary Sewer Subtotal					_____	_____

WATER MAIN

150	2104.502	REMOVE GATE VALVE & BOX	EACH	53.0	\$ _____	\$ _____
151	2104.502	SALVAGE HYDRANT	EACH	22.0	\$ _____	\$ _____
152	2104.502	REMOVE YARD HYDRANT	EACH	1.0	\$ _____	\$ _____
153	2104.503	REMOVE WATER MAIN	LIN FT	12,210.0	\$ _____	\$ _____
154	2504.601	TEMPORARY WATER	LUMP SUM	1.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
155	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	25.0	\$ _____	\$ _____
156	2504.602	CONNECT TO EXISTING WATER SERVICE	EACH	147.0	\$ _____	\$ _____
157	2504.602	YARD HYDRANT	EACH	1.0	\$ _____	\$ _____
158	2504.602	HYDRANT (WATEROUS WB67-250)	EACH	26.0	\$ _____	\$ _____
159	2504.602	4" GATE VALVE AND BOX	EACH	9.0	\$ _____	\$ _____
160	2504.602	6" GATE VALVE AND BOX	EACH	63.0	\$ _____	\$ _____
161	2504.602	8" GATE VALVE AND BOX	EACH	14.0	\$ _____	\$ _____
162	2504.602	1" CORPORATION STOP W/SADDLE	EACH	145.0	\$ _____	\$ _____
163	2504.602	2" CORPORATION STOP W/SADDLE	EACH	2.0	\$ _____	\$ _____
164	2504.602	1" CURB STOP AND BOX	EACH	145.0	\$ _____	\$ _____
165	2504.602	2" CURB STOP AND BOX	EACH	2.0	\$ _____	\$ _____
166	2504.602	WATER MAIN OFFSET	EACH	10.0	\$ _____	\$ _____
167	2504.603	1" SERVICE PIPE W/TRACER WIRE	LIN FT	4,110.0	\$ _____	\$ _____
168	2504.603	2" SERVICE PIPE W/TRACER WIRE	LIN FT	248.0	\$ _____	\$ _____
169	2504.603	6" WATER MAIN W/TRACER WIRE	LIN FT	10,521.0	\$ _____	\$ _____
170	2504.603	8" WATER MAIN W/TRACER WIRE	LIN FT	2,055.0	\$ _____	\$ _____
171	2504.604	4" POLYSTYRENE INSULATION (WATER)	SQ YD	56.0	\$ _____	\$ _____
172	2504.608	WATER MAIN FITTINGS	LBS	8,560.0	\$ _____	\$ _____
173	2506.502	CASTING ASSEMBLY SPECIAL #1	EACH	18.0	\$ _____	\$ _____
Water Main Subtotal					_____	_____

Well Rehabilitation

174	1	WELL REMOVALS AND INSTALLS	LS	1.0	\$ _____	\$ _____
175	2	WELL #1 MOBILIZATION/DEMobilIZATION	LS	1.0	\$ _____	\$ _____
176	3	WELL #1 REMOVAL, INSPECTION, AND REINSTALLATION OF PUMP, MOTOR, AND DOWNHOLE EQUIPMENT	LS	1.0	\$ _____	\$ _____
177	4	WELL #1 INITIAL TELEVISIONING OF WELL	LS	1.0	\$ _____	\$ _____
178	5	WELL #1 1-1/4-INCH PVC STILLING TUBE	LS	1.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
179	6	WELL #1 6-INCH SCH 40 COLUMN PIPE	LF	100.0	\$ _____	\$ _____
180	7	WELL #1 NEW PUMP AND MOTOR	LS	1.0	\$ _____	\$ _____
181	8	WELL #1 CLEANING MOBILIZATION/DEMOBILIZATION	LS	1.0	\$ _____	\$ _____
182	9	WELL #1 WIRE BRUSH CLEANING OF CASING	LS	1.0	\$ _____	\$ _____
183	10	WELL #1 BAILING AND REMOVAL OF WASTE MATERIAL	CY	2.0	\$ _____	\$ _____
184	11	WELL #1 REPEAT TELEVISIONING OF WELL	LS	1.0	\$ _____	\$ _____
185	12	WELL #1 TESTING	LS	1.0	\$ _____	\$ _____
186	13	WELL #2 MOBILIZATION/DEMOBILIZATION	LS	1.0	\$ _____	\$ _____
187	14	WELL #2 REMOVAL, INSPECTION, AND REINSTALLATION OF PUMP, MOTOR, AND DOWNHOLE EQUIPMENT	LS	1.0	\$ _____	\$ _____
188	15	WELL #2 INITIAL TELEVISIONING OF WELL	LS	1.0	\$ _____	\$ _____
189	16	WELL #2 1-1/4-INCH PVC STILLING TUBE	LS	1.0	\$ _____	\$ _____
190	17	WELL #2 6-INCH SCH 40 COLUMN PIPE	LF	100.0	\$ _____	\$ _____
191	18	WELL #2 NEW PUMP AND MOTOR	LS	1.0	\$ _____	\$ _____
192	19	WELL #2 CLEANING MOBILIZATION/DEMOBILIZATION	LS	1.0	\$ _____	\$ _____
193	20	WELL #2 WIRE BRUSH CLEANING OF CASING	LS	1.0	\$ _____	\$ _____
194	21	WELL #2 BAILING AND REMOVAL OF WASTE MATERIAL	CY	2.0	\$ _____	\$ _____
195	22	WELL #2 REPEAT TELEVISIONING OF WELL	LS	1.0	\$ _____	\$ _____
196	23	WELL #2 TESTING	LS	1.0	\$ _____	\$ _____
Well Rehabilitation Subtotal					_____	_____
WASTEWATER POND REHABILITATION						
197	1	Pond Fence Removal	LF	4,300.0	\$ _____	\$ _____
198	2	Pond Vehicle Gate Removal	EA	1.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
199	3	Woven Wire Fencing	LF	4,300.0	\$ _____	\$ _____
200	4	Vehicle Gate	EA	1.0	\$ _____	\$ _____
201	5	Pedestrian Gate	EA	1.0	\$ _____	\$ _____
202	6	Security Signs	EA	8.0	\$ _____	\$ _____
Wastewater Pond Rehabilitation Subtotal					_____	_____

CLEVELAND LIFT STATION

203	1	Cleveland Lift Station	LS	1.0	\$ _____	\$ _____
Cleveland Lift Station Subtotal					_____	_____

MAIN LIFT STATION

204	1	Main Lift Station	LS	1.0	\$ _____	\$ _____
Main Lift Station Subtotal					_____	_____

ALLOWANCES

205	1	GENERAL PROVISIONS FOR ELECTRICAL SYSTEMS	LUMP SUM	1.0	\$5,000.00	\$5,000.00
206	2	WELL #1 PUMP AND MOTOR REPAIR	LUMP SUM	1.0	\$10,000.00	\$10,000.00
207	3	WELL #2 PUMP AND MOTOR REPAIR	LUMP SUM	1.0	\$10,000.00	\$10,000.00
Total Allowances						\$25,000.00
TOTAL BASE BID					_____	_____

ALTERNATE 1

STREET, CURB AND GUTTER, DRIVEWAYS, SIDEWALKS, SIGNS, PAVEMENT MARKINGS

208	2101.502	CLEARING (15" TREE OR SMALLER)	TREE	1.0	\$ _____	\$ _____
209	2101.502	CLEARING (16" TREE OR LARGER)	TREE	1.0	\$ _____	\$ _____
210	2101.502	GRUBBING (15" TREE OR SMALLER)	TREE	1.0	\$ _____	\$ _____
211	2101.502	GRUBBING (16" TREE OR LARGER)	TREE	1.0	\$ _____	\$ _____
212	2104.502	REMOVE SIGN	EACH	2.0	\$ _____	\$ _____
213	2104.502	REMOVE CONCRETE STEP (RISER)	EACH	2.0	\$ _____	\$ _____
214	2104.503	REMOVE CONCRETE CURB AND GUTTER	LIN FT	1,061.0	\$ _____	\$ _____
215	2104.503	REMOVE PIPE DRAIN (DRAIN TILE)	LIN FT	65.0	\$ _____	\$ _____
216	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	41.0	\$ _____	\$ _____
217	2104.504	REMOVE CONCRETE WALK	SQ YD	187.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
218	2104.504	REMOVE BITUMINOUS PAVEMENT (P)	SQ YD	2,399.0	\$ _____	\$ _____
219	2104.505	REMOVE DRIVEWAY PAVEMENT	SQ YD	100.0	\$ _____	\$ _____
220	2105.504	GEOTEXTILE FABRIC, TYPE 7 (NON-WOVEN)	SQ YD	2,673.0	\$ _____	\$ _____
221	2105.604	TRIAxIAL GEOGRID	SQ YD	187.0	\$ _____	\$ _____
222	2105.507	COMMON EXCAVATION (EV) (P)	CU YD	3,115.0	\$ _____	\$ _____
223	2105.507	SUBGRADE EXCAVATION (EV)	CU YD	218.0	\$ _____	\$ _____
224	2105.507	SELECT GRANULAR BORROW (CV) (P)	CU YD	1,681.0	\$ _____	\$ _____
225	2112.519	SUBGRADE PREPARATION	RD ST	5.0	\$ _____	\$ _____
226	2118.509	AGGREGATE SURFACING, CLASS 5 (TEMPORARY)	TON	267.0	\$ _____	\$ _____
227	2118.509	AGGREGATE SURFACING, CLASS 5 (RESIDENTIAL DRIVEWAYS)	TON	1.0	\$ _____	\$ _____
228	2123.610	MACHINE TIME	HOUR	3.0	\$ _____	\$ _____
229	2123.610	STREET SWEEPER (WITH BROOM PICKUP)	HOUR	13.0	\$ _____	\$ _____
230	2130.523	WATER (FOR DUST CONTROL)	MGAL	2.0	\$ _____	\$ _____
231	2130.523	WATER (FOR TURF ESTABLISHMENT)	MGAL	3.0	\$ _____	\$ _____
232	2211.507	AGGREGATE BASE, CLASS 5 (CV) (P)	CU YD	560.0	\$ _____	\$ _____
233	2357.506	BITUMINOUS MATERIAL FOR TACK COAT (CSS-1H)	GAL	108.0	\$ _____	\$ _____
234	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,C) (SPWEA240C)	TON	211.0	\$ _____	\$ _____
235	2360.509	TYPE SP 12.5 NON-WEARING COURSE MIX (2,B) (SPNWB230B)	TON	351.0	\$ _____	\$ _____
236	2451.507	AGGREGATE (GRANULAR) BACKFILL (CV)	CU YD	218.0	\$ _____	\$ _____
237	2502.503	4" PERF PIPE DRAIN W/GEOTEXTILE WRAP AND AGGREGATE MATERIAL	LIN FT	1,183.0	\$ _____	\$ _____
238	2502.602	4" CLEANOUT (DRAIN TILE)	EACH	2.0	\$ _____	\$ _____
239	2502.602	SUMP PUMP SERVICE LINE	EACH	14.0	\$ _____	\$ _____
240	2521.518	4" CONCRETE WALK W/4" AGGREGATE BASE	SQ FT	1,868.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
241	2521.518	6" CONCRETE WALK W/4" AGGREGATE BASE (PEDESTRIAN RAMP)	SQ FT	200.0	\$ _____	\$ _____
242	2521.518	CONCRETE STEP (RISER)	EACH	2.0	\$ _____	\$ _____
243	2531.503	CONCRETE CURB & GUTTER, DESIGN B618	LIN FT	1,096.0	\$ _____	\$ _____
244	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/6" AGGREGATE BASE (RESIDENTIAL)	SQ YD	160.0	\$ _____	\$ _____
245	2531.618	TRUNCATED DOMES	SQ FT	30.0	\$ _____	\$ _____
246	2540.602	RELOCATE MAILBOX SUPPORT	EACH	4.0	\$ _____	\$ _____
247	2564.502	INSTALL SALVAGED TYPE C SIGN	EACH	1.0	\$ _____	\$ _____
248	2564.502	INSTALL SIGN TYPE SPECIAL	EACH	2.0	\$ _____	\$ _____
249	2564.518	SIGN PANELS TYPE C	SQ FT	23.0	\$ _____	\$ _____
250	2573.502	STABILIZED CONSTRUCTION EXIT	EACH	2.0	\$ _____	\$ _____
251	2573.503	SEDIMENT CONTROL LOG, TYPE WOOD FIBER	LIN FT	810.0	\$ _____	\$ _____
252	2575.604	TURF ESTABLISHMENT	SQ YD	1,400.0	\$ _____	\$ _____
253	2575.604	OVER-SEEDING	SQ YD	600.0	\$ _____	\$ _____
254	2575.607	SELECT TOPSOIL BORROW (LV)	CU YD	156.0	\$ _____	\$ _____
255	2575.609	LANDSCAPE ROCK	TON	10.0	\$ _____	\$ _____
Street, Curb and Gutter, Driveways, Sidewalks, Signs, Pavement Markings Subtotal					_____	_____
STORM SEWER						
256	2104.502	REMOVE STORM STRUCTURE (CATCH BASIN)	EACH	5.0	\$ _____	\$ _____
257	2104.502	REMOVE STORM STRUCTURE (MANHOLE)	EACH	2.0	\$ _____	\$ _____
258	2104.503	REMOVE PIPE SEWER (STORM)	LIN FT	767.0	\$ _____	\$ _____
259	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (STORM)	EACH	4.0	\$ _____	\$ _____
260	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	35.0	\$ _____	\$ _____
261	2503.503	12" STORM PIPE SEWER	LIN FT	144.0	\$ _____	\$ _____
262	2503.503	18" STORM PIPE SEWER	LIN FT	293.0	\$ _____	\$ _____
263	2503.503	21" STORM PIPE SEWER	LIN FT	231.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
264	2503.503	24" STORM PIPE SEWER	LIN FT	33.0	\$ _____	\$ _____
265	2503.602	CONNECT TO EXISTING STORM SEWER (STRUCTURE)	EACH	1.0	\$ _____	\$ _____
266	2503.602	CONNECT TO EXISTING PIPE DRAIN (DRAIN TILE)	EACH	1.0	\$ _____	\$ _____
267	2503.602	CONSTRUCT BULKHEAD (STORM)	EACH	5.0	\$ _____	\$ _____
268	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	LIN FT	9.0	\$ _____	\$ _____
269	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 60-4020	LIN FT	19.0	\$ _____	\$ _____
270	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN H	LIN FT	19.0	\$ _____	\$ _____
271	2573.503	FLOATATION SILT CURTAIN TYPE STILL	LIN FT	10.0	\$ _____	\$ _____
Storm Sewer Subtotal					_____	_____
SANITARY SEWER						
272	2104.502	REMOVE MANHOLE (SANITARY)	EACH	2.0	\$ _____	\$ _____
273	2104.503	REMOVE PIPE SEWER (SANITARY)	LIN FT	15.0	\$ _____	\$ _____
274	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (SANITARY)	EACH	3.0	\$ _____	\$ _____
275	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	41.0	\$ _____	\$ _____
276	2503.602	CONNECT TO EXISTING SANITARY SEWER MAIN	EACH	4.0	\$ _____	\$ _____
277	2503.602	CONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	13.0	\$ _____	\$ _____
278	2503.602	8" X 4" WYE	EACH	13.0	\$ _____	\$ _____
279	2503.602	VIDEO INSPECTION SEWER SERVICES (PRELIMINARY & POST)	EACH	13.0	\$ _____	\$ _____
280	2503.603	4" SANITARY SEWER SERVICE PIPE (OPEN CUT)	LIN FT	338.0	\$ _____	\$ _____
281	2503.603	8" SANITARY SEWER PIPE (REGARDLESS OF DEPTH)	LIN FT	813.0	\$ _____	\$ _____
282	2504.604	4" POLYSTYRENE INSULATION (SANITARY)	SQ YD	3.0	\$ _____	\$ _____
283	2506.502	ADJUST FRAME AND RING CASTING (SANITARY)	EACH	13.0	\$ _____	\$ _____
284	2506.602	6" SANITARY SERVICE CLEANOUT	EACH	3.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
285	2506.602	CONSTRUCT 8" INSIDE DROP	EACH	21.0	\$ _____	\$ _____
Sanitary Sewer Subtotal						_____
WATER MAIN						
286	2104.502	REMOVE GATE VALVE & BOX	EACH	4.0	\$ _____	\$ _____
287	2104.502	SALVAGE HYDRANT	EACH	1.0	\$ _____	\$ _____
288	2104.503	REMOVE WATER MAIN	LIN FT	584.0	\$ _____	\$ _____
289	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	2.0	\$ _____	\$ _____
290	2504.602	CONNECT TO EXISTING WATER SERVICE	EACH	14.0	\$ _____	\$ _____
291	2504.602	HYDRANT (WATEROUS WB67-250)	EACH	3.0	\$ _____	\$ _____
292	2504.602	6" GATE VALVE AND BOX	EACH	1.0	\$ _____	\$ _____
293	2504.602	8" GATE VALVE AND BOX	EACH	4.0	\$ _____	\$ _____
294	2504.602	2" CORPORATION STOP W/SADDLE	EACH	14.0	\$ _____	\$ _____
295	2504.602	2" CURB STOP AND BOX	EACH	14.0	\$ _____	\$ _____
296	2504.603	2" SERVICE PIPE W/TRACER WIRE	LIN FT	396.0	\$ _____	\$ _____
297	2504.603	8" WATER MAIN W/TRACER WIRE	LIN FT	612.0	\$ _____	\$ _____
298	2506.502	CASTING ASSEMBLY SPECIAL #1	EACH	492.0	\$ _____	\$ _____
299	2506.502	CASTING ASSEMBLY SPECIAL #1	EACH	7.0	\$ _____	\$ _____
Water Main Subtotal						_____
TOTAL ALTERNATE 1						_____
ALTERNATE 2						
STREET, CURB AND GUTTER, DRIVEWAYS, SIDEWALKS, SIGNS, PAVEMENT MARKINGS						
300	2104.502	REMOVE SIGN	EACH	4.0	\$ _____	\$ _____
301	2104.503	REMOVE CONCRETE CURB AND GUTTER	LIN FT	2,227.0	\$ _____	\$ _____
302	2104.503	REMOVE OR SALVAGE DRIVEWAY EDGING	LIN FT	78.0	\$ _____	\$ _____
303	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	23.0	\$ _____	\$ _____
304	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	30.0	\$ _____	\$ _____
305	2104.504	REMOVE CONCRETE WALK	SQ YD	3.0	\$ _____	\$ _____
306	2104.504	REMOVE BITUMINOUS PAVEMENT (P)	SQ YD	3,652.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
307	2104.505	REMOVE DRIVEWAY PAVEMENT	SQ YD	184.0	\$ _____	\$ _____
308	2105.504	GEOTEXTILE FABRIC, TYPE 7 (NON-WOVEN)	SQ YD	4,325.0	\$ _____	\$ _____
309	2105.604	TRIAxIAL GEOGRID	SQ YD	303.0	\$ _____	\$ _____
310	2105.507	COMMON EXCAVATION (EV) (P)	CU YD	5,149.0	\$ _____	\$ _____
311	2105.507	SUBGRADE EXCAVATION (EV)	CU YD	360.0	\$ _____	\$ _____
312	2105.507	SELECT GRANULAR BORROW (CV) (P)	CU YD	2,167.0	\$ _____	\$ _____
313	2112.519	SUBGRADE PREPARATION	RD ST	11.0	\$ _____	\$ _____
314	2118.509	AGGREGATE SURFACING, CLASS 5 (TEMPORARY)	TON	432.0	\$ _____	\$ _____
315	2118.509	AGGREGATE SURFACING, CLASS 5 (RESIDENTIAL DRIVEWAYS)	TON	2.0	\$ _____	\$ _____
316	2123.610	MACHINE TIME	HOUR	4.0	\$ _____	\$ _____
317	2123.610	STREET SWEEPER (WITH BROOM PICKUP)	HOUR	22.0	\$ _____	\$ _____
318	2130.523	WATER (FOR DUST CONTROL)	MGAL	4.0	\$ _____	\$ _____
319	2130.523	WATER (FOR TURF ESTABLISHMENT)	MGAL	5.0	\$ _____	\$ _____
320	2211.507	AGGREGATE BASE, CLASS 5 (CV) (P)	CU YD	722.0	\$ _____	\$ _____
321	2357.506	BITUMINOUS MATERIAL FOR TACK COAT (CSS-1H)	GAL	167.0	\$ _____	\$ _____
322	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,B) 3.0" THICK (SPWEA240B) (DRIVEWAYS W/8" AGGREGATE BASE)	SY	5.0	\$ _____	\$ _____
323	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,C) (SPWEA240C)	TON	325.0	\$ _____	\$ _____
324	2360.509	TYPE SP 12.5 NON-WEARING COURSE MIX (2,B) (SPNWB230B)	TON	541.0	\$ _____	\$ _____
325	2451.507	AGGREGATE (GRANULAR) BACKFILL (CV)	CU YD	360.0	\$ _____	\$ _____
326	2502.503	4" PERF PIPE DRAIN W/GEOTEXTILE WRAP AND AGGREGATE MATERIAL	LIN FT	2,123.0	\$ _____	\$ _____
327	2502.602	4" CLEANOUT (DRAIN TILE)	EACH	4.0	\$ _____	\$ _____
328	2502.602	SUMP PUMP SERVICE LINE	EACH	15.0	\$ _____	\$ _____
329	2521.518	4" CONCRETE WALK W/4" AGGREGATE BASE	SQ FT	39.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
330	2531.503	CONCRETE CURB & GUTTER, DESIGN B618	LIN FT	2,088.0	\$ _____	\$ _____
331	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/6" AGGREGATE BASE (RESIDENTIAL)	SQ YD	276.0	\$ _____	\$ _____
332	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/12" AGGREGATE BASE (COMMERCIAL)	SQ YD	55.0	\$ _____	\$ _____
333	2531.604	8" CONCRETE VALLEY GUTTER	SQ YD	10.0	\$ _____	\$ _____
334	2564.502	INSTALL SIGN TYPE SPECIAL	EACH	2.0	\$ _____	\$ _____
335	2564.518	SIGN PANELS TYPE C	SQ FT	16.0	\$ _____	\$ _____
336	2573.502	STABILIZED CONSTRUCTION EXIT	EACH	2.0	\$ _____	\$ _____
337	2573.503	SEDIMENT CONTROL LOG, TYPE WOOD FIBER	LIN FT	1,600.0	\$ _____	\$ _____
338	2575.604	TURF ESTABLISHMENT	SQ YD	2,500.0	\$ _____	\$ _____
339	2575.604	OVER-SEEDING	SQ YD	1,000.0	\$ _____	\$ _____
340	2575.607	SELECT TOPSOIL BORROW (LV)	CU YD	278.0	\$ _____	\$ _____
Street, Curb and Gutter, Driveways, Sidewalks, Signs, Pavement Markings Subtotal					_____	_____
STORM SEWER						
341	2104.502	REMOVE STORM STRUCTURE (CATCH BASIN)	EACH	2.0	\$ _____	\$ _____
342	2104.503	REMOVE PIPE SEWER (STORM)	LIN FT	71.0	\$ _____	\$ _____
343	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	10.0	\$ _____	\$ _____
344	2501.502	12" STORM APRON	EACH	1.0	\$ _____	\$ _____
345	2503.503	12" STORM PIPE SEWER	LIN FT	209.0	\$ _____	\$ _____
346	2503.602	CONNECT TO EXISTING STORM SEWER (PIPE)	EACH	1.0	\$ _____	\$ _____
347	2503.602	CONNECT TO EXISTING PIPE DRAIN (SUMP PUMP)	EACH	1.0	\$ _____	\$ _____
348	2506.502	CASTING ASSEMBLY (STORM)	EACH	4.0	\$ _____	\$ _____
349	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48-4020	LIN FT	4.0	\$ _____	\$ _____
350	2506.503	CONSTRUCT DRAINAGE STRUCTURE DESIGN SPECIAL (TYPE 2)	LIN FT	10.0	\$ _____	\$ _____
351	2511.507	RANDOM RIPRAP CLASS III	CU YD	4.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
352	2573.502	STORM DRAIN INLET PROTECTION	EACH	8.0	\$ _____	\$ _____
		Storm Sewer Subtotal				
SANITARY SEWER						
353	2104.502	REMOVE MANHOLE (SANITARY)	EACH	3.0	\$ _____	\$ _____
354	2104.503	REMOVE PIPE SEWER (SANITARY)	LIN FT	994.0	\$ _____	\$ _____
355	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (SANITARY)	EACH	2.0	\$ _____	\$ _____
356	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	53.0	\$ _____	\$ _____
357	2503.602	CONNECT TO EXISTING SANITARY SEWER MAIN	EACH	2.0	\$ _____	\$ _____
358	2503.602	CONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	15.0	\$ _____	\$ _____
359	2503.602	8" X 4" WYE	EACH	15.0	\$ _____	\$ _____
360	2503.602	VIDEO INSPECTION SEWER SERVICES (PRELIMINARY)	EACH	15.0	\$ _____	\$ _____
361	2503.602	CONSTRUCT BULKHEAD (SANITARY)	EACH	1.0	\$ _____	\$ _____
362	2503.603	4" SANITARY SEWER SERVICE PIPE (OPEN CUT)	LIN FT	376.0	\$ _____	\$ _____
363	2503.603	8" SANITARY SEWER PIPE (REGARDLESS OF DEPTH)	LIN FT	1,057.0	\$ _____	\$ _____
364	2504.604	4" POLYSTYRENE INSULATION (SANITARY)	SQ YD	350.0	\$ _____	\$ _____
365	2506.502	CASTING ASSEMBLY (SANITARY W/CONCEALED PICK HOLES)	EACH	2.0	\$ _____	\$ _____
366	2506.602	4" SANITARY SERVICE CLEANOUT	EACH	15.0	\$ _____	\$ _____
367	2506.602	EXTERNAL MANHOLE SEAL (SANITARY)	EACH	2.0	\$ _____	\$ _____
368	2506.603	CONSTRUCT SANITARY MANHOLE DESIGN 4007 - 48"	LIN FT	12.0	\$ _____	\$ _____
		Sanitary Sewer Subtotal				
WATER MAIN						
369	2104.502	REMOVE GATE VALVE & BOX	EACH	4.0	\$ _____	\$ _____
370	2104.502	SALVAGE HYDRANT	EACH	2.0	\$ _____	\$ _____
371	2104.503	REMOVE WATER MAIN	LIN FT	1,027.0	\$ _____	\$ _____
372	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	2.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
373	2504.602	CONNECT TO EXISTING WATER SERVICE	EACH	15.0	\$ _____	\$ _____
374	2504.602	HYDRANT (WATEROUS WB67-250)	EACH	2.0	\$ _____	\$ _____
375	2504.602	6" GATE VALVE AND BOX	EACH	6.0	\$ _____	\$ _____
376	2504.602	1" CORPORATION STOP W/SADDLE	EACH	15.0	\$ _____	\$ _____
377	2504.602	1" CURB STOP AND BOX	EACH	15.0	\$ _____	\$ _____
378	2504.602	WATER MAIN OFFSET	EACH	1.0	\$ _____	\$ _____
379	2504.603	1" SERVICE PIPE W/TRACER WIRE	LIN FT	350.0	\$ _____	\$ _____
380	2504.603	6" WATER MAIN W/TRACER WIRE	LIN FT	1,026.0	\$ _____	\$ _____
381	2504.608	WATER MAIN FITTINGS	LBS	624.0	\$ _____	\$ _____
Water Main Subtotal					_____	_____
TOTAL ALTERNATE 2					_____	_____

ALTERNATE 3

STREET, CURB AND GUTTER, DRIVEWAYS, SIDEWALKS, SIGNS, PAVEMENT MARKINGS

382	2101.502	CLEARING (16" TREE OR LARGER)	TREE	2.0	\$ _____	\$ _____
383	2101.502	GRUBBING (16" TREE OR LARGER)	TREE	2.0	\$ _____	\$ _____
384	2104.502	REMOVE SIGN	EACH	2.0	\$ _____	\$ _____
385	2104.503	REMOVE CONCRETE CURB AND GUTTER	LIN FT	785.0	\$ _____	\$ _____
386	2104.503	SALVAGE CHAIN LINK FENCE	LIN FT	86.0	\$ _____	\$ _____
387	2104.503	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	68.0	\$ _____	\$ _____
388	2104.504	REMOVE CONCRETE WALK	SQ YD	19.0	\$ _____	\$ _____
389	2104.504	REMOVE BITUMINOUS PAVEMENT (P)	SQ YD	1,717.0	\$ _____	\$ _____
390	2104.505	REMOVE DRIVEWAY PAVEMENT	SQ YD	119.0	\$ _____	\$ _____
391	2105.504	GEOTEXTILE FABRIC, TYPE 7 (NON-WOVEN)	SQ YD	1,919.0	\$ _____	\$ _____
392	2105.604	TRIAxIAL GEOGRID	SQ YD	134.0	\$ _____	\$ _____
393	2105.507	COMMON EXCAVATION (EV) (P)	CU YD	2,329.0	\$ _____	\$ _____
394	2105.507	SUBGRADE EXCAVATION (EV)	CU YD	163.0	\$ _____	\$ _____
395	2105.507	SELECT GRANULAR BORROW (CV) (P)	CU YD	1,011.0	\$ _____	\$ _____
396	2112.519	SUBGRADE PREPARATION	RD ST	4.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
397	2118.509	AGGREGATE SURFACING, CLASS 5 (TEMPORARY)	TON	192.0	\$ _____	\$ _____
398	2118.509	AGGREGATE SURFACING, CLASS 5 (RESIDENTIAL DRIVEWAYS)	TON	11.0	\$ _____	\$ _____
399	2123.610	MACHINE TIME	HOUR	1.0	\$ _____	\$ _____
400	2123.610	STREET SWEEPER (WITH BROOM PICKUP)	HOUR	10.0	\$ _____	\$ _____
401	2130.523	WATER (FOR DUST CONTROL)	MGAL	2.0	\$ _____	\$ _____
402	2130.523	WATER (FOR TURF ESTABLISHMENT)	MGAL	2.0	\$ _____	\$ _____
403	2211.507	AGGREGATE BASE, CLASS 5 (CV) (P)	CU YD	337.0	\$ _____	\$ _____
404	2357.506	BITUMINOUS MATERIAL FOR TACK COAT (CSS-1H)	GAL	77.0	\$ _____	\$ _____
405	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,B) 3.0" THICK (SPWEA240B) (DRIVEWAYS W/8" AGGREGATE BASE)	SY	29.0	\$ _____	\$ _____
406	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2,C) (SPWEA240C)	TON	150.0	\$ _____	\$ _____
407	2360.509	TYPE SP 12.5 NON-WEARING COURSE MIX (2,B) (SPNWB230B)	TON	250.0	\$ _____	\$ _____
408	2451.507	AGGREGATE (GRANULAR) BACKFILL (CV)	CU YD	163.0	\$ _____	\$ _____
409	2502.503	4" PIPE DRAIN	LIN FT	797.0	\$ _____	\$ _____
410	2502.602	CONNECT DRAINTILE TO EXISTING STRUCTURE (CORE DRILL)	EACH	2.0	\$ _____	\$ _____
411	2502.602	4" CLEANOUT (DRAIN TILE)	EACH	2.0	\$ _____	\$ _____
412	2502.602	SUMP PUMP SERVICE LINE	EACH	8.0	\$ _____	\$ _____
413	2521.518	4" CONCRETE WALK W/4" AGGREGATE BASE	SQ FT	165.0	\$ _____	\$ _____
414	2531.503	CONCRETE CURB & GUTTER, DESIGN B618	LIN FT	785.0	\$ _____	\$ _____
415	2531.504	7" CONCRETE DRIVEWAY PAVEMENT W/6" AGGREGATE BASE (RESIDENTIAL)	SQ YD	143.0	\$ _____	\$ _____
416	2531.604	8" CONCRETE VALLEY GUTTER	SQ YD	18.0	\$ _____	\$ _____
417	2557.603	INSTALL SALVAGED CHAIN LINK FENCE	LIN FT	86.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
418	2564.502	INSTALL SIGN TYPE SPECIAL	EACH	1.0	\$ _____	\$ _____
419	2564.518	SIGN PANELS TYPE C	SQ FT	6.0	\$ _____	\$ _____
420	2573.502	STABILIZED CONSTRUCTION EXIT	EACH	2.0	\$ _____	\$ _____
421	2573.503	SEDIMENT CONTROL LOG, TYPE WOOD FIBER	LIN FT	610.0	\$ _____	\$ _____
422	2575.604	TURF ESTABLISHMENT	SQ YD	2,400.0	\$ _____	\$ _____
423	2575.604	OVER-SEEDING	SQ YD	1,000.0	\$ _____	\$ _____
424	2575.607	SELECT TOPSOIL BORROW (LV)	CU YD	267.0	\$ _____	\$ _____
Street, Curb and Gutter, Driveways, Sidewalks, Signs, Pavement Markings Subtotal					_____	_____
STORM SEWER						
425	2503.602	CONNECT TO EXISTING PIPE DRAIN (SUMP PUMP)	EACH	1.0	\$ _____	\$ _____
426	2573.502	STORM DRAIN INLET PROTECTION	EACH	4.0	\$ _____	\$ _____
Storm Sewer Subtotal					_____	_____
SANITARY SEWER						
427	2104.502	REMOVE MANHOLE (SANITARY)	EACH	1.0	\$ _____	\$ _____
428	2104.503	REMOVE PIPE SEWER (SANITARY)	LIN FT	318.0	\$ _____	\$ _____
429	2405.502	ADJUSTING METAL RING FOR MANHOLE CASTING (SANITARY)	EACH	2.0	\$ _____	\$ _____
430	2451.609	CRUSHED ROCK (PIPE FOUNDATION) MNDOT 3149.2G2	TON	29.0	\$ _____	\$ _____
431	2503.602	CONNECT TO EXISTING SANITARY SEWER MAIN	EACH	2.0	\$ _____	\$ _____
432	2503.602	CONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	9.0	\$ _____	\$ _____
433	2503.602	8" X 4" WYE	EACH	9.0	\$ _____	\$ _____
434	2503.602	VIDEO INSPECTION SEWER SERVICES (PRELIMINARY)	EACH	9.0	\$ _____	\$ _____
435	2503.602	CONSTRUCT BULKHEAD (SANITARY)	EACH	1.0	\$ _____	\$ _____
436	2503.603	4" SANITARY SEWER SERVICE PIPE (OPEN CUT)	LIN FT	245.0	\$ _____	\$ _____
437	2503.603	8" SANITARY SEWER PIPE (REGARDLESS OF DEPTH)	LIN FT	590.0	\$ _____	\$ _____
438	2504.604	4" POLYSTYRENE INSULATION (SANITARY)	SQ YD	322.0	\$ _____	\$ _____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
439	2506.502	CASTING ASSEMBLY (SANITARY W/CONCEALED PICK HOLES)	EACH	2.0	\$ _____	\$ _____
440	2506.502	ADJUST FRAME AND RING CASTING (SANITARY)	EACH	1.0	\$ _____	\$ _____
441	2506.602	4" SANITARY SERVICE CLEANOUT	EACH	9.0	\$ _____	\$ _____
442	2506.602	EXTERNAL MANHOLE SEAL (SANITARY)	EACH	2.0	\$ _____	\$ _____
443	2506.603	CONSTRUCT SANITARY MANHOLE DESIGN 4007 - 48"	LIN FT	9.0	\$ _____	\$ _____
Sanitary Sewer Subtotal					_____	_____

WATER MAIN

444	2104.502	REMOVE GATE VALVE & BOX	EACH	1.0	\$ _____	\$ _____
445	2104.502	SALVAGE HYDRANT	EACH	2.0	\$ _____	\$ _____
446	2104.503	REMOVE WATER MAIN	LIN FT	724.0	\$ _____	\$ _____
447	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	2.0	\$ _____	\$ _____
448	2504.602	CONNECT TO EXISTING WATER SERVICE	EACH	12.0	\$ _____	\$ _____
449	2504.602	HYDRANT (WATEROUS WB67-250)	EACH	2.0	\$ _____	\$ _____
450	2504.602	6" GATE VALVE AND BOX	EACH	6.0	\$ _____	\$ _____
451	2504.602	1" CORPORATION STOP W/SADDLE	EACH	12.0	\$ _____	\$ _____
452	2504.602	1" CURB STOP AND BOX	EACH	12.0	\$ _____	\$ _____
453	2504.603	1" SERVICE PIPE W/TRACER WIRE	LIN FT	278.0	\$ _____	\$ _____
454	2504.603	6" WATER MAIN W/TRACER WIRE	LIN FT	715.0	\$ _____	\$ _____
455	2504.608	WATER MAIN FITTINGS	LBS	518.0	\$ _____	\$ _____
456	2506.502	CASTING ASSEMBLY SPECIAL #1	EACH	3.0	\$ _____	\$ _____
Water Main Subtotal					_____	_____

TOTAL ALTERNATE 3

ALTERNATE 4

STREET, CURB AND GUTTER, DRIVEWAYS, SIDEWALKS, SIGNS, PAVEMENT MARKINGS

457	2360.504	TYPE SP 9.5 WEARING COURSE MIX (2,B) 4.0" THICK (SPWEA240B) (PATCHING)	SQ YD	20.0	\$ _____	\$ _____
Street, Curb and Gutter, Driveways, Sidewalks, Signs, Pavement Markings Subtotal					_____	_____

Line Item	Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Bid Price
SANITARY SEWER						
458	2503.602	VIDEO INSPECTION SEWER SERVICES (PRELIMINARY)	EACH	16.0	\$ _____	\$ _____
459	2503.602	CLEAN LATERAL	EACH	16.0	\$ _____	\$ _____
460	2503.602	SANITARY SEWER SPOT REPAIR	EACH	2.0	\$ _____	\$ _____
461	2503.602	CHEMICAL GROUT POINT REPAIR	EACH	4.0	\$ _____	\$ _____
462	2503.602	4" CURED-IN-PLACE SANITARY SEWER SERVICE PIPE	EACH	16.0	\$ _____	\$ _____
463	2503.603	MANHOLE LINER	LIN FT	32.0	\$ _____	\$ _____
464	2503.603	8" CURED-IN-PLACE-PIPE (CIPP)	LIN FT	860.0	\$ _____	\$ _____
Sanitary Sewer Subtotal					_____	_____
TOTAL ALTERNATE 4					_____	_____
ALTERNATE 5						
465	1	Metering Manhole	LUMP SUM	1.0	\$ _____	\$ _____
TOTAL ALTERNATE 5					_____	_____
ALTERNATE 6						
466	1	Primary Pond Control Structure	LUMP SUM	1.0	\$ _____	\$ _____
TOTAL ALTERNATE 6					_____	_____

C. Bidder acknowledges that:

- each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
- estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

3.02 ~~Total Bid Price (Lump Sum and Unit Prices)~~

Total Bid Price (Total of all Lump Sum and Unit Price Bids)	\$ _____
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ARTICLE 4—DELETE. BASIS OF BID—COST PLUS FEE

4.01 ~~The Contract Price will be the Cost of the Work, determined as provided in Paragraph 13.01 of the General Conditions, together with the following fee, and subject to the Guaranteed Maximum Price.~~

4.02 Deleted. *Contractor's Fee*

- A. Contractor's fee will be **[number]** percent of the Cost of the Work. No fee will be payable on the basis of costs itemized as excluded in Paragraph 13.01.C of the General Conditions.
1. The maximum amount payable by Owner as a percentage fee (Guaranteed Maximum Fee) will not exceed **\$(insert cap amount)**, subject to increases or decreases for changes in the Work.
- B. Contractor's fee will be determined by applying the following percentages to the various portions of the Cost of the Work as defined in Article 13 of the General Conditions. No fee will be payable on the basis of costs itemized as excluded in Paragraph 13.01.C of the General Conditions:

Costs	Percent
Payroll costs (See Paragraph 13.01.B.1, General Conditions)	
Materials and Installed Equipment cost (GC 13.01.B.2)	
Amounts to be paid to Subcontractors (GC 13.01.B.3)	
Amount to be paid to special consultants (GC 13.01.B.4)	
Other costs (GC 13.01.B.5)	

1. The maximum amount payable by Owner as a percentage fee (Guaranteed Maximum Fee) will not exceed **\$(insert cap amount)**, subject to increases or decreases for changes in the Work.
- C. Contractor's fee will be the fixed sum of **\$(number)**.

4.03 Deleted. *Guaranteed Maximum Price*

- A. The Guaranteed Maximum Price to Owner of the Cost of the Work including Contractor's Fee will not exceed **\$(Bidder fill in GMP)**.

ARTICLE 5—DELETED. PRICE PLUS TIME BID

5.01 Deleted. *Price Plus Time Contract Award (Stipulated Price Contract)*

- A. The Bidder to which an award of the Contract will be made will be determined in part on the basis of the Total Bid Price and the total number of calendar days to substantially complete the Work, in accordance with the following:

	Description		Amount
A	1. Total Bid Price		\$(number)
	2. Total number of calendar days to substantially complete the Work	[number] days	
	3. Liquidated Damages Rate (from Agreement)	\$(number)/day	
B	4. Adjustment Amount (2 x 3)		\$(number)
A+B	5. Amount for Comparison of Bids		\$(number)

- B. The purpose of the process in the table above is only to calculate the lowest price-plus-time (A+B) bid amount for bid comparison purposes. The price for completion of the Work (the Contract Price) is the Total Bid Price.

~~C. Bonds required under Paragraph 6.01 of the General Conditions will be based on the Contract Price.~~

5.02 ~~Deleted. Price Plus Time Contract Award (Cost Plus Fee with Guaranteed Maximum Price Contract)~~

~~A. The Bidder to which an award of Contract will be made will be determined in part on the basis of the Guaranteed Maximum Price and the total number of calendar days to substantially complete the Work, in accordance with the following:~~

	Description		Amount
A	1. Guaranteed Maximum Price		\$(number)
	2. Total number of calendar days to substantially complete the Work	[number] days	
	3. Liquidated Damages Rate (from Agreement)	\$(number)/day	
B	4. Adjustment Amount (2 x 3)		\$(number)
A+B	5. Amount for Comparison of Bids		\$(number)

~~B. The purpose of the process in the table above is only to calculate the lowest price plus time (A+B) bid amount for bid comparison purposes. The price for completion of the Work (the Contract Price) is based on the cost of the Work, plus a fee, subject to a guaranteed maximum price, as set forth in the Agreement.~~

~~C. Bonds required under Paragraph 6.01 of the General Conditions will be based on the Contract Price.~~

ARTICLE 6—TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 ~~Deleted. Bidder agrees that the Work will be substantially complete on or before [Bidder inserts date], and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before [Bidder inserts date].~~

6.03 ~~Deleted. Bidder agrees that the Work will be substantially complete within [Bidder inserts number] calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within [Bidder inserts number] calendar days after the date when the Contract Times commence to run.~~

6.04 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

7.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

7.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

7.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 8—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

8.01 *Bidder’s Representations*

- A. In submitting this Bid, Bidder represents the following:
 - 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 - 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - 3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work, **including all American Iron and Steel requirements.**
 - 4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 - 5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 - 6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
 - 7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

8.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.: (if applicable) _____

BID BOND (PENAL SUM FORM)

Bidder Name: Address <i>(principal place of business)</i> :	Surety Name: Address <i>(principal place of business)</i> :
Owner Name: City of Silver Lake, Minnesota Address <i>(principal place of business)</i> : 308 Main Street W Silver Lake, MN 55381	Bid Project <i>(name and location)</i> : Silver Lake Infrastructure Improvements Project Silver Lake, Minnesota Bid Due Date:
Bond Penal Sum: Date of Bond:	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

COMPLIANCE STATEMENT

This statement relates to a proposed contract with _____

(Name of borrower or grantee)

who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor, I represent that:

1. I have, have not, participated in a previous contract or subcontract subject to Executive Order 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract, I have, have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.
 If the proposed contract is for \$50,000 or more: or If the proposed nonconstruction contract is for \$50,000 or more and I have 50 or more employees, I also represent that:
3. I have, have not previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.
4. If I have participated in such a contract or subcontract, I have, have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

I understand that if I have failed to file any compliance reports that have been required of me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS or RUS, or to the office where the reports are required to be filed.

I also certify that I do not maintain or provide for my employees any segregated facilities at any of my establishments, and that I do not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I certify further that I will not maintain or provide for my employees any segregated facilities at any of my establishments, and that I will not permit my employees to perform their services at any location, under my control, where segregated facilities are maintained. I agree that a breach of this certification is a violation of the Equal Opportunity clause in my contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and wash rooms, restaurants and other eating areas time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. I further agree that (except where I have obtained identical certifications for proposed subcontractors for specific time periods) I will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that I will retain such certifications in my files; and that I will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays the valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENTS FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A certification of Nonsegregated Facilities, as required by the May 9, 1967, order (32F.R. 7439, may 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$ 10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

DATE _____

(Signature of Bidder or Prospective Contractor)

Address (including Zip Code)



**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
 Lower Tier Covered Transactions**

The following statement is made in accordance with the Privacy Act of 1974 (5 U.S.C. § 552a, as amended). This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, and 2 CFR §§ 180.300, 180.335, Participants' responsibilities. The regulations were amended and published on August 31, 2005, in 70 Fed. Reg. 51865-51880. Copies of the regulations may be obtained by contacting the Department of Agriculture agency offering the proposed covered transaction.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0505-0027. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The provisions of appropriate criminal or civil fraud, privacy, and other statutes may be applicable to the information provided.

(Read instructions on page two before completing certification.)

- A. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency;
- B. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

ORGANIZATION NAME	PR/AWARD NUMBER OR PROJECT NAME
NAME(S) AND TITLE(S) OF AUTHORIZED REPRESENTATIVE(S)	
SIGNATURE	DATE

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint](#) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

Instructions for Certification

- (1) By signing and submitting this form, the prospective lower tier participant is providing the certification set out on page 1 in accordance with these instructions.
- (2) The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the Department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.
- (3) The prospective lower tier participant must provide immediate written notice to the person(s) to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- (4) The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549, at 2 CFR Parts 180 and 417. You may contact the Department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.
- (5) The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it may not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the Department or agency with which this transaction originated.
- (6) The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- (7) A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the General Services Administration's System for Award Management Exclusions database.
- (8) Nothing contained in the foregoing shall be construed to require establishment of a system of records to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- (9) Except for transactions authorized under paragraph (5) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the Department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant or Federal loan, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant or loan.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant or loan, the undersigned shall complete and submit Standard Form - LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including contracts, subcontracts, and subgrants under grants and loans) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(name)

(date)

(title)

oOo

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Bidder / Quoter / Contractor Conflict of Interest Certification

Certification: This is to certify that _____ (Bidder/Quoter/Contractor name) hereby declares no direct or indirect conflict of interest exists with the Owner or USDA Rural Development regarding financial interests. If an owner or officer of the Bidder/Quoter/Contractor, or a relative or close associate thereof, is an elected or appointed official or employee of the Owner or of USDA Rural Development, Bidder/Quoter/Contractor shall submit with the Bid/Quote written identification of its owners, officers, or relatives or close associates thereof who may create a conflict of interest regarding financial interests.

Complete one of the following:

1. Potential or planned transactions related to the use of Federal Funds that may constitute or present the appearance of personal or organizational conflict of interest for this project or contract are:

(Attach additional information as needed.)

2. There are no conflicts of interest, either personal or organizational anticipated for this contract.

Date: _____ Signature: _____

(Bidder/Quoter/Contractor authorized signer)

Printed Name: _____

Title: _____

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LIST OF PROPOSED SUBCONTRACTORS

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Type of Construction _____

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LIST OF PROPOSED SUPPLIERS

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

Company _____ Telephone No. _____
Name of Contact _____
Address _____
Material/Equipment to be Supplied _____

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AFFIDAVIT OF NON-COLLUSION

STATE OF _____

COUNTY OF _____

I Hereby swear (or affirm) under the penalty of perjury:

- 1) That I am the bidder (if the bidder is an individual), a partner in the bidder (if the bidder is a partnership) or an officer or employee of the bidder corporation having authority to sign on its behalf (if the bidder is a corporation);
- 2) That the attached bid or bids have been arrived at by the bidder individually and have been submitted without collusion with, and without any agreement, understanding or planned common course of action with any other vendor of materials, supplies, equipment or services described in the invitation to bid designed to limit individual bidding or competition;
- 3) That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids, and will not be communicated to any such person, prior to any official opening of the bid or bids; and
- 4) That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Subscribed and sworn to before me this
_____ day of _____, 20____

Bidder's Signature

Notary

Title

(Seal)

Company

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**VERIFICATION OF COMPLIANCE
WITH MN STATUTES 16C.285**

State of Minnesota – Responsible Contractor Requirement (for responses in excess of \$50,000 only)

Minnesota Statute 16C.285, subdivision 7, **IMPLEMENTATION.** ... any prime contractor or subcontractor or motor carrier that does not meet the minimum criteria in subdivision 3 or fails to verify that it meets those criteria is not a responsible contractor and is not eligible to be awarded a construction contract for the project or to perform work on the project... *It is your sole responsibility to provide this information at the due date and time of the bid.*

Minnesota Statute 16C.285, subdivision 3, **RESPONSIBLE CONTRACTOR, MINIMUM CRITERIA.** “Responsible Contractor” means a contractor that conforms to the responsibility requirements in the solicitation document for its portion of the work on the project and verifies that it meets the following minimum criteria:

Your response will be rejected unless:

(1) The Contractor:

- (i) is in compliance with workers' compensation and unemployment insurance requirements;
- (ii) is in compliance with Department of Revenue and Department of Employment and Economic Development registration requirements if it has employees;
- (iii) has a valid federal tax identification number or a valid Social Security number if an individual;
- (iv) has filed a certificate of authority to transact business in Minnesota with the secretary of state if a foreign corporation or cooperative;

Your response will be rejected unless:

(2) The Contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 177.24, 177.25, 177.41 to 177.44, 181.13, 181.14, or 181.722, and has not violated United States Code, title 29, sections 201 to 219, or United States Code, title 40, sections 3141 to 3148. For purposes of this clause, a violation occurs when a contractor or related entity:

- (i) repeatedly fails to pay statutorily required wages or penalties on one or more separate projects for a total underpayment of \$25,000 or more within the three-year period, provided that a failure to pay is “repeated” only if it involves two or more separate and distinct occurrences of underpayment during a three year period;
- (ii) has been issued an order to comply by the commissioner of labor and industry that has become final;
- (iii) has been issued at least two determination letters within the three-year period by the Department of Transportation finding an underpayment by the contractor or related entity to its own employees;
- (iv) has been found by the commissioner of labor and industry to have repeatedly or willfully violated any of the sections referenced in this clause pursuant to section 177.27;
- (v) has been issued a ruling or findings of underpayment by the administrator of the Wage and Hour Division of the United States Department of Labor that have become final or have been upheld by an administrative law judge or the Administrative Review Board; or
- (vi) has been found liable for underpayment of wages or penalties or misrepresenting a construction worker as an independent contractor in an action brought in a court having jurisdiction. Provided that, if the contractor or related entity contests a determination of underpayment by the Department of Transportation in a contested case proceeding, a violation does not occur until the contested case proceeding has concluded with a determination that the contractor or related entity underpaid wages or penalties; *

- (3) the Contractor or related entity is in compliance with and, during the three-year period before submitting the verification, has not violated section 181.723 or chapter 326B. For purposes of this clause, a violation occurs when a contractor or related entity has been issued a final administrative or licensing order; *
 - (4) the Contractor or related entity has not, more than twice during the three-year period before submitting the verification, had a certificate of compliance under section 363A.36 revoked or suspended based on the provisions of section 363A.36, with the revocation or suspension becoming final because it was upheld by the Office of Administrative Hearings or was not appealed to the office; *
 - (5) the Contractor or related entity has not received a final determination assessing a monetary sanction from the Department of Administration or Transportation for failure to meet targeted group business, disadvantaged business enterprise, or veteran-owned business goals, due to a lack of good faith effort, more than once during the three-year period before submitting the verification; *
- * Any violations, suspensions, revocations, or sanctions, as defined in clauses (2) to (5), occurring prior to July 1, 2014, shall not be considered in determining whether a contractor or related entity meets the minimum criteria.
- (6) the Contractor or related entity is not currently suspended or debarred by the federal government or the state of Minnesota or any of its departments, commissions, agencies, or political subdivisions that have authority to debar a contractor; and
 - (7) Check if all subcontractors that the contractor intends to use to perform project work have verified to the contractor through a signed statement under oath by an owner or officer that they meet the minimum criteria listed in clauses (1) to (6).

Minn. Stat. 16C.285, Subd. 5. SUBCONTRACTOR VERIFICATION

A Prime Contractor or subcontractor shall include in its verification of compliance under subdivision 4 a list of all of its first-tier subcontractors that it intends to retain for work on the project.

Prior to execution of a construction contract, and as a condition precedent to the execution of a construction contract, the apparent successful prime contractor shall submit to the contracting authority a supplemental verification under oath confirming compliance with subdivision 3, clause (7). Each contractor or subcontractor shall obtain from all subcontractors with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each subcontractor.

If a prime contractor or any subcontractor retains additional subcontractors on the project after submitting its verification of compliance, the prime contractor or subcontractor shall obtain verifications of compliance from each additional subcontractor with which it has a direct contractual relationship and shall submit a supplemental verification confirming compliance with subdivision 3, clause (7), within 14 days of retaining the additional subcontractors.

A prime contractor shall submit to the contracting authority upon request copies of the signed verifications of compliance from all subcontractors of any tier pursuant to subdivision 3, clause (7). A prime contractor and subcontractors shall not be responsible for the false statements of any subcontractor with which they do not have a direct contractual relationship. A prime contractor and subcontractors shall be responsible for false statements by their first-tier with which they have a direct contractual relationship only if they accept the verification of compliance with actual knowledge that it contains a false statement.

Minn. Stat. 16C.285, Subd. 5a. MOTOR CARRIER VERIFICATION

A prime contractor or subcontractor shall obtain annually from all motor carriers with which it will have a direct contractual relationship a signed statement under oath by an owner or officer verifying that they meet all of the minimum criteria in subdivision 3 prior to execution of a construction contract with each motor carrier. A prime contractor or subcontractor shall require each such motor carrier to provide it with immediate written notification in the event that the motor carrier no longer meets one or more of the minimum criteria in subdivision 3 after submitting its annual verification. A motor carrier shall be ineligible to perform work on a project covered by this section if it does not meet all the minimum criteria in subdivision 3. Upon request, a prime contractor or subcontractor shall submit to the contracting authority the signed verifications of compliance from all motor carriers providing for-hire transportation of materials, equipment, or supplies for a project.

Minn. Stat. 16C.285, Subd. 4. VERIFICATION OF COMPLIANCE

A contractor responding to a solicitation document of a contracting authority shall submit to the contracting authority a signed statement under oath by and owner of officer verifying compliance with each of the minimum criteria in subdivision 3, with the exception of clause (7), at the time that it responds to the solicitation documents.

A contracting authority may accept a signed statement under oath as sufficient to demonstrate that a contractor is a responsible contractor and shall not be held liable for awarding a contract in reasonable reliance on that statement. A prime contractor, subcontractor, or motor carrier that fails to verify compliance with any one of the required minimum criteria or makes a false statement under oath in a verification of compliance shall be ineligible to be awarded a construction contract on the project for which the verification was submitted.

A false statement under oath verifying compliance with any of the minimum criteria may result in termination of a construction contract that has already been awarded to a prime contractor or subcontractor that submits a false statement. A contracting authority shall not be liable for declining to award a contract or terminating a contract based on a reasonable determination that the contractor failed to verify compliance with the minimum criteria or falsely stated that it meets the minimum criteria. A verification of compliance need not be notarized. An electronic verification of compliance made and submitted as part of an electronic bid shall be an acceptable verification of compliance under this section provided that it contains an electronic signature as defined in section 325L.02, paragraph (h).

Minn. Stat. 16C.285, Subd. 6. ADDITIONAL CRITERIA

Nothing in this section shall restrict the discretion of a contracting authority to establish additional factors for defining contractor responsibility. This subdivision is not an independent grant of authority to a contracting authority to establish additional minimum criteria pursuant to subdivision 3.

CERTIFICATION

By signing this document, I certify that I am authorized to sign on behalf of the company, and I swear under oath that:

- 1) My company meets each of the minimum criteria to be a responsible contractor as defined in Minn. Stat. 16C.285,
- 2) I have included a list of my first-tier subcontractors with my company's solicitation response,
- 3) If my company is awarded a contract, I will submit a list of additional subcontractors as required.

Name of Company: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____ Telephone number: _____

Before me on this _____ day of _____, 20____, personally appeared _____

_____ known to be, who being duly sworn did depose and say that they are the _____ (office) of the Contractor above mentioned that they executed the above Verification of Compliance and Affidavit on behalf of said Contractor; and that all of the statements contained therein are true, correct and complete.

Attest:

Notary Signature: _____

Printed Name: _____

My Commission expires: _____, 20____

Date: _____ Telephone number: _____

LIST OF FIRST TIER SUBCONTRACTORS

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

Company _____ Telephone No. _____

Name of Contact _____

Address _____

Type of Construction _____

**CERTIFICATION OF COMPLIANCE
WITH MN STATUTES 363A.36**

State of Minnesota - Affirmative Action Data (for responses in excess of \$100,000 only)

If your response to this solicitation is in excess of \$100,000, please complete the information requested below to determine whether you are subject to the Minnesota Human Rights Act (Minnesota Statutes 363A.36) certification requirement, and to provide documentation of compliance if necessary. *It is your sole responsibility to provide this information and--if required to apply for Human Rights certification prior to the due date and time of the bid or proposal and to obtain Human Rights certification prior to the execution of the contract.*

How to determine which boxes to complete on this form:

	Then you must complete these boxes...	BOX A	BOX B	BOX C	BOX D
On any single working day within the past 12 months, if your company...					
Employed more than 40 full-time employees in Minnesota		X			X
Did not employ more than 40 full-time employees in Minnesota, but did employ more than 40 full-time employees in the state where you have your primary place of business			X		X
Did not employ more than 40 full-time employees in Minnesota or in the state where you have your primary place of business.				X	X

BOX A – For companies which have employed more than 40 full-time employees within Minnesota on any single working day during the previous 12 months.

Your response will be rejected unless your business:

Has a current Certification of Compliance issued by the Minnesota Department of Human Rights (MDHR)
~~–or–~~
 has submitted an affirmative action plan to the MDHR, which the Department received prior to the date and time the responses are due.

Check one of the following statements if you have employed more than 40 full-time employees in Minnesota on any single working day during the previous 12 months:

We do have a current Certificate of Compliance issued by the MDHR. Proceed to **BOX D**. Include a copy of your certificate with your response.

We do not have a current Certificate of Compliance. However, we submitted an Affirmative Action Plan to the MDHR for approval, which the Department received on _____ (date) at _____ (time). [If you do not know when the Department received your Plan, contact the Department.] We acknowledge that the plan must be approved by the MDHR before any contact or agreement can be executed. Proceed to **BOX D**.

We do not have a Certificate of Compliance, nor has the MDHR received an Affirmative Action Plan from our company. *We acknowledge that our response will be rejected. Proceed to BOX D. Call the Minnesota Department of Human Rights for assistance.*

Please note: Certificates of Compliance must be issued by the Minnesota Department of Human Rights, Affirmative Action Plans approved by the Federal government, a county, or a municipality must still be reviewed and approved by the Minnesota Department of Human Rights before a certificate can be issued.

BOX B – For companies which *have not* had more than 40 full-time employees within Minnesota but have employed more than 40 full-time employees on any single working day during the previous 12 months in the state where they have their primary place of business.

You may achieve compliance with the Minnesota Human Rights Act by certifying that you are in compliance with applicable Federal Affirmative Action requirements.

Check one of the following statements if you have not employed more than 40 full-time employees in Minnesota but you have employed more than 40 full-time employees on any single working day during the previous 12 months in the state where you have your primary place of business:

- We are not subject to Federal Affirmative Action requirements. **Proceed to BOX D.**
- We are subject to Federal Affirmative Action requirements, and we are in compliance with those requirements. **Proceed to BOX D.**

BOX C – For those companies not described in BOX A or BOX B.

Check below. You are not subject to the Minnesota Human Rights Act certification requirement.

- We have not employed more than 40 full-time employees on any single working day in Minnesota or in the state of our primary place of business within the previous 12 months. **Proceed to BOX D.**

BOX D – For all companies.

By signing this statement, you certify that the information provided is accurate and that you are authorized to sign on behalf of the responder.

Name of Company: _____

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____ Telephone number: _____

For further information regarding Minnesota Human Rights Act requirements, contact:

Minnesota Department of Human Rights, Compliance Services Section
Mail: 190 East 5th Street, Suite 700 Metro: 651.296.5663
St. Paul, MN 55101 Toll Free: 800.657.3704
Website: www.humanrights.state.mn.us Fax: 651.296.9042
Email: employerinfo@therightsplace.net TTY: 651.296.1283

Affirmative Action Data
Revised 2015 - MDHR

NOTICE OF AWARD

Date of Issuance:

Owner: City of Silver Lake, Minnesota

Owner's Project No.:

Engineer: Short Elliott Hendrickson Inc.

Engineer's Project No.: SILAK 171969

Project: Silver Lake Infrastructure Improvements Project

Contract Name:

Bidder:

Bidder's Address:

You are notified that Owner has accepted your Bid dated **[date]** for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

[Describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is \$**[Contract Price]**. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: **City of Silver Lake, Minnesota**

By (signature): _____

Name (printed): _____

Title: _____

Copy: Engineer

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AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **the City of Silver Lake, Minnesota** (“Owner”) and **[name of contracting entity]** (“Contractor”).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: **Construction sanitary sewer, sanitary sewer services, water main, water services, storm sewer, drain tile, sump pump services, concrete curb and gutter, sidewalk, aggregate base, bituminous surfacing, lift station reconstruction, well rehabilitation, turf restoration, and miscellaneous items required to properly complete the improvements.**

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **Silver Lake Infrastructure Improvements Project.**

ARTICLE 3—ENGINEER

3.01 The Owner has retained **Short Elliott Hendrickson Inc.**, (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by **Engineer.**

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Dates*

A. The Work will be substantially complete **as per the table in 4.02.B**, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **July 16, 2027.**

B. **Parts of the Work shall be completed on or before the following Interim Completion Dates:**

Work Description (See Construction Phasing Sheet in Plans for Area Overview)	Work Occurring In*	Substantial Completion Date**
Area 1 – Lane Avenue from Main Street to T.H. 7; Lift Station Road; Sanitary between Tennis Court and Swimming Pool	2025	2025
Main Lift Station Improvements; Metering Manhole (Alternate 5)	2025 or 2026	2025 or 2026
Area 2 – Center Street from Lane Avenue to Park Avenue; Oliver Avenue from Main Street to Center Street	2025	2025
Area 3 – Frank Street from Lane Avenue to Oliver Avenue	2025	2025
Area 4 – Center Street from Park Avenue to Summit Avenue; Park Avenue from Main Street to Center Street	2025 or 2026	2025 or 2026
Well House No. 1 Rehabilitation	2025 or 2026	2025 or 2026
Area 5 – Frank Street from Oliver Avenue to Queen Avenue; Oliver Avenue from Center Street to Frank Street; Park Avenue from Center Street to	2025 or 2026	2025 or 2026
Area 6 – Frank Street from Summit Avenue to Lake Avenue; Lake Avenue from Frank Street to T.H. 7 (Alternate 1)	2025 or 2026	2025 or 2026
Area 7 – Frank Street from Queen Avenue to Summit Avenue; Queen Avenue from Center Street to Frank Street; Rice Avenue from Center Street to Frank Street; Summit Avenue from Center Street to Frank Street	2026	2026
Area 8 – Merrill Street from Lake Avenue to Grove Avenue; Lake Avenue from Gehlen Drive to Cleveland Street	June 2, 2025	August 25, 2025
Cleveland Lift Station	2025 or 2026	2026
Area 9 – Cleveland Street from Thomas Avenue to Cleveland Lift Station; Lake Avenue from Cleveland Street to Main Street	2026	2026
Well House No. 2 Rehabilitation	2025 or 2026	2025 or 2026
Area 10 – Cleveland Street to Park Avenue to Thomas Avenue; Tower Avenue from Cleveland Street to Main Street	2026	2026

Work Description (See Construction Phasing Sheet in Plans for Area Overview)	Work Occurring In*	Substantial Completion Date**
Area 11 – Utility Easement East of Grove Avenue (Alternate 3); Cleveland Street from Grove Avenue to East Avenue (Alternate 3); Center Street from Grove Avenue to East Avenue (Alternate 2); Frank Street from Grove Avenue to East Avenue (Alternate 2); East Avenue from Center Street to Frank Street (Alternate 2)	2025 or 2026	2025 or 2026
Cured-In-Place-Pipe Lining – Main Street from Lane Avenue to Lake Avenue; Oliver Avenue from Frank Street to T.H. 7 (Alternate 4); Summit Avenue from Frank Street to T.H. 7 (Alternate 4); Howard Avenue from Summit Avenue to Lake Avenue (Alternate 4)	2025 or 2026	2025 or 2026
Treatment Pond Improvements (Base Bid); Pond Control Structure (Alternate 6)	2025 or 2026	2025 or 2026
<p>* If applicable, all utility work in the project area shall be completed on or before October 16 of the year listed above.</p> <p>** If applicable, all street segments in the project area shall have its initial lift of bituminous pavement prior to November 15 of the year listed above.</p>		

4.03 **Deleted.** *Contract Times: Days*

A. ~~The Work will be substantially complete within [number] days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within [number] days after the date when the Contract Times commence to run.~~

4.04 *Milestones*

- A. Parts of the Work must be substantially completed ~~on or before~~ **according to** the following Milestone(s):
1. Work is not expected to begin on all streets at the same time. It is anticipated that Work will occur in staggered groups that can be better managed and which will reduce disruption and maintain mobility in the neighborhood.
 2. In an attempt to reduce costs and the time of disruption to the community, to the neighborhood, and to the residents and businesses, the Owner is proposing to limit the amount of time any street may be without pavement. There are interim milestones on each of the streets that will begin on any given street at the time pavement or reclaim material is first removed on that particular street.
 3. **Work shall be limited to: 6 weeks from the initial pavement removal that any given street will be allowed to remain without aggregate base, and 12 weeks from the initial pavement removal until the Work on that street is substantially complete.**

4. **It is expected that all areas disturbed shall have final turf restoration completed in accordance with the Final Completion date listed in 4.02.A. If final turf restoration is not completed in the year prior to the date listed in 4.02.A, the Contractor shall winter stabilize or temporary stabilize any remaining areas with temporary turf restoration.**

4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and interim milestones not achieved within the times specified in Paragraph 4.01.C and 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 1. **The Contractor shall pay \$755 per day for each day that expires after the time specified in Paragraph 4.01.C.1 above. At no time will liquidated damages for the requirements of 4.01.C.1 exceed \$1,510 per day.**
 2. *Substantial Completion:* Contractor shall pay Owner **\$2,293** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in **Paragraph 4.02.A** above for Substantial Completion of **each phase** until the Work is substantially complete. **At no time will liquidated damages for failure to meet multiple interim completion dates exceed \$4,586 per day.**
 3. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment **as per the Final Completion Date specified in Paragraph 4.02.A above**, Contractor shall pay Owner **\$755** for each day that expires after such time until the Work is completed and ready for final payment.
 4. ~~**Deleted. Milestones:** Contractor shall pay Owner \$[number] for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.~~
 5. ~~**Deleted.** Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.~~
 6. **The liquidated damages set forth above may apply equally, separately, and may be assessed concurrently.**
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.
- C. ~~**Deleted. Bonus:** Contractor and Owner further recognize the Owner will realize financial and other benefits if the Work is completed prior to the time specified for Substantial Completion.~~

Accordingly, Owner and Contractor agree that as a bonus for early completion, Owner shall pay Contractor \$[number] for each day prior to the time specified above for Substantial Completion (as duly adjusted pursuant to the Contract) that the Work is substantially complete. The maximum value of the bonus will be limited to \$[number].

4.06 Deleted. *Special Damages*

- A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.
- C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

- A. **For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that item as indicated in Contractor's Bid, attached hereto as an exhibit.**
- B. **The Bid Prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 10.05 of the General Conditions.**

The Estimated Total of All Unit Price Work is: \$ _____

- A. Deleted. For all Work other than Unit Price Work, a lump sum of \$[number].

All specific cash allowances are included in the above price in accordance with Paragraph 13.02 of the General Conditions.

- B. ~~Deleted.~~ For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Unit Price Work					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Extended Price
				\$	\$
				\$	\$
				\$	\$
				\$	\$
				\$	\$
Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					\$

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

- C. ~~Deleted.~~ Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) \$[number].
- D. ~~Deleted.~~ For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the ~~[ordinal number, such as 5th]~~ day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments

previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. **95** percent of the value of the Work completed (with the balance being retainage).

1) ~~Deleted.~~ If 50 percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

b. **95** percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion **of the entire construction to be provided under the construction Contract Documents**, Owner shall pay an amount sufficient to increase total payments to Contractor to **100** percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less **200** percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

A. All amounts not paid when due will bear interest at the rate of **1** percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.

2. Bonds:

a. Performance bond (together with power of attorney).

b. Payment bond (together with power of attorney).

3. General Conditions.

4. Supplementary Conditions.

5. Specifications as listed in the table of contents of the project manual (copy of list attached).

6. Drawings (not attached but incorporated by reference) consisting of **249** sheets with each sheet bearing the following general title: **Silver Lake Infrastructure Improvements Project**.
 7. ~~Drawings listed on the attached sheet index.~~
 8. Addenda (numbers **[number]** to **[number]**, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. **Contractor's Bid.**
 10. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 Contractor's Representations

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in

the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or “track changes” (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

City of Silver Lake, Minnesota
(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

308 Main Street W
Silver Lake, MN 55381

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address: _____

Phone: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address: _____

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

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PERFORMANCE BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address <i>(principal place of business)</i>: [Address of Contractor's principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address <i>(principal place of business)</i>: [Address of Surety's principal place of business]</p>
<p>Owner</p> <p>Name: City of Silver Lake, Minnesota</p> <p>Mailing address <i>(principal place of business)</i>: 308 Main Street W Silver Lake, MN 55381</p>	<p>Contract</p> <p>Description <i>(name and location)</i>: Silver Lake Infrastructure Improvements Project Silver Lake, Minnesota</p> <p>Contract Price: [Amount from Contract]</p> <p>Effective Date of Contract: [Date from Contract]</p>
<p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
- 6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
- 7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
- 8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
- 9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
- 10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
- 11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
- 12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
- 13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

PAYMENT BOND

<p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address <i>(principal place of business)</i>: [Address of Contractor's principal place of business]</p>	<p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address <i>(principal place of business)</i>: [Address of Surety's principal place of business]</p>
<p>Owner</p> <p>Name: City of Silver Lake, Minnesota</p> <p>Mailing address <i>(principal place of business)</i>: 308 Main Street W Silver Lake, MN 55381</p>	<p>Contract</p> <p>Description <i>(name and location)</i>: Silver Lake Infrastructure Improvements Project Silver Lake, Minnesota</p> <p>Contract Price: [Amount, from Contract]</p> <p>Effective Date of Contract: [Date, from Contract]</p>
<p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.
 - 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
 - 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
 18. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor’s plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work.

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the 30th day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the 60th day after the day of Bid opening or the 30th day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work may be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the

established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
- a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities*: Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

- Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
 - E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
 - F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
 - G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
 - H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

- Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
 - F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
 - G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
 - H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
 - I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
 - J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
 - K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 Contractor's Insurance

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against

Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

- A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and neither Owner nor Engineer has any responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 *Substitutes*

- A. *Contractor's Request; Governing Criteria:* Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

- E. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
1. Observations by Engineer;
 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. Use or occupancy of the Work or any part thereof by Owner;
 5. Any review and approval of a Shop Drawing or Sample submittal;
 6. The issuance of a notice of acceptability by Engineer;
 7. The end of the correction period established in Paragraph 15.08;
 8. Any inspection, test, or approval by others; or

9. Any correction of defective Work by Owner.
- E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

- 9.05 *Lands and Easements; Reports, Tests, and Drawings*
- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
 - B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
 - C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.
- 9.06 *Insurance*
- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.
- 9.07 *Change Orders*
- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.
- 9.08 *Inspections, Tests, and Approvals*
- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.
- 9.09 *Limitations on Owner's Responsibilities*
- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 9.10 *Undisclosed Hazardous Environmental Condition*
- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.
- 9.11 *Evidence of Financial Arrangements*
- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).
- 9.12 *Safety Programs*
- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
 - B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

E. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.05 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.06 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Resident Project Representative, if any.

10.08 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs of which Engineer has been informed.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
- 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
- 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
- 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 6. Expenses incurred in preparing and advancing Claims.
- 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
- 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:
1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination of the Contract or of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party to this Contract of any rights under or interests in the Contract will be binding on the other party without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

18.09 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

18.10 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

~~No suggested Supplementary Conditions in this Article.~~

SC-1.01.A.8 Add the following at the end of the Paragraph:

The Change Order form to be used on this Project is EJCDC C-941 (2018). Agency approval is required before Change Orders are effective.

SC-1.01.A.30 Add the following at the end of the Paragraph:

For the purposes of Rural Development, this term is synonymous with the term "applicant" as defined in 7 CFR 1780.7 (a) (1), (2) and (3) and is an entity receiving financial assistance from the federal programs.

SC-1.01.A.50 Add the following at the end of the Paragraph:

The Work Change Directive form to be used on this Project is EJCDC C-940 (2018). Agency approval is required before a Work Change Directive is issued.

SC-1.01.A.51 Add the following new paragraph immediately after Paragraph 1.01.A.50:

1. 51. Agency - The Project is financed in whole or in part by USDA Rural Utilities Service pursuant to the Consolidated Farm and Rural Development Act (7 USC Section 1921 et seq.). The Rural Utilities Service programs are administered through the USDA Rural Development offices; therefore, the Agency for these documents is USDA Rural Development.

SC-1.01.A.52 Add the following new paragraph with the title "American Iron and Steel Definitions" immediately after Paragraph 1.01.A.51:

1. *American Iron and Steel Definitions*
 - a. *American Iron and Steel (AIS)* - Requirements mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference for "iron and steel products," meaning the following products, if made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints,

valves, structural steel, reinforced precast concrete, and Construction Materials. AIS requirements apply in each of the several states, the District of Columbia, and each federally recognized Tribe, but not the U.S. Territories.

- b. **Coating** - A covering that is applied to the surface of an object. If a Coating is applied to the external surface of a domestic iron or Steel component, and the application takes place outside of the United States, said product would be considered a compliant product under the AIS requirements. Any Coating processes that are applied to the external surface of Iron and Steel components that would otherwise be AIS compliant would not disqualify the product from meeting the AIS requirements regardless of where the Coating processes occur, provided that final assembly of the product occurs in the United States. This exemption only applies to Coatings on the external surface of Iron and Steel components. It does not apply to Coatings or linings on internal surfaces of Iron and Steel products, such as the lining of lined pipes. All Manufacturing Processes for lined pipes, including the application of pipe lining, must occur in the United States for the product to be compliant with AIS requirements.
- c. **Construction Materials** - Those articles, materials, or supplies made primarily of iron and/or steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered “structural steel”. Note: Mechanical and electrical components, equipment and systems are not considered Construction Materials. See definitions of Mechanical Equipment and Electrical Equipment.
- d. **Contractor’s Certification** - Documentation submitted by the Contractor upon Substantial Completion of the Contract that all Iron and Steel products installed were Produced in the United States.
- e. **De Minimis** - Various miscellaneous, incidental low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. Examples of De Minimis components could include small washers, screws, fasteners (such as “off the shelf” nuts and bolts), miscellaneous wire, corner bead, ancillary tube, signage, trash bins, door hardware etc. Costs for such De Minimis components cumulatively may comprise no more than a total of five percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed one percent of the total cost of the materials used in and incorporated into a project.
- f. **Electrical Equipment** - Typically any machine powered by electricity and includes components that are part of the electrical distribution system. AIS does not apply to Electrical Equipment.
- g. **Engineer’s Certification** - Documentation submitted by the Engineer that Drawings, Specifications, and Bidding Documents comply with AIS.
- h. **Iron and Steel products** - The following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and Construction Materials. Only items on the above

list made primarily of iron or steel, permanently incorporated into the project must be Produced in the United States. For example, trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. iron or steel.

- i. **Manufacturer** - A Supplier, fabricator, distributor, materialman, or vendor is an entity with which the Owner, Contractor or any subcontractor has contracted to furnish materials or equipment to be incorporated in the project by the Owner, Contractor or a subcontractor.
- j. **Manufacturer's Certification** - Documentation provided by the Manufacturer stating that the Iron and Steel products to be used in the project are produced in the United States in accordance with American Iron and Steel (AIS) Requirements. If items are purchased via a Supplier, distributor, vendor, etc. from the Manufacturer directly, then the Supplier, distributor, vendor, etc. will be responsible for obtaining and providing these certifications to the parties purchasing the products.
- k. **Manufacturing Processes** - Processes such as melting, refining, pouring, forming, rolling, drawing, finishing, and fabricating. Further, if a domestic Iron and Steel product is taken out of the United States for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the material(s), if any, being applied as a Coating are similarly not covered. Non-iron or Steel components of an Iron and Steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-Iron and Steel components do not have to be of domestic origin. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-U.S. sources.
- l. **Mechanical Equipment** - Typically equipment which has motorized parts and/or is powered by a motor. AIS does not apply to Mechanical Equipment.
- m. **Minor Components** - Components within an iron and/or Steel product otherwise compliant with the American Iron and Steel requirements; this waiver is typically used by Manufacturers. It differs from the De Minimis definition in that De Minimis pertains to the entire project and the minor component definition pertains to a single product. This waiver allows use of non-domestically produced miscellaneous Minor Components comprising up to five percent of the total material cost of an otherwise domestically produced Iron and Steel product. However, unless a separate waiver for a product has been approved, all other Iron and Steel components in said product must still meet the AIS requirements. This waiver does not exempt the whole product from the AIS requirements only Minor Components within said product and the iron or Steel components of the product must be produced domestically. Valves and hydrants are also subject to the cost ceiling requirements described here. Examples of Minor Components could include items such as pins and springs in valves/hydrants, bands/straps in couplings, and other low-cost items such as small fasteners etc.

- n. ***Municipal Castings*** - Cast iron or Steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and solid waste infrastructure.
- o. ***Primarily Iron or Steel*** - A product is made of greater than 50 percent iron or Steel on a materials cost basis. An exception to this definition is reinforced precast concrete (see Definitions). All technical specifications and applicable industry standards (e.g. NIST, NSF, AWWA) must be met. If a product is determined to be less than 50 percent iron and/or steel, the AIS requirements do not apply. For example, the cost of a fire hydrant includes:
 - 1) The cost of materials used for the iron portion of a fire hydrant (e.g. bonnet, body and shoe); and
 - 2) The cost to pour and cast to create those components (e.g. labor and energy).
 - 3) Not included in the cost are:
 - i) The additional material costs for the non-iron or Steel internal workings of the hydrant (e.g. stem, coupling, valve, seals, etc.); and
 - ii) The cost to assemble the internal workings into the hydrant body.
- p. ***Produced in the United States*** - The production in the United States of the iron or Steel products used in the project requires that all Manufacturing Processes must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives.
- q. ***Reinforced Precast Concrete*** – Reinforced Precast Concrete structures must comply with AIS, regardless of whether it consists of at least 50 percent iron or steel. The reinforcing bar and wire must be Produced in the United States and meet the same standards as for any other iron or Steel product. Additionally, the casting of the concrete product must take place in the United States. The cement and other raw materials used in concrete production are not required to be of domestic origin. If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered Construction Materials and must be Produced in the United States.
- r. ***Steel*** - An alloy that includes at least 50 percent iron, between 0.02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of Steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of Steel covers carbon steel, alloy steel, stainless steel, tool steel, and other specialty steels.
- s. ***Structural Steel*** - Rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees, and zees. Other shapes include but are

not limited to, H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

ARTICLE 2—PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. *Evidence of Owner's Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 Copies of Documents

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor **five** printed copies of conformed Contract Documents incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2.06 Electronic Transmittals

SC-2.06 Delete Paragraphs 2.06.B and 2.06.C in their entirety and insert the following in their place:

- B. *Electronic Documents Protocol:* The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.
 - 1. *Basic Requirements*
 - a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
 - b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
 - c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using

non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

- d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.
- e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.
- f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

2. *System Infrastructure for Electronic Document Exchange*

- a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.
 - 1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is **10 MB**. Attachments larger than that may be exchanged using large file transfer functions or physical media.
 - 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.
- b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
- c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like

worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

- d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.
- e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.
- f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
- g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.
- h. The Owner will operate a Project information management system (also referred to in this EDP as “Project Website”) for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:
 - 1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
 - 2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;

- 3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and
- 4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.

C. *Software Requirements for Electronic Document Exchange; Limitations*

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.
 - a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.
2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.
3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

SC-2.06 Supplement Paragraph 2.06 of the General Conditions by adding the following paragraph:

D. *Requests by Contractor for Electronic Documents in Other Formats*

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.
2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:
 - a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application, or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of

accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

- b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.
- c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.
- d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

SC-3.01 Delete Paragraph 3.01.C in its entirety.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 Commencement of Contract Times; Notice to Proceed

SC-4.01.A Delete the last sentence of paragraph.

4.03 Reference Points

SC-4.03.A Delete Paragraph 4.03.A in its entirety and insert the following new paragraph in its place:

- A. **Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgement are necessary to enable Contractor to proceed with the Work. Engineer shall provide necessary construction staking for all Work on this Project. Contractor shall notify Engineer 48 hours prior (excluding weekends) to any staking needs. Contractor shall be responsible for protecting and preserving the established reference points, property monuments, and construction stakes, and shall make no changes or relocations without the prior written approval of the Engineer. Contractor shall report to Engineer whenever any reference point, property monument, or construction stake is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points, property monuments, or construction stakes by professionally qualified personnel.**

Exhibit C—Geotechnical Baseline Report Supplement to the Supplementary Conditions.

EJCDC® C-800, Supplementary Conditions of the Construction Contract.

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4.05 *Delays in Contractor's Progress*

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*

- a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled. **Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered abnormal weather conditions. Requests for time extensions due to abnormal weather conditions will be submitted to the Engineer within five days of the end of the abnormal weather condition event. It is the responsibility of the Contractor to provide the information listed in SC 4.05.C.5.b.**
 - b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
 - 1) **By comparison of actual precipitation, air temperature and wind (direction and speed) to the normal weather conditions (normal as defined by both average and typical ranges for the same period of time and location).**
 - 2) **Contractor shall anticipate the number of foreseeable bad weather days per month indicated in the table in Exhibit A—Foreseeable Bad Weather Days.**
- ~~1) Every workday on which one or more of the following conditions exist will be considered a "bad weather day":~~
- ~~i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds **[threshold precipitation quantity]** of precipitation (as rain equivalent, based on the snow/rain conversion indicated in the table entitled Foreseeable Bad Weather Days; such table is hereby incorporated in this SC 4.05.C by reference.~~
 - ~~ii) Ambient outdoor air temperature at 11:00 a.m. is equal to or less than the following low temperature threshold: **[temperature]** degrees Fahrenheit; or, at 3:00 p.m. the ambient outdoor temperature is equal to or greater than the following high temperature threshold: **[temperature]** degrees Fahrenheit.~~
- ~~2) Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by **[name of the entity operating the weather station]** weather monitoring station at **[location of the weather monitoring station]**.~~

- ~~3) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in the table in Exhibit [exhibit number]—Foreseeable Bad Weather Days.~~
- ~~4) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in the table in Exhibit [exhibit number]—Foreseeable Bad Weather Days will be considered as “abnormal weather conditions.” The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.~~

ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Geotechnical Evaluation Report	July 24, 2023	Soil Borings

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
Appendix A - Cleveland Lift Station Existing Pumps	2023-12-14	Existing Pump Data
Appendix B - Cleveland Lift Station Existing Control Panel	01/10/2022	As Built Control Panel Data
Appendix C - Main Lift Station and Wastewater Ponds Record Drawings	3-30-90	Record Drawing Data

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
No Such Reports Exist		

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
No Such Drawings Exist		

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

SC-6.01 **Deleted.** Add the following paragraphs immediately after Paragraph 6.01.B:

- ~~1. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be **[number—either 2, 3, or other]** years after Substantial Completion.~~
- ~~2. After Substantial Completion, Contractor shall furnish a warranty bond issued in the form of EJCDC® C-612, Warranty Bond (2018). The warranty bond must be in a bond amount of **[number—either 10, 15, or other]** percent of the final Contract Price. The warranty bond period will extend to a date **[number—either 2, 3, or other]** years after Substantial Completion of the Work. Contractor shall deliver the fully executed warranty bond to Owner prior to or with the final application for payment, and in any event no later than 11 months after Substantial Completion.~~
- ~~3. The warranty bond must be issued by the same surety that issues the performance bond required under Paragraph 6.01.A of the General Conditions.~~

6.02 *Insurance—General Provisions*

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker’s compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker’s compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker’s compensation insurance for similar projects by the state within the last 12 months.

SC-6.02 **Deleted.** Add the following paragraph immediately after Paragraph 6.02.H.2 of the General Conditions:

3. ~~For the following Subcontractors, Suppliers, or categories of Subcontractor or Supplier, Contractor shall require the following specified insurance, with policy limits as stated: [Identify Subcontractors, Suppliers, or categories of same, and insert specific insurance requirements and policy limits]~~

6.03 *Contractor’s Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: **McLeod County Department of Public Works, MnDOT District 8.**
- E. *Workers’ Compensation and Employer’s Liability:* Contractor shall purchase and maintain workers’ compensation and employer’s liability insurance, including, as applicable, United States Longshoreman and Harbor Workers’ Compensation Act, Jones Act, stop-gap employer’s liability coverage for monopolistic states, and foreign voluntary workers’ compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers’ Compensation and Related Policies	Policy limits of not less than:
Workers’ Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman’s)	Statutory
Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable	Statutory
Jones Act (if applicable) —	
Bodily injury by accident—each accident	\$2,000,000
Bodily injury by disease—aggregate	\$2,000,000
Employer’s Liability	
Each accident	\$2,000,000
Each employee	\$2,000,000
Policy limit	\$2,000,000

Workers' Compensation and Related Policies	Policy limits of not less than:
Stop-gap Liability Coverage—	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:—	\$ _____

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
 6. Any limitation or exclusion based on the nature of Contractor’s work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000
Products—Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$2,000,000
Bodily Injury and Property Damage—Each Occurrence	\$2,000,000

- J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$2,000,000
Each Accident	\$2,000,000
Property Damage	
Each Accident	\$2,000,000
for	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$

- K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general

liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$4,000,000
General Aggregate	\$4,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer’s liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy’s policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of **\$4,000,000** after accounting for partial attribution of its limits to underlying policies, as allowed above.
- M. ~~**Deleted.** *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after final completion.~~

— Contractor’s Pollution Liability —	— Policy limits of not less than: —
Each Occurrence/Claim —	\$ _____
General Aggregate —	\$ _____

- N. ~~**Deleted.** *Contractor’s Professional Liability Insurance:* If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.~~

Contractor’s Professional Liability	Policy limits of not less than:
Each Claim	\$ _____
Annual Aggregate	\$ _____

- O. ~~**Deleted.** *Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and~~

Exhibit C—Geotechnical Baseline Report Supplement to the Supplementary Conditions.

EJCDC® C-800, Supplementary Conditions of the Construction Contract.

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(4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

[Insert additional specific requirements, commonly set by the railroad, here.]

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	\$
Aggregate	\$

- P. ~~Deleted. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor’s compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.~~

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$
General Aggregate	\$

- Q. ~~Deleted. *Other Required Insurance:* [Here list additional types and amounts of insurance that Contractor is required to carry.]~~

6.04 *Builder’s Risk and Other Property Insurance*

SC-6.04 ~~Deleted.~~ Delete Paragraph 6.04.A and insert the following in its place:

- A. ~~Owner shall purchase and maintain builder’s risk insurance upon the Work on a completed value basis, in the amount of the Work’s full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder’s risk insurance are set forth in the Supplementary Conditions.~~

SC-6.04 ~~Deleted.~~ Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. ~~*Builder’s Risk Requirements:* The builder’s risk insurance must:~~

- ~~1. be written on a builder’s risk “all risk” policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).~~

- a. ~~Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.~~
 - b. ~~If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.~~
2. ~~cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.~~
 3. ~~cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).~~
 4. ~~extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].~~
 5. ~~extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].~~
 6. ~~allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.~~
 7. ~~allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.~~
 8. ~~include performance/hot testing and start-up, if applicable.~~
 9. ~~be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.~~
 10. ~~include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:~~
 - a. ~~[Here list by legal name (not category, role, or classification) other persons or entities to be included on the builder's risk policy as named insureds. It is generally recommended to list the insured's full legal/contractual name, address,~~

~~contact person, telephone, and e-mail address. Include only persons or entities that have property at the Site that is to be insured by the builder's risk insurance. If applicable, separately identify any mortgagee or lender required to be named as a loss payee.]~~

~~11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:~~

~~a. [Here list or provide cross reference to specific items of Owner furnished (or third party furnished) equipment, and purchase value; do not list items whose value is already included in the Contract Price.]~~

~~12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of \$[amount].~~

~~13. In addition to the coverage sublimits stated above, the following coverages are also subject to sublimits, as follows:~~

~~a. [Here list a specific coverage, or cause of loss, that has been determined to be likely to be subject to a sublimit. If not applicable, then delete Paragraph SC 6.04.F.13 in its entirety.] If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].~~

SC-6.04 **Deleted.** Supplement Paragraph 6.04 of the General Conditions with the following provision:

~~G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.~~

SC-6.04 **Deleted.** Supplement Paragraph 6.04 of the General Conditions with the following provisions:

~~H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.~~

~~1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$[number] for direct physical loss in any one occurrence.~~

SC-6.04 **Deleted.** Delete Paragraph 6.04.A of the General Conditions and substitute the following in its place:

~~A. *Installation Floater*~~

~~1. Contractor shall provide and maintain installation floater insurance on a broad form or "all risk" policy providing coverage for materials, supplies, machinery, fixtures, and equipment that will be incorporated into the Work ("Covered Property"). Coverage under the Contractor's installation floater will include loss from covered "all risk" causes (perils) to Covered Property:~~

- a. ~~of the Contractor, and Covered Property of others that is in Contractor's care, custody, and control;~~
 - b. ~~while in transit to the Site, including while at temporary storage sites;~~
 - c. ~~while at the Site awaiting and during installation, erection, and testing;~~
 - d. ~~continuing at least until the installation or erection of the Covered Property is completed, and the Work into which it is incorporated is accepted by Owner.~~
- 2. ~~The installation floater coverage cannot be contingent on an external cause or risk, or limited to property for which the Contractor is legally liable.~~
 - 3. ~~The installation floater coverage will be in an amount sufficient to protect Contractor's interest in the Covered Property. The Contractor will be solely responsible for any deductible carried under this coverage.~~
 - 4. ~~This policy will include a waiver of subrogation applicable to Owner, Contractor, Engineer, all Subcontractors, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them.~~

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.03 Labor; Working Hours

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

- 1. Regular working hours will be **7:00 a.m. to 7:00 p.m.**
- 2. Owner's legal holidays are **all Federal holidays.**

SC-7.03 **Deleted.** Amend the first and second sentences of Paragraph 7.03.C to state "...all Work at the Site must be performed during regular working hours, **[day of the week]** through **[day of the week]**. Contractor will not perform Work on a **[day of the week]**, **[day of the week]**, or any legal holiday."

SC-7.03 **Deleted.** Delete Paragraph 7.03.C in its entirety, and insert the following:

- C. ~~In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.~~

SC-7.03 **Deleted.** Add the following new paragraph immediately after Paragraph 7.03.C:

- D. **[Contractor] [Owner] [choose one and delete the other]** shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-7.03 **Deleted.** Add the following new subparagraph immediately after Paragraph SC-7.03.D:
1. ~~For purposes of administering the foregoing requirement, additional overtime costs are defined as [Here insert parameters for compensated overtime hours].~~

7.04 Services, Materials, and Equipment

SC-7.04.D Add the following new paragraph immediately after Paragraph 7.04.C:

B. All Iron and Steel products must meet American Iron and Steel requirements.

SC-7.04.E Add the following new paragraph immediately after Paragraph 7.04.D:

C. For projects utilizing a *De Minimis* waiver, Contractor shall maintain an itemized list of non-domestically produced iron or steel incidental components and ensure that the cost is less than 5% of total materials cost for project.

7.05 "Or Equals"

SC-7.05.A Amend the third sentence of paragraph by striking out the following words:

Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item is permitted,

SC-7.05.A.1.a.3 Amend the last sentence of Paragraph a.3 by striking out "and;" and adding a period at the end of Paragraph a.3.

SC-7.05.A.1.a.4 Delete paragraph in its entirety and insert "Deleted."

SC-7.05.B Add the following at the end of paragraph:

Contractor shall include a Manufacturer's Certification letter for compliance with American Iron and Steel requirements in support data, if applicable. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

7.06 Substitutes

SC-7.06.A.3.a.2 Remove "and" from the end of paragraph.

SC-7.06.A.3.a.3 Add "; and" to the end of paragraph.

SC-7.06.A.3.a.4 Add the following new paragraph immediately after Paragraph 7.06.A.3.a.3:

4. Comply with American Iron and Steel by providing Manufacturer's Certification letter of American Iron and Steel compliance, if applicable. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

7.07 Concerning Subcontractors and Suppliers

SC-7.07.A – Amend by adding the following to the end of the paragraph:

The total amount of work subcontracted by the Contractor shall not exceed fifty percent of the Contract price without prior approval from the Owner, Engineer and Agency.

SC-7.07.B – Delete paragraph in its entirety and insert "Deleted".

SC-7.07.E – Delete the second sentence of paragraph and insert the following in its place:

Owner may not require that Contractor use a specific replacement.

7.10 Taxes

SC-7.10 **Deleted.** Add a new paragraph immediately after Paragraph 7.10.A:

- ~~A. Owner is exempt from payment of sales and compensating use taxes of the State of **[name of state where Project is located]** and of cities and counties thereof on all materials to be incorporated into the Work.~~
- ~~1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.~~
 - ~~2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.~~

7.12 *Record Documents*

SC-7.12.A Amend paragraph by adding the following after "written interpretations and clarifications,":
Manufacturers' Certifications,

7.13 *Safety and Protection*

SC-7.13 **Deleted.** Insert the following after the second sentence of Paragraph 7.13.G:

~~The following Owner safety programs are applicable to the Work: **[Here expressly identify by title and/or date, any such Owner safety programs. If Owner's safety programs are included in or addressed in the Specifications, SC 7.13 may be used to provide a cross-reference to the Specification section].**~~

7.16 *Submittals*

SC-7.16.A.1.c – Amend paragraph by deleting the last period and adding:

, including Manufacturer's Certification letter for any item in the submittal subject to American Iron and Steel requirements and include the Certificate in the submittal. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

SC-7.16.C.9 – Add new paragraph immediately after Paragraph 7.16.C.8:

- 9. Engineer's review and approval of a Shop Drawing or Sample shall include review of Manufacturers' Certifications in order to document compliance with American Iron and Steel requirements, as applicable.**

7.17 *Contractor's General Warranty and Guarantee*

SC-7.17.F – Add new paragraph immediately after Paragraph 7.17.E:

- F. Contractor shall certify upon Substantial Completion that all Work and Materials have complied with American Iron and Steel requirements as mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference. Contractor shall provide said Certification to Owner. Refer to General Contractor's Certification Letter provided in these Contract Documents.**

ARTICLE 8—OTHER WORK AT THE SITE

8.02 Coordination

SC-8.02 ~~Deleted.~~ Add the following new Paragraph 8.02.C immediately after Paragraph 8.02.B:

~~C. Owner intends to contract with others for the performance of other work at or adjacent to the Site.~~

~~1. **[Here identify individual or entirety]** shall have authority and responsibility for coordination of the various contractors and work forces at the Site;~~

~~2. The following specific matters are to be covered by such authority and responsibility: **[Here itemize such matters];**~~

~~3. The extent of such authority and responsibilities is: **[Here provide the extent].**~~

ARTICLE 9—OWNER’S RESPONSIBILITIES

9.13 Owner’s Site Representative

SC-9.13 ~~Deleted.~~ Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

~~9.13—Owner’s Site Representative~~

~~A. Owner will furnish an “Owner’s Site Representative” to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner’s Site Representative is not Engineer’s consultant, agent, or employee. Owner’s Site Representative will be **[here identify individual or entity]**. The authority and responsibilities of Owner’s Site Representative follow: **[Here describe the duties and activities of the Owner’s Site Representative.]**~~

ARTICLE 10—ENGINEER’S STATUS DURING CONSTRUCTION

10.03 Resident Project Representative

SC-10.03 ~~Deleted.~~ Add the following new subparagraph immediately after Paragraph 10.03.A:

~~1. On this Project, by agreement with the Owner, the Engineer will not furnish a Resident Project Representative to represent Engineer at the Site or assist Engineer in observing the progress and quality of the Work.~~

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:

1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor’s safety meetings), and as appropriate prepare and circulate copies of minutes thereof.

2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
 - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 6. *Payment Requests:* Review Applications for Payment with Contractor.
 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

No suggested Supplementary Conditions in this Article.

SC-11.02.C Add new paragraph immediately after Paragraph 11.02.B:

- C. The Engineer or Owner shall contact the Agency for concurrence on each Change Order prior to issuance. All Contract Change Orders must be concurred on (signed) by Agency before they are effective.

SC-11.03.A.2 Add new Paragraph 11.03.A.2 immediately after Paragraph 11.03.A, which shall be renamed Paragraph 11.03.A.1:

2. The Engineer or Owner shall contact the Agency for concurrence on each Work Change Directive prior to issuance. Once authorized by Owner, a copy of each Work Change Directive shall be provided by Engineer to the Agency.

SC-11.05.B Add the following at the end of this paragraph:

For Owner-authorized changes in the Work, the Contractor will provide the Manufacturer's Certification(s) for materials subject to American Iron and Steel requirements except when sole-source is specified, in which case the Engineer will provide the Manufacturer's Certification(s).

SC-11.09.B.2.c Add new paragraph immediately after Paragraph 11.09.B.2.b:

- c. Change orders involving materials subject to American Iron and Steel requirements shall include supporting data (name of Manufacturer, city and state where the product was manufactured, description of product, signature of authorized Manufacturer's representative) in the Manufacturer's Certification Letter, as applicable.

ARTICLE 12—CLAIMS

No suggested Supplementary Conditions in this Article.

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01 **Deleted.** Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

~~The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of [name of equipment rental rate book].~~

SC-13.01 **Deleted.** Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

- ~~a. For purposes of this paragraph, “small tools and hand tools” means any tool or equipment whose current price if it were purchased new at retail would be less than \$500. [or insert other threshold price.]~~

13.02 *Allowances*

SC-13.02.C Delete paragraph in its entirety and insert “Deleted”.

13.03 *Unit Price Work*

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. The work to be performed is recognized to be construction of a type involving uncertain quantities. All basis of payment provisions of these specifications specifically preclude price adjustments in the event of increased or decreased quantities of Contract items. Any payments provided by bid item shall be valid and shall be accepted by the Contractor as compensation in full for work, regardless of percentage of increased or decreased quantities. The Owner has the right to delete a bid item or schedule in its entirety. There will be no compensation made for a bid item that is deleted from the Contract.**

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

~~No suggested Supplementary Conditions in this Article.~~

14.02 *Defective Work*

SC-14.03.G Add new paragraph immediately after Paragraph 14.03.F:

- G. Installation of materials that are non-compliant with American Iron and Steel requirements shall be considered defective work.**

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.01 *Progress Payments*

SC-15.01.B.4 Add the following language at the end of paragraph:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage or invest the retainage for the benefit of the Contractor.

SC-15.01.B.5 Add new paragraph immediately after Paragraph 15.01.B.4:

5. The Application for Payment form to be used on this Project is EJCDC® C-620. The Agency must approve all Applications for Payment before payment is made.

SC-15.01.B.6 Add new paragraph immediately after Paragraph 15.01.B.5:

6. By submitting an Application for Payment based in whole or in part on furnishing equipment or materials, Contractor certifies that such equipment and materials are compliant with American Iron and Steel requirements. Manufacturer's Certification letter for materials satisfy this requirement. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

SC-15.01.C.2.d Add the following new paragraph immediately after Paragraph 15.01.C.2.c:

- d. The materials presented for payment in an Application for Payment comply with American Iron and Steel requirements.

SC-15.01.D.1 Delete paragraph in its entirety and insert the following in its place:

1. The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.01 Deleted. Add the following new Paragraph 15.01.F:

- ~~F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.~~

15.02 Contractor's Warranty of Title

SC-15.02.A Amend paragraph by striking out the following text: "7 days after".

15.03 Substantial Completion

SC-15.03.A – Modify by adding the following after the last sentence:

Contractor shall also submit the General (Prime) Contractor's Certification of Compliance certifying that to the best of the Contractor's knowledge and belief all substitutes, equals, and all Iron and Steel products proposed in the Shop Drawings, Change Orders, and Partial Payment Estimates, and those installed for the Project, are either Produced in the United States or are the subject of an approved waiver under Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.

Exhibit C—Geotechnical Baseline Report Supplement to the Supplementary Conditions.

EJCDC® C-800, Supplementary Conditions of the Construction Contract.

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SC-15.03.A. – Add a new paragraph immediately after Paragraph 15.03.A which reads as follows:

2. For this Work, Substantial Completion is further defined as follows:

- a. Completion of all unit price Work with the exception of the final lift of wear course paving.**
- b. Includes placement of all turf establishment items (unless otherwise approved by Engineer due to weather conditions).**
- c. Project clean up, including removal of unnecessary temporary traffic control and erosion control items.**

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

- 1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.08 *Correction Period*

SC-15.08 Add the following new Paragraph 15.08.G:

- G. The correction period for each phase of work shall start on the day following the Substantial Completion Date as listed in 4.02.B of the Agreement Between Owner and Contractor.**

SC-15.08 ~~Deleted. Add the following new Paragraph 15.08.G:~~

- ~~G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC 6.01.B.1; or if no such revision has been made in SC 6.01.B, then the correction period is hereby specified to be [number] years after Substantial Completion.~~

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No suggested Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.02 *Arbitration*

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

17.02 *Arbitration*

- A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of \$100,000 or less will be settled in accordance with the American Arbitration Association's supplemental rules for

Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.

- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 17, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.
- C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.
- D. The Arbitrators will have the authority to allocate the costs of the arbitration process among the parties, but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.
- E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.
- F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.
- G. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 - 1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;
 - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;
 - 3. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and
 - 4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.

- H. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

17.03 *Attorneys' Fees*

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02

17.03 *Attorneys' Fees*

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18—MISCELLANEOUS

18.08 *Assignment of Contract*

SC-18.08 **Deleted.** Add the following new paragraph immediately after Paragraph 18.08.A:

- ~~B. The contract dated **[date]** between Owner as "buyer" and **[identify seller]** as "seller" for procurement of goods and special services ("procurement contract") **[is hereby] [will be]** assigned to Contractor by Owner, and Contractor **[accepts] [will accept]** such assignment. A form documenting the assignment is attached as an exhibit to this Contract.~~
 - ~~1. This assignment will occur on the **[Effective Date of the Contract]**, and will relieve the Owner as "buyer" from all further obligations and liabilities under the procurement contract.~~
 - ~~2. Upon assignment, the "seller" will be a Subcontractor or Supplier of the Contractor, and Contractor will be responsible for seller's performance, acts, and omissions, as set forth in Paragraph 7.07 of the General Conditions just as Contractor is responsible for all other Subcontractors and Suppliers.~~
 - ~~3. Notwithstanding this assignment, all performance guarantees and warranties required by the procurement contract will continue to run for the benefit of the Owner and, in addition, for the benefit of the Contractor.~~
 - ~~4. Except as noted in the procurement contract, all rights, duties and obligations of Engineer to "buyer" and "seller" under the procurement contract will cease **[upon the assignment to Contractor]**.~~

SC-18.11 Add new paragraph immediately after Paragraph 18.10:

18.11 Tribal Sovereignty

- A. No provision of this Agreement will be construed by any of the signatories as abridging or debilitating any sovereign powers of the [insert name of Tribe] Tribe; affecting the trust-beneficiary relationship between the Secretary of the Interior, Tribe, and Indian landowner(s); or interfering with the government-to-government relationship between the United States and the Tribe.

SC-19 Add the following new Article 19 immediately after Article 18:

ARTICLE 19—FEDERAL REQUIREMENTS

19.01 Agency Not a Party

- A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees, is a party to this Contract.

19.02 Contract Approval

- A. A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the "Certificate of Owner's Attorney" (Exhibit G of this Bulletin) before Owner submits the executed Contract Documents to Agency for approval.
- B. Agency concurrence is required on both the Bid and the Contract before the Contract is effective.

19.03 Conflict of Interest

- C. Contractor may not knowingly contract with a Supplier or Manufacturer if the individual or entity who prepared the Drawings and Specifications has a corporate or financial affiliation with the Supplier or Manufacturer. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest or other interest in or a tangible personal benefit from the Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

19.04 Gratuities

- D. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

- E. In the event this Contract is terminated as provided in paragraph 19.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

19.05 *Small, Minority and Women's Businesses*

- A. If Contractor intends to let any subcontracts for a portion of the work, Contractor will take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. Affirmative steps will include:
 - 1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 - 2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 - 3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
 - 4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
 - 5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

19.06 *Anti-Kickback*

- A. Contractor shall comply with the Copeland Anti-Kickback Act (40 USC 3145) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

19.07 *Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended*

- A. Contractor to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

19.08 *Equal Employment Opportunity*

- A. The Contract is considered a federally assisted construction contract. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted

construction contract” in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, “Equal Employment Opportunity” (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity,” and implementing regulations at 41 CFR part 60, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor.

19.09 *Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)*

- A. Contractors that apply or bid for an award exceeding \$100,000 must file the required certification (RD Instruction 1940-Q Exhibit A-1). The Contractor certifies to the Owner and every subcontractor certifies to the Contractor that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining the Contract if it is covered by 31 U.S.C. 1352. The Contractor and every subcontractor must also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

19.10 *Environmental Requirements*

- A. When constructing a Project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental conditions:
1. Wetlands – When disposing of excess, spoil, or other Construction Materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 2. Floodplains – When disposing of excess, spoil, or other Construction Materials on public or private property, Contractor shall not fill in or otherwise convert 100-year floodplain areas (Standard Flood Hazard Area) delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, e.g., alluvial soils on NRCS Soil Survey Maps.
 3. Historic Preservation - Applicants shall ensure that Contractors maintain a copy of the following inadvertent discovery plan onsite for review:
 - a. If during the course of any ground disturbance related to any Project, any post review discovery, including but not limited to, any artifacts, foundations, or other indications of past human occupation of the area are uncovered, shall be protected by complying with 36 CFR § 800.13(b)(3) and (c) and shall include the following:
 - 1) All Work, including vehicular traffic, shall immediately stop within a 50 ft. radius around the area of discovery. The Contractor shall ensure barriers are established to protect the area of discovery and notify the Engineer to contact the appropriate RD personnel. The Engineer shall engage a Secretary of the Interior (SOI) qualified professional archeologist to quickly assess the nature and scope of the discovery; implement interim measures to protect the discovery from looting and vandalism; and establish broader barriers if further historic and/or precontact properties, can reasonably be expected to occur.

- 2) The RD personnel shall notify the appropriate RD environmental staff member, the Federal Preservation Officer (FPO), and State Historic Preservation Office (SHPO) immediately. Indian tribe(s) or Native Hawaiian Organization (NHOs) that have an interest in the area of discovery shall be contacted immediately. The SHPO may require additional tribes or NHOs who may have an interest in the area of discovery also be contacted. The notification shall include an assessment of the discovery provided by the SOI qualified professional archeologist.
 - 3) When the discovery contains burial sites or human remains, the Contractor shall immediately notify the appropriate RD personnel who will contact the RD environmental staff member, FPO, and the SHPO. The relevant law enforcement authorities shall be immediately contacted by onsite personnel to reduce delay times, in accordance with tribal, state, or local laws including 36 CFR Part 800.13; 43 CFR Part 10, Subpart B; and the Advisory Council on Historic Preservation's Policy Statement Regarding treatment of Burial Sites, Human Remains, or Funerary Objects (February 23, 2007).
 - 4) When the discovery contains burial sites or human remains, all construction activities, including vehicular traffic shall stop within a 100 ft. radius of the discovery and barriers shall be established. The evaluation of human remains shall be conducted at the site of discovery by a SOI qualified professional. Remains that have been removed from their primary context and where that context may be in question may be retained in a secure location, pending further decisions on treatment and disposition. RD may expand this radius based on the SOI professional's assessment of the discovery and establish broader barriers if further subsurface burial sites, or human remains can reasonably be expected to occur. RD, in consultation with the SHPO and interested tribes or NHOs, shall develop a plan for the treatment of native human remains.
 - 5) Work may continue in other areas of the undertaking where no historic properties, burial sites, or human remains are present. If the inadvertent discovery appears to be a consequence of illegal activity such as looting, the onsite personnel shall contact the appropriate legal authorities immediately if the landowner has not already done so.
 - 6) Work may not resume in the area of the discovery until a notice to proceed has been issued by RD. RD shall not issue the notice to proceed until it has determined that the appropriate local protocols and consulting parties have been consulted.
 - 7) Inadvertent discoveries on federal and tribal land shall follow the processes required by the federal or tribal entity.
4. **Endangered Species** – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency.

Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

5. **Mitigation Measures** – The following environmental mitigation measures are required on this Project: The project, as proposed, has been evaluated to be consistent with the National Environmental Policy Act. Other Federal, State, tribal, and local laws, regulations and/or permits may apply or be required. If the project or any project element deviates from or is modified from the originally approved project, additional environmental review may be required.

“No mitigation measures, 7 CFR §1970.53, “Categorical Exclusions Involving No or Minimal Disturbance,” or §1970.54 (c), “Categorical Exclusions Involving Small-scale Development.” Upon review of the proposal’s description or the Environmental Report the proposal is consistent with 40 CFR §1508.4, “Categorical Exclusion” and does not have any extraordinary circumstances or that the proposal individually or cumulatively does not have a significant effect on the human environment and, therefore, neither an Environmental Assessment nor an Environmental Impact Statement is required.”

19.11 *Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708)*

- A. Where applicable, for contracts awarded by the Owner in excess of \$100,000 that involve the employment of mechanics or laborers, the Contractor will comply with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, the Contractor will compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic will be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

19.12 *Debarment and Suspension (Executive Orders 12549 and 12689)*

- A. A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

19.13 *Procurement of recovered materials*

- A. The Contractor will comply with 2 CFR Part 200.322, “Procurement of recovered materials.”

19.14 *American Iron and Steel*

- A. Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies

Appropriations Act, 2017) and subsequent statutes mandating domestic preference applies an American Iron and Steel requirement to this project. All iron and steel products used in this project must be produced in the United States. The term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and Construction Materials.

B. The following waivers apply to this Contract:

1. *De Minimis,*
2. *Minor Components,*
3. *Pig iron and direct reduced iron., and*
4. *[add project specific waivers as applicable].*

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EXHIBIT A–FORESEEABLE BAD WEATHER DAYS

Month	Number of Foreseeable Bad Weather Days in Month Based on Precipitation as Rain Equivalent (inches) (1)	Ambient Outdoor Air Temperature (degrees F)	
		Number of Foreseeable Bad Weather Days in Month Based on Low Temperature (at 11:00 a.m.)	Number of Foreseeable Bad Weather Days in Month Based on High Temperature (at 3:00 p.m.)
January	1	21	N/A
February	1	17	N/A
March	3	8	N/A
April	4	1	N/A
May	5	0	N/A
June	5	0	N/A
July	4	0	N/A
August	4	0	N/A
September	4	0	N/A
October	3	8	N/A
November	2	8	N/A
December	2	18	N/A

Notes:
1. Two inches of sleet equal one inch of rain. Five inches of wet, heavy snow equal one inch of rain. Fifteen inches of “dry” powder snow equals one inch of rain.

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CERTIFICATE OF OWNER’S ATTORNEY AND AGENCY CONCURRENCE

Notes to User: This exhibit consists of two certificates, on a single page, to be attached to the Contract and signed upon execution. The first is a certificate to be signed by the Owner’s attorney and the second is the concurrence to be signed by the State Engineer. This page is to be inserted after the Agreement between Owner and Contractor for Construction Contract (Stipulated Price) (EJCDC C-520, 2018) in the Construction Contract Documents.

CERTIFICATE OF OWNER’S ATTORNEY

PROJECT NAME:

CONTRACTOR NAME AND CONTRACT NUMBER:

I, the undersigned, _____, the duly authorized and acting legal representative of _____, do hereby certify as follows: I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Name

Date

AGENCY CONCURRENCE

As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments thereunder, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency Representative

Date

Name

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NOTICE TO PROCEED

Owner: City of Silver Lake, Minnesota Owner's Project No.: _____
Engineer: Short Elliott Hendrickson Inc. Engineer's Project No.: SILAK 171969
Contractor: _____ Contractor's Project No.: _____
Project: Silver Lake Infrastructure Improvements Project
Contract Name: _____
Effective Date of Contract: _____

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

[or]

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

Before starting any Work at the Site, Contractor must comply with the following:

[Note any access limitations, security procedures, or other restrictions]

Owner: City of Silver Lake, Minnesota
By (signature): _____
Name (printed): _____
Title: _____
Date Issued: _____
Copy: Engineer

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GOALS AND TIMETABLES
FOR MINORITIES AND
WOMEN

From part 60-4 to 41 CFR Chapter 60 published at
41 CFR 14888-14894, April 8, 1978:

Appendix A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor's aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally assisted construction contract or subcontract.

AREA COVERED

Goals for women apply nationwide.

GOALS AND TIMETABLES

Timetable	Goal (percent)
From Apr. 1, 1980, extended indefinitely	6.9

**Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity
(Executive Order 11246) (40 CFR 60-4.2(d)):**

1. The bidders attention is called to the "Equal Opportunity Clause" (40 CFR 60-1.4(a)) and to the "Standard Federal Equal Opportunity Construction Contract Specifications" (40 CFR 60-4.3(a)), hereby incorporated in this specification by reference.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for minority participation for each trade	Goals for women participation for trade
Until further Notice	2.2%	6.9%

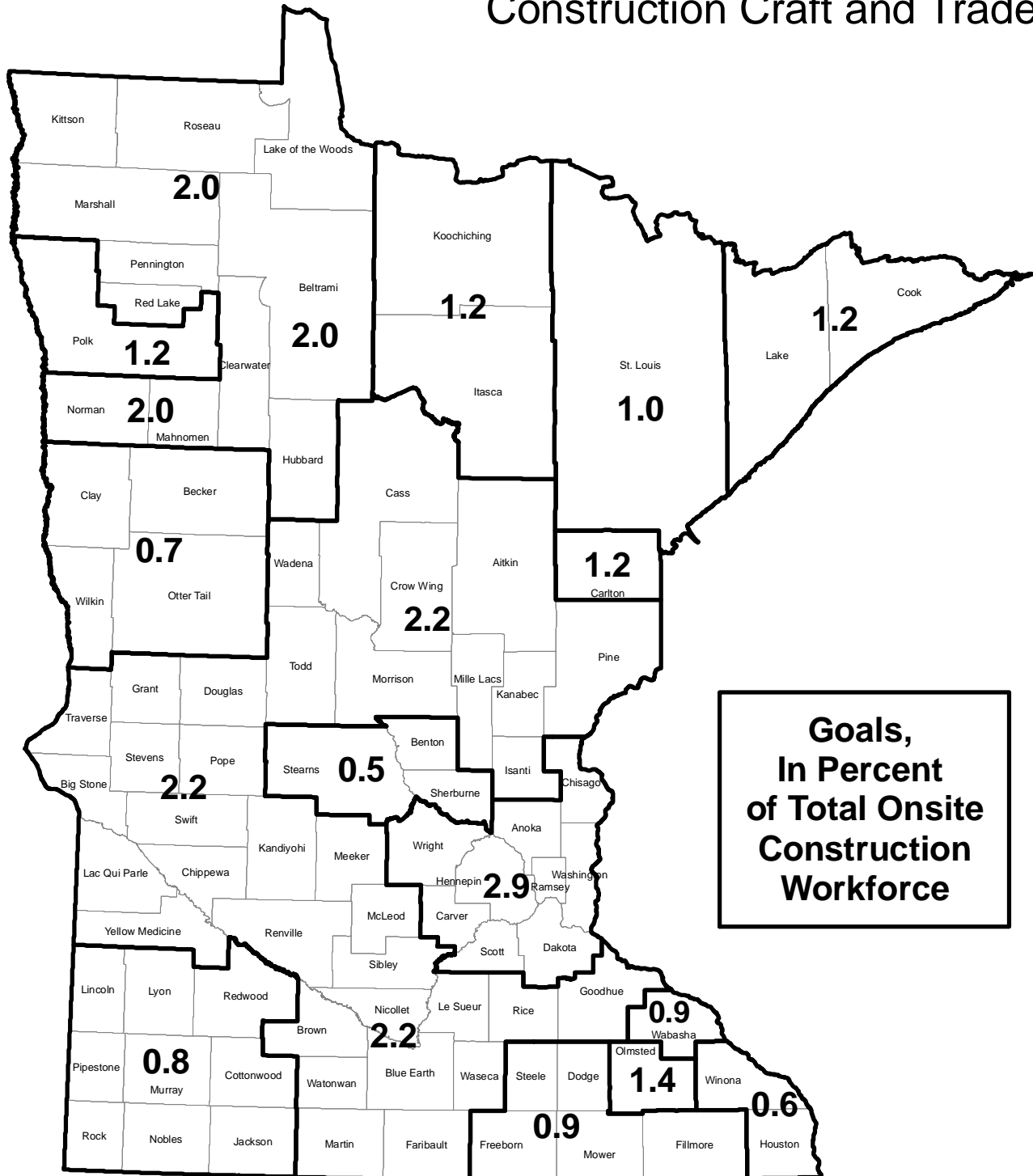
These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulation in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specification set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the regulation in 41 CFR part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction worked under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer, identification number for the subcontractor, estimated dollar amount of the subcontract, estimated starting and completion date; of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this Notice, and in the contract resulting from this solicitation the "covered area:

McLeod
(to be filled in by Project Engineer)
County, Minnesota

Goals for Minority Utilization in each Construction Craft and Trade



**Goals,
In Percent
of Total Onsite
Construction
Workforce**

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Contractor's Application for Payment

Owner: <u>City of Silver Lake, Minnesota</u>	Owner's Project No.: _____
Engineer: <u>Short Elliott Hendrickson Inc.</u>	Engineer's Project No.: <u>SILAK 171969</u>
Contractor: _____	Contractor's Project No.: _____
Project: <u>Silver Lake Infrastructure Improvements Project</u>	
Contract: _____	
Application No.: _____	Application Date: _____
Application Period: From _____ to _____	

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

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

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

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	City of Silver Lake, Minnesota	Owner's Project No.:	
Engineer:	Short Elliott Hendrickson Inc.	Engineer's Project No.:	SILAK 171969
Contractor:		Contractor's Project No.:	
Project:	Silver Lake Infrastructure Improvements Project		
Contract:			

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I
Item No.	Description	Scheduled Value (\$)	Work Completed		Materials Currently Stored (not in D or E) (\$)	Work Completed and Materials Stored to Date (D + E + F) (\$)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) (\$)
			(D + E) From Previous Application (\$)	This Period (\$)				
Original Contract								
			-			-		-
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						-		-
						-		-
	Original Contract Totals	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -

Progress Estimate - Lump Sum Work

Contractor's Application for Payment

Owner:	City of Silver Lake, Minnesota	Owner's Project No.:	
Engineer:	Short Elliott Hendrickson Inc.	Engineer's Project No.:	SILAK 171969
Contractor:		Contractor's Project No.:	
Project:	Silver Lake Infrastructure Improvements Project		
Contract:			

Application No.: _____		Application Period: From _____ to _____		Application Date: _____				
A	B	C	D	E	F	G	H	I
Item No.	Description	Scheduled Value (\$)	Work Completed		Materials Currently Stored (not in D or E) (\$)	Work Completed and Materials Stored to Date (D + E + F) (\$)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) (\$)
			(D + E) From Previous Application (\$)	This Period (\$)				
Change Orders								
						-		-
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	Change Order Totals	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -
Original Contract and Change Orders								
	Project Totals	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: City of Silver Lake, Minnesota
 Engineer: Short Elliott Hendrickson Inc.
 Contractor: _____
 Project: Silver Lake Infrastructure Improvements Project
 Contract: _____

Owner's Project No.: _____
 Engineer's Project No.: SILAK 171969
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)	
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)					
Original Contract												
					-		-		-		-	
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Original Contract Totals					\$	-	\$	-	\$	-	\$	-

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: City of Silver Lake, Minnesota
 Engineer: Short Elliott Hendrickson Inc.
 Contractor: _____
 Project: Silver Lake Infrastructure Improvements Project
 Contract: _____

Owner's Project No.: _____
 Engineer's Project No.: SILAK 171969
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)	
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)					
Change Orders												
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Change Order Totals					\$	-	\$	-	\$	-	\$	-
Original Contract and Change Orders												
Project Totals					\$	-	\$	-	\$	-	\$	-

Stored Materials Summary

Contractor's Application for Payment

Owner:	City of Silver Lake, Minnesota	Owner's Project No.:	
Engineer:	Short Elliott Hendrickson Inc.	Engineer's Project No.:	SILAK 171969
Contractor:		Contractor's Project No.:	
Project:	Silver Lake Infrastructure Improvements Project		
Contract:			

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L	M	
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Materials Stored			Incorporated in Work			Materials Remaining in Storage (I-L) (\$)	
						Previous Amount Stored (\$)	Amount Stored this Period (\$)	Amount Stored to Date (G+H) (\$)	Amount Previously Incorporated in the Work (\$)	Amount Incorporated in the Work this Period (\$)	Total Amount Incorporated in the Work (J+K) (\$)		
								-			-	-	
								-			-	-	
								-			-	-	
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								-			-	-	
Totals						\$	-	\$	-	\$	-	\$	-

WORK CHANGE DIRECTIVE NO.: [Number of Work Change Directive]

Owner: City of Silver Lake, Minnesota
Engineer: Short Elliott Hendrickson Inc.
Contractor:
Project: Silver Lake Infrastructure Improvements Project
Contract Name:
Date Issued: Effective Date of Work Change Directive:
Owner's Project No.:
Engineer's Project No.: SILAK 171969
Contractor's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

Notes to User—Check one or both of the following

Non-agreement on pricing of proposed change. Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ _____ **[increase] [decrease] [not yet estimated].**
Contract Time: _____ days **[increase] [decrease] [not yet estimated].**

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

	Recommended by Engineer	Authorized by Owner
By:	_____	_____
Title:	_____	_____
Date:	_____	_____

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CHANGE ORDER NO.: [Number of Change Order]

Owner: City of Silver Lake, Minnesota Owner's Project No.:
 Engineer: Short Elliott Hendrickson Inc. Engineer's Project No.: SILAK 171969
 Contractor: Contractor's Project No.:
 Project: Silver Lake Infrastructure Improvements Project
 Contract Name:
 Date Issued: Effective Date of Change Order:

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

Change in Contract Price	Change in Contract Times [State Contract Times as either a specific date or a number of days]
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. [Number of previous Change Order] : \$ _____	[Increase] [Decrease] from previously approved Change Orders No.1 to No. [Number of previous Change Order] : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: \$ _____	[Increase] [Decrease] this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Authorized by Owner

By: _____

Title: _____

Date: _____

Authorized by Owner Approved by Funding Agency (if applicable)

By: _____

Title: _____

Date: _____

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FIELD ORDER NO.: [Number of Field Order]

Owner: City of Silver Lake, Minnesota Owner's Project No.:
Engineer: Short Elliott Hendrickson Inc. Engineer's Project No.: SILAK 171969
Contractor: Contractor's Project No.:
Project: Silver Lake Infrastructure Improvements Project
Contract Name:
Date Issued: Effective Date of Field Order:

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: _____

Title: _____

Date: _____

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CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: City of Silver Lake, Minnesota Owner's Project No.:
Engineer: Short Elliott Hendrickson Inc. Engineer's Project No.: SILAK 171969
Contractor: Contractor's Project No.:
Project: Silver Lake Infrastructure Improvements Project
Contract Name:

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: None As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

The following documents are attached to and made a part of this Certificate:

[List attachments such as punch list; other documents]

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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NOTICE OF ACCEPTABILITY OF WORK

Owner: City of Silver Lake, Minnesota Owner’s Project No.:
Engineer: Short Elliott Hendrickson Inc. Engineer’s Project No.:
Contractor: Contractor’s Project No.:
Project: Silver Lake Infrastructure Improvements Project
Contract Name:
Notice Date: Effective Date of the Construction Contract:

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract’s Contract Documents (“Contract Documents”) and of the Agreement between Owner and Engineer for Professional Services dated [date of professional services agreement] (“Owner-Engineer Agreement”). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

- 1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
- 2. This Notice reflects and is an expression of the Engineer’s professional opinion.
- 3. This Notice has been prepared to the best of Engineer’s knowledge, information, and belief as of the Notice Date.
- 4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor’s Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer’s knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.
- 5. This Notice is not a guarantee or warranty of Contractor’s performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.
- 6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner’s reservations of rights with respect to completion and final payment.

Engineer

By (signature): _____
Name (printed): _____
Title: _____

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USDA-Rural Development
MN 1780, Guide 8
(Rev. 12/04)

CERTIFICATE OF FINAL APPROVAL

As Project Engineer for _____ (Owner), and as a Registered Professional Engineer in the State of Minnesota, I do hereby certify that I have inspected the improvements for the _____ Project performed by _____ (Contractor) and find them accomplished according to the plans, specifications and duly authorized change orders. I do hereby approve the above-mentioned improvements and recommend acceptance of this work. (If applicable: I also hereby certify that all correction's listed on the Certificate of Substantial Completion "Punch List" have been completed in satisfactory manner and in accordance with all Contract requirements.)

THE WARRANTY PERIOD BEGAN _____ AND ENDS _____.

(IF REQUIRED: THE LETTER OF INITIATION OF OPERATIONS WAS SENT TO MPCA OR MDOH DATED _____.)

DATE

PROJECT ENGINEER

FIRM

I HEREBY CERTIFY THAT THE WORK DONE BY THE ABOVE-MENTIONED CONTRACTOR HAS BEEN ACCEPTED BY FORMAL COUNCIL RESOLUTION DATED _____.

(SEAL)

MAYOR

CLERK

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Date _____

Dear Sir:

I hereby acknowledge the receipt of _____ dollars
(\$ _____) in full payment of my contract dated _____ for improvement work which I did for you and
which is described in my contract.

I certify that I have paid in full for all materials purchased and all labor employed in the performance of this contract, and that there
are no claims against me under this contract on account of injuries sustained by workers employed by me or by subcontractors
thereunder. I hereby release you from any claims arising by virtue of this contract.

I am attaching Form RD 1924-10, "Release by Claimants," signed by all persons from whom I have purchased materials and by all
subcontractors and all persons employed in connection with my contract with the above-named borrower.

WARNING

**The statements and representations made above are made in connection with construction financed in whole or
in part by the United States Department of Agriculture (USDA). The statements and representations will be
used to determine the release of USDA provided funds. The making of any false statement or misrepresentation
herein may be a crime punishable under Title 18 U.S.C. § 1001 which provides in part: "Whoever, in any matter
within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or
covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or
representations, or makes or uses any false writing or statement or entry, shall be fined under [title 18 of the United
States code] or imprisoned not more than five years, or both.**

Sincerely,

Contractor

Position 6

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0042. The time required to complete this information collection is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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Exemption from Surety Deposits for Non-Minnesota Contractors

Please type or print clearly. This information will be used for returning the form to you.

Contractor <hr/> Address <hr/> City State ZIP code	Total contract amount	Minnesota tax ID number
	\$	
	Contact person	Daytime phone
	Contract starting date	Projected completion date
Business type (check one): <input type="checkbox"/> Corporation <input type="checkbox"/> S corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Sole proprietor		

Name of business or government agency	Contact person	Daytime phone
Contract owner's address	City State ZIP Code	Project number
Project location address	City State ZIP code	

I request exemption from surety deposits under Minnesota law (M.S. 290.9705) for the following reason (check one box only and complete the information requested):

- I have a cash surety or a bond secured by an insurance company licensed in Minnesota. The bond must be 8 percent of the total contract amount. Attach a copy of Form SDB, Non-Minnesota Contractor's Bond.

Bonding Company	Bonding Agent
Address	Daytime Phone
City State ZIP Code	Period of Bond (Month/Day/Year)
	From / / To / /

- I have done construction work in Minnesota during the past three calendar years and have fully complied with Minnesota law regarding Minnesota income, sales and use, corporate franchise, and withholding taxes.
- I am performing work for a government agency and have a payment and performance bond.
- I am performing work for a government agency and have a cash surety issued by a state bank, national bank, or savings and loan association doing business in Minnesota.

I declare this information is true and complete to the best of my knowledge and belief. I authorize the Department of Revenue to send a copy of this form to the contract owner and discuss this case and related taxes with the bonding company.

Contractor's signature	Title	Date
------------------------	-------	------

Mail to: Minnesota Revenue, Mail Station 6501, St. Paul, MN 55146-6501

Department of Revenue Approval

The above-named non-Minnesota contractor is exempt from the surety requirements of Minnesota Statute 290.9705 for this project.

Department of Revenue approval

Date

Form SDE Instructions

Unless the non-Minnesota construction contractor is approved for exemption, any person or business that hires or contracts with the contractor must withhold 8 percent of their compensation as a Minnesota surety deposit.

The withholding amount is deposited with the department and is used as a surety to guarantee that the contractor has fulfilled the requirements for withholding, sales and use, franchise, and income taxes.

For additional information regarding the 8 percent withholding, see Fact Sheet 12, Surety Deposits for Non-Minnesota Construction Contractors.

Purpose of Form SDE

If you are a non-Minnesota construction contractor and you want to apply for an exemption from the surety deposit (see “Exemption Requirements” below), complete and file Form SDE with the department before you start the project.

If approved, give the original, signed Form SDE to the person or business for whom you are doing the work to show you are exempt from the 8 percent surety deposit.

Surety Deposit Law

If you hire or contract with a non-Minnesota contractor to perform construction work in Minnesota, you must withhold 8 percent (.08) of their compensation as a Minnesota surety deposit. Payments are subject to 8 percent withholding only if the work was performed in Minnesota and the total payments during the year exceed \$50,000. If the total payments exceed \$50,000 in a calendar year, all of the payments, even the first \$50,000, are subject to withholding.

Exemption Requirements

A non-Minnesota construction contractor may qualify for an exemption from the surety deposit if one of the following requirements are met:

- The contractor gives the department a bond that is secured by an insurance company licensed in Minnesota and is equal to 8 percent of the contract. The bond remains in effect until the contractor satisfies all tax liabilities. You may choose to complete Form SDB, *Non-Minnesota Contractor’s Bond*, to submit to the department.

- The contractor gives the department a cash surety. A cash surety is evidence of a savings account, deposit or certificate of deposit in, or issued by, a state bank, national bank, or savings and loan association doing business in Minnesota. Interest and dividends earned on the principal amount may be retained by the contractor.
- The contractor is performing work for a government agency and has a payment and performance bond.
- The contractor has done construction work in Minnesota during the past three calendar years and has fully complied with Minnesota laws regarding withholding, sales and use, franchise, and income taxes.

If a non-Minnesota contractor is hired or contracted to perform construction work in Minnesota, the person or business who is paying the contractor must withhold 8 percent of the payment as a Minnesota surety deposit.

Unless the contractor has received exemption from surety deposits, payments made to the contractor are subject to 8 percent withholding, if:

- the construction work was performed in Minnesota; and
- the total amount paid to the non-Minnesota construction contractor during the year exceeds \$50,000.

Who can apply?

A non-Minnesota contractor can apply for an exemption if your contract exceeds or is expected to exceed \$50,000 or multiple contracts have exceeded \$50,000 cumulative per calendar year for work done in Minnesota.

Before You Start

You must have a Minnesota tax ID number from the Department of Revenue to request an exemption from surety deposit.

If you don’t have a Minnesota ID number, you may apply online at www.revenue.state.mn.us or by calling our Business Registration Office at 651-282-5225 or 1-800-657-3605.

How to Apply

To apply for an exemption from Minnesota surety deposits, file Form SDE before you start the project.

Mail this form and any required attachments to the address on the front.

If You’re Approved

If we approve the exemption, we will sign the bottom of the form and return it to you. Make a copy for your records and give the original to the business for whom you are doing the work.

If You’re Not Approved

If we determine you’re not eligible for exemption, 8 percent of each payment made to you must be withheld by the business for whom you are doing the work and deposited with the Department of Revenue.

To apply for a refund, complete Form SDR, *Refund of Surety Deposits for Non-Minnesota Contractors*. When the project is complete, and we determine that you have complied with Minnesota income, withholding, corporate franchise and sales and use tax laws, you’ll receive a refund plus interest.

Information and Assistance

Additional forms and information, including fact sheets and frequently asked questions, are available on our website.

Website: www.revenue.state.mn.us

Email: withholding.tax@state.mn.us

Phone: 651-282 9999 or 1-800-657-3594

This information is available in alternate formats.

Use of Information

All information on this form is required except for your phone number.

All information, except your Minnesota tax ID number, is private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee the same privacy, the contract owner or bonding company and certain government agencies as provided by law.

Contractor Affidavit

This Contractor Affidavit must be certified by the Minnesota Department of Revenue before the state of Minnesota or any of its subdivisions can make final payment to contractors. For more detailed information, see the instructions on the back of this form.

Please type or print clearly. This information will be used for returning the completed form.

Company name			Daytime phone	Minnesota tax ID number
Address			Total contract amount	Month/year work began
City	State	ZIP code	\$	Month/year work ended
			Amount still due	
			\$	

Project number	Project location			
Project owner	Address	City	State	ZIP code

Did you have employees work on this project? Yes No. If no, who did the work?

Check the box that describes your involvement in the project and fill in all information requested.

Sole contractor

Subcontractor

Name of contractor who hired you

Address

Prime contractor—If you subcontracted out any work on this project, all of your subcontractors must submit their own Contractor Affidavits and have them certified by the Department of Revenue *before* you can submit your Contractor Affidavit. For each subcontractor you had, fill in the information below and attach a copy of each subcontractor's certified Contractor Affidavit. If you need more space, attach a separate sheet.

Business name	Address	Owner/Officer

I declare that all information I have filled in on this form is true and complete to the best of my knowledge and belief. I authorize the Department of Revenue to disclose pertinent information relating to this project, including sending copies of this form, to the prime contractor if I am a subcontractor, and to any subcontractors if I am a prime contractor, and to the contracting agency.

Contractor's signature	Title	Date
------------------------	-------	------

Mail to: Minnesota Revenue, Mail Station 6610, St. Paul, MN 55146-6610
Phone: 651-282-9999 or 1-800-657-3594

Certificate of Compliance

Based on records of the Minnesota Department of Revenue, I certify that the contractor who has signed this Contractor Affidavit has fulfilled all the requirements of Minnesota Statutes 290.92 and 270C.66 concerning the withholding of Minnesota income tax from wages paid to employees relating to contract services with the state of Minnesota and/or its subdivisions.

Department of Revenue approval

Date

Form IC134 Instructions

Contractor Affidavit

No state agency or local unit of government can make final payment to a contractor until the Department of Revenue has certified that the contractor and any subcontractor have fulfilled the requirements of Minnesota withholding tax laws.

If you are a prime contractor, a contractor or a subcontractor who did work on a project for the state of Minnesota or any of its local government subdivisions — such as a county, city or school district — you must submit a Contractor Affidavit to the Department of Revenue to receive a certificate of compliance.

Use of Information

The Department of Revenue needs **all** the requested information to determine if you have met the state income tax withholding requirements. If all required information is not provided, Form IC134 will be returned to you for completion.

All information on this Contractor Affidavit is private by state law. It cannot be given to others without your permission, except to the Internal Revenue Service, other states that guarantee the same privacy and certain government agencies as provided by law.

Minnesota Tax ID Number

You must have a Minnesota tax ID number if you have employees who work in Minnesota. You must enter your Minnesota tax ID number on Form IC134.

If you don't have a Minnesota tax ID number, apply online at www.revenue.state.mn.us or by calling our Business Registration Office at 651-282-5225 or 1-800-657-3605.

If you have no employees and did all the work yourself, you do not need a Minnesota tax ID number. Instead, enter your Social Security number in the space for Minnesota tax ID number and explain who did the work.

Submit Contractor Affidavit

Form IC134 cannot be processed by the Department of Revenue until you finish the work. If you submit the form before the project is completed, it will be returned to you unprocessed.

If any withholding payments are due to the state, Minnesota law requires certified payments before we approve your Form IC134.

If you are a subcontractor or sole contractor, submit the form when you have completed your part of the project.

If you are a prime contractor, submit the form when the entire project is completed and you have received certified Contractor Affidavits from all of your subcontractors.

If you're a prime contractor and a subcontractor on the same project

If you were hired as a subcontractor to do work on a project, and you subcontracted all or a part of your portion of the project to another contractor, you are a prime contractor as well. Complete both the subcontractor and prime contractor areas on a single Form IC134.

You may submit your Contractor Affidavit either electronically **or** by mail. This affidavit must be certified and returned before the state or any of its subdivisions can make final payment for your work.

For an immediate response: Complete and submit your Contractor Affidavit electronically. Go to www.revenue.state.mn.us and choose **Withholding Tax**. Under the File and Pay tab, click on Contractor Affidavit Information for Government Projects.

You may complete and mail Form IC134 to: Minnesota Revenue, Mail Station 6610, St. Paul, MN, 55146-6610. If you have fulfilled the requirements of Minnesota withholding tax laws, the department will sign your Form IC134 and return it to you. To receive your final payment, submit the certified Contractor Affidavit to the government unit for which the work was done. If you are a subcontractor, submit the certified Contractor Affidavit to your prime contractor to receive your final payment.

Information and Assistance

Additional forms and information, including fact sheets and frequently asked questions, are available on our website.

Website: www.revenue.state.mn.us

Email: withholding.tax@state.mn.us

Phone: 651-282-9999 or 1-800-657-3594

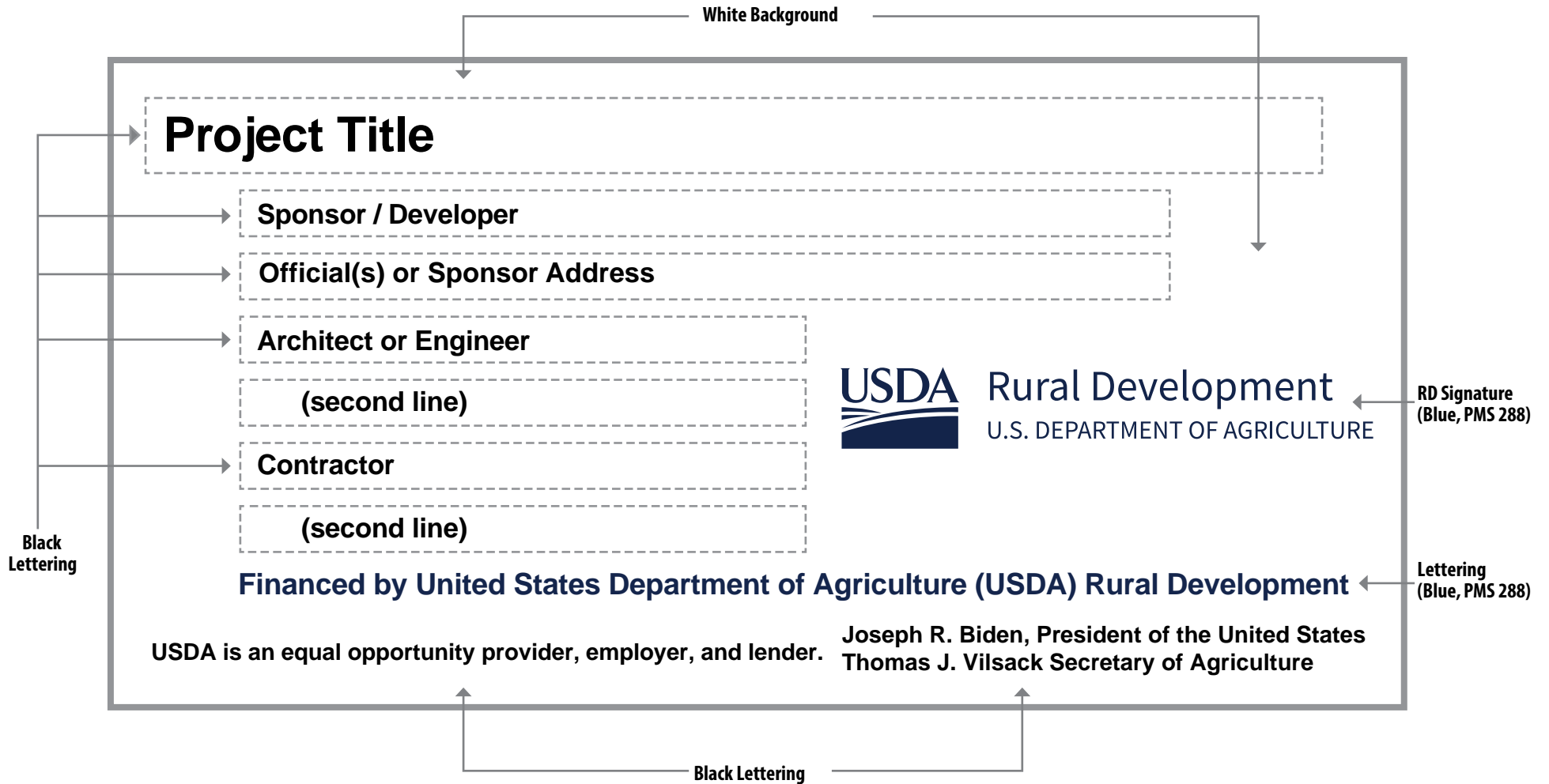
This information is available in alternate formats.

PROGRESS CHART OR PROGRESS SCHEDULE EXAMPLE

ID	Task Name	Duration	Start	4/22/07	4/29/07	5/6/07	5/13/07	5/20/07	5/27/07	6/3/07	6/10/07	6/17/07	6/24/07	7/1/07	7/8/07	7/15/07	7/22/07	7/29/07	8/5/07	8/12/07	8/19/07	8/26/07	9/2/07	9/9/07	9/16/07	9/23/07	9/30/07	10/7/07	10/14/07	10/21/07	10/28/07	11/4/07	11/11/07	11/18/07	11/25/07	12/2/07	12/9/07	12/16/07	12/23/07	12/30/07	1/6/08	1/13/08	1/20/08	1/27/08	2/3/08	2/10/08	2/17/08	2/24/08	3/2/08	3/9/08	3/16/08	3/23/08	3/30/08	4/6/08	4/13/08	4/20/08	4/27/08	5/4/08	5/11/08	5/18/08	5/25/08	6/1/08	6/8/08	6/15/08	6/22/08	6/29/08	7/6/08	7/13/08	7/20/08	7/27/08	8/3/08	8/10/08	8/17/08	8/24/08	8/31/08	9/7/08	9/14/08	9/21/08	9/28/08	10/5/08	10/12/08	10/19/08	10/26/08	11/2/08	11/9/08	11/16/08	11/23/08	11/30/08	12/7/08	12/14/08	12/21/08	12/28/08	1/4/09	1/11/09	1/18/09	1/25/09	2/1/09	2/8/09	2/15/09	2/22/09	2/29/09	3/6/09	3/13/09	3/20/09	3/27/09	4/3/09	4/10/09	4/17/09	4/24/09	5/1/09	5/8/09	5/15/09	5/22/09	5/29/09	6/5/09	6/12/09	6/19/09	6/26/09	7/3/09	7/10/09	7/17/09	7/24/09	7/31/09	8/7/09	8/14/09	8/21/09	8/28/09	9/4/09	9/11/09	9/18/09	9/25/09	10/2/09	10/9/09	10/16/09	10/23/09	10/30/09	11/6/09	11/13/09	11/20/09	11/27/09	12/4/09	12/11/09	12/18/09	12/25/09	1/1/10	1/8/10	1/15/10	1/22/10	1/29/10	2/5/10	2/12/10	2/19/10	2/26/10	3/5/10	3/12/10	3/19/10	3/26/10	4/2/10	4/9/10	4/16/10	4/23/10	4/30/10	5/7/10	5/14/10	5/21/10	5/28/10	6/4/10	6/11/10	6/18/10	6/25/10	7/2/10	7/9/10	7/16/10	7/23/10	7/30/10	8/6/10	8/13/10	8/20/10	8/27/10	9/3/10	9/10/10	9/17/10	9/24/10	10/1/10	10/8/10	10/15/10	10/22/10	10/29/10	11/5/10	11/12/10	11/19/10	11/26/10	12/3/10	12/10/10	12/17/10	12/24/10	1/1/11	1/8/11	1/15/11	1/22/11	1/29/11	2/5/11	2/12/11	2/19/11	2/26/11	3/5/11	3/12/11	3/19/11	3/26/11	4/2/11	4/9/11	4/16/11	4/23/11	4/30/11	5/7/11	5/14/11	5/21/11	5/28/11	6/4/11	6/11/11	6/18/11	6/25/11	7/2/11	7/9/11	7/16/11	7/23/11	7/30/11	8/6/11	8/13/11	8/20/11	8/27/11	9/3/11	9/10/11	9/17/11	9/24/11	10/1/11	10/8/11	10/15/11	10/22/11	10/29/11	11/5/11	11/12/11	11/19/11	11/26/11	12/3/11	12/10/11	12/17/11	12/24/11	1/1/12	1/8/12	1/15/12	1/22/12	1/29/12	2/5/12	2/12/12	2/19/12	2/26/12	3/5/12	3/12/12	3/19/12	3/26/12	4/2/12	4/9/12	4/16/12	4/23/12	4/30/12	5/7/12	5/14/12	5/21/12	5/28/12	6/4/12	6/11/12	6/18/12	6/25/12	7/2/12	7/9/12	7/16/12	7/23/12	7/30/12	8/6/12	8/13/12	8/20/12	8/27/12	9/3/12	9/10/12	9/17/12	9/24/12	10/1/12	10/8/12	10/15/12	10/22/12	10/29/12	11/5/12	11/12/12	11/19/12	11/26/12	12/3/12	12/10/12	12/17/12	12/24/12	1/1/13	1/8/13	1/15/13	1/22/13	1/29/13	2/5/13	2/12/13	2/19/13	2/26/13	3/5/13	3/12/13	3/19/13	3/26/13	4/2/13	4/9/13	4/16/13	4/23/13	4/30/13	5/7/13	5/14/13	5/21/13	5/28/13	6/4/13	6/11/13	6/18/13	6/25/13	7/2/13	7/9/13	7/16/13	7/23/13	7/30/13	8/6/13	8/13/13	8/20/13	8/27/13	9/3/13	9/10/13	9/17/13	9/24/13	10/1/13	10/8/13	10/15/13	10/22/13	10/29/13	11/5/13	11/12/13	11/19/13	11/26/13	12/3/13	12/10/13	12/17/13	12/24/13	1/1/14	1/8/14	1/15/14	1/22/14	1/29/14	2/5/14	2/12/14	2/19/14	2/26/14	3/5/14	3/12/14	3/19/14	3/26/14	4/2/14	4/9/14	4/16/14	4/23/14	4/30/14	5/7/14	5/14/14	5/21/14	5/28/14	6/4/14	6/11/14	6/18/14	6/25/14	7/2/14	7/9/14	7/16/14	7/23/14	7/30/14	8/6/14	8/13/14	8/20/14	8/27/14	9/3/14	9/10/14	9/17/14	9/24/14	10/1/14	10/8/14	10/15/14	10/22/14	10/29/14	11/5/14	11/12/14	11/19/14	11/26/14	12/3/14	12/10/14	12/17/14	12/24/14	1/1/15	1/8/15	1/15/15	1/22/15	1/29/15	2/5/15	2/12/15	2/19/15	2/26/15	3/5/15	3/12/15	3/19/15	3/26/15	4/2/15	4/9/15	4/16/15	4/23/15	4/30/15	5/7/15	5/14/15	5/21/15	5/28/15	6/4/15	6/11/15	6/18/15	6/25/15	7/2/15	7/9/15	7/16/15	7/23/15	7/30/15	8/6/15	8/13/15	8/20/15	8/27/15	9/3/15	9/10/15	9/17/15	9/24/15	10/1/15	10/8/15	10/15/15	10/22/15	10/29/15	11/5/15	11/12/15	11/19/15	11/26/15	12/3/15	12/10/15	12/17/15	12/24/15	1/1/16	1/8/16	1/15/16	1/22/16	1/29/16	2/5/16	2/12/16	2/19/16	2/26/16	3/5/16	3/12/16	3/19/16	3/26/16	4/2/16	4/9/16	4/16/16	4/23/16	4/30/16	5/7/16	5/14/16	5/21/16	5/28/16	6/4/16	6/11/16	6/18/16	6/25/16	7/2/16	7/9/16	7/16/16	7/23/16	7/30/16	8/6/16	8/13/16	8/20/16	8/27/16	9/3/16	9/10/16	9/17/16	9/24/16	10/1/16	10/8/16	10/15/16	10/22/16	10/29/16	11/5/16	11/12/16	11/19/16	11/26/16	12/3/16	12/10/16	12/17/16	12/24/16	1/1/17	1/8/17	1/15/17	1/22/17	1/29/17	2/5/17	2/12/17	2/19/17	2/26/17	3/5/17	3/12/17	3/19/17	3/26/17	4/2/17	4/9/17	4/16/17	4/23/17	4/30/17	5/7/17	5/14/17	5/21/17	5/28/17	6/4/17	6/11/17	6/18/17	6/25/17	7/2/17	7/9/17	7/16/17	7/23/17	7/30/17	8/6/17	8/13/17	8/20/17	8/27/17	9/3/17	9/10/17	9/17/17	9/24/17	10/1/17	10/8/17	10/15/17	10/22/17	10/29/17	11/5/17	11/12/17	11/19/17	11/26/17	12/3/17	12/10/17	12/17/17	12/24/17	1/1/18	1/8/18	1/15/18	1/22/18	1/29/18	2/5/18	2/12/18	2/19/18	2/26/18	3/5/18	3/12/18	3/19/18	3/26/18	4/2/18	4/9/18	4/16/18	4/23/18	4/30/18	5/7/18	5/14/18	5/21/18	5/28/18	6/4/18	6/11/18	6/18/18	6/25/18	7/2/18	7/9/18	7/16/18	7/23/18	7/30/18	8/6/18	8/13/18	8/20/18	8/27/18	9/3/18	9/10/18	9/17/18	9/24/18	10/1/18	10/8/18	10/15/18	10/22/18	10/29/18	11/5/18	11/12/18	11/19/18	11/26/18	12/3/18	12/10/18	12/17/18	12/24/18	1/1/19	1/8/19	1/15/19	1/22/19	1/29/19	2/5/19	2/12/19	2/19/19	2/26/19	3/5/19	3/12/19	3/19/19	3/26/19	4/2/19	4/9/19	4/16/19	4/23/19	4/30/19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TEMPORARY CONSTRUCTION SIGN FOR RURAL DEVELOPMENT PROJECTS

Recommended Fonts: Helvetica or Arial



SIGN DIMENSIONS : 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR)

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GENERAL (PRIME) CONTRACTOR'S CERTIFICATION OF COMPLIANCE

Notes to User: This exhibit is the sample General (Prime) Contractor's Certification of Compliance with the American Iron and Steel requirements to be provided by all General (Prime) Contractors to Engineer for delivery to the Owner at Substantial Completion.

GENERAL (PRIME) CONTRACTOR'S CERTIFICATION OF COMPLIANCE WITH PROVISIONS OF THE AMERICAN IRON AND STEEL REQUIREMENTS OF SECTION 746 OF TITLE VII OF THE CONSOLIDATED APPROPRIATIONS ACT OF 2017 (DIVISION A - AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES APPROPRIATIONS ACT, 2017) AND SUBSEQUENT STATUTES MANDATING DOMESTIC PREFERENCE

DATE:

RE: PROJECT NAME
APPLICANT
CONTRACT NUMBER

I hereby certify that to the best of my knowledge and belief all Iron and Steel products installed for this project by my company and by any and all subcontractors and Manufacturers my company has contracted with for this project comply with Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference or are the subject of a waiver approved by the Secretary of Agriculture or designee.

Name of Construction Company (PRINT)

By Authorized Representative (SIGNATURE)

Title

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MANUFACTURER'S CERTIFICATION OF COMPLIANCE

Notes to User: This exhibit is the sample Manufacturer's Certification of Compliance with the American Iron and Steel requirements to be provided by all Manufacturers of American Iron and Steel covered items, to be submitted by Contractor to the Engineer with the corresponding Shop Drawing submittal for delivery to the Owner at Substantial Completion.

EXAMPLE OF A MANUFACTURER'S CERTIFICATION OF COMPLIANCE WITH PROVISIONS OF THE AMERICAN IRON AND STEEL (AIS) REQUIREMENTS OF SECTION 746 OF TITLE VII OF THE CONSOLIDATED APPROPRIATIONS ACT OF 2017 (DIVISION A - AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES APPROPRIATIONS ACT, 2017) AND SUBSEQUENT STATUTES MANDATING DOMESTIC PREFERENCE

Date:

Company Name:

Company Address:

Subject: American Iron and Steel (AIS) Certification for Project (X), Owner's Name, and Contract Number

I, (company representative), certify that the (melting, bending, galvanizing, cutting, etc.) processes for (manufacturing or fabricating) the following products and/or material shipped or provided for the subject project is in full compliance with the AIS requirement as mandated by Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference.

Item, Products and/or Materials, and location of delivery (City, State):

1.

2.

Such processes for AIS took place at the following location:

(City, State)

Authorized Company Representative Signature

Notes: Authorized signature will be Manufacturer's representative, not the material distributor or Supplier. If any of the above compliance statements change while providing materials to this project, please immediately notify the person(s) who is requesting to use your product(s).

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INFORMATIONAL CHECKLIST FOR PROJECT-SPECIFIC WAIVER REQUESTS

Notes to User: This exhibit is a checklist that is to be completed by the Owner and/or Engineer to help ensure that all appropriate and necessary information is submitted with the request to USDA. All information presented in waiver requests are subject to evaluation. Waiver requests deliberately containing false information will be rejected.

INFORMATIONAL CHECKLIST FOR PROJECT SPECIFIC WAIVER REQUEST

Information	<input type="checkbox"/>
General <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> - Description of the foreign and domestic Construction Materials <input type="checkbox"/> - Unit of measure <input type="checkbox"/> - Quantity <input type="checkbox"/> - Price <input type="checkbox"/> - Date that product is needed (e.g. time of delivery or availability) <input type="checkbox"/> - Location of the construction project <input type="checkbox"/> - Name and address of the proposed Supplier <input type="checkbox"/> - A detailed justification for the use of foreign Construction Materials <input type="checkbox"/> • Waiver request was submitted according to the instructions in the memorandum <input type="checkbox"/> • Assistance recipient made a good faith effort to solicit bids for domestic Iron and Steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime <input type="checkbox"/> 	
Public Interest Waiver Request <ul style="list-style-type: none"> • Applicants and their Engineers will submit a written justification demonstrating definitive impacts on the community if a specified product is not utilized. <input type="checkbox"/> 	
Cost Waiver Requests <ul style="list-style-type: none"> • Waiver request includes the following information: <ul style="list-style-type: none"> - Comparison of overall cost of project with domestic Iron and Steel products to overall cost of project with foreign Iron and Steel products <input type="checkbox"/> - Relevant excerpts from the bid documents used by the Contractors to complete the comparison <input type="checkbox"/> - Supporting documentation indicating that the Contractor made a reasonable survey of the market, such as a description of the process for identifying Suppliers and a list of contacted Suppliers <input type="checkbox"/> 	
Availability Waiver Requests <ul style="list-style-type: none"> • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: <ul style="list-style-type: none"> - Supplier information or pricing information from a reasonable number of domestic Suppliers indicating availability/delivery date for Construction Materials <input type="checkbox"/> - Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying Suppliers and a list of contacted Suppliers. <input type="checkbox"/> - Date that product is needed (e.g. time of delivery or availability) to provide justification <input type="checkbox"/> - Relevant excerpts from project Drawings, Specifications, and permits indicating the required quantity and quality of Construction Materials <input type="checkbox"/> • Waiver request includes a statement from the prime Contractor and/or Supplier confirming the non-availability of the domestic Construction Materials for which the waiver is sought <input type="checkbox"/> • Has the State received other waiver requests for the materials described in this waiver request for comparable projects? <input type="checkbox"/> 	

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AMERICAN IRON AND STEEL *DE MINIMIS* LIST FORMAT

Notes to User: This exhibit is an example format for Contractors to use in maintaining a list of items to document the use of the De Minimis waiver of the American Iron and Steel requirements. This list or similar is required to be filled out throughout the construction Contract as needed. The State Engineer may periodically ask to review this information. At the Contract completion, this list, along with all Manufacturers' certifications, are to be given to the Engineer for delivery to the Owner.

DE MINIMIS COSTING WORKSHEET

Project Name: _____

Contract Name/# (if more than one) _____

Contractor (Company Name): _____

Representative: _____

Date: _____

Total Cost of All Materials (or Estimated Value at 50% of the Installed Bid Price): _____ \$

Allowable Total *De Minimis* Costs (5% of all materials) _____ \$

Total Cost of all *De Minimis* Items _____ \$

Remaining Amount Allowed for Future *De Minimis* Items _____ \$

Note: No single De Minimis item can be more than 1% of the total material cost.

No.	Detailed Description and Manufacturer or Local Source of <i>De Minimis</i> Material	Quantity	Cost Per Item	Total Item Cost
1				
2				
3				
4				
5				
6				
7				
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9				
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14				

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WAGE DETERMINATION SCHEDULE

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MINNESOTA DEPARTMENT OF LABOR AND INDUSTRY PREVAILING WAGES FOR STATE FUNDED CONSTRUCTION PROJECTS



THIS NOTICE MUST BE POSTED ON THE JOBSITE IN A CONSPICUOUS PLACE

Construction Type: Highway and Heavy

Region Number: 08

Counties within region:

- CHIPPEWA-12
- KANDIYOHI-34
- LAC QUI PARLE-37
- LINCOLN-41
- LYON-42
- MCLEOD-46
- MEEKER-47
- MURRAY-51
- PIPESTONE-59
- REDWOOD-64
- RENVILLE-65
- YELLOW MEDICINE-87

Effective: 2023-11-20

This project is covered by Minnesota prevailing wage statutes. Wage rates listed below are the minimum hourly rates to be paid on this project.

All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at a rate of one and one half (1 1/2) times the basic hourly rate. *Note: Overtime pay after eight (8) hours on the project must be paid even if the worker does not exceed forty (40) hours in the work week.*

Violations on MnDOT highways and road projects should be reported to:

Department of Transportation
Office of Construction
Transportation Building MS650
John Ireland Blvd
St. Paul, MN 55155
(651) 366-4209

All other prevailing wage violations and questions should be sent to:

Department of Labor and Industry
Prevailing Wage Section
443 Lafayette Road N
St Paul, MN 55155
(651) 284-5091
DLI.PrevWage@state.mn.us

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE	
LABORERS (101 - 112) (SPECIAL CRAFTS 701 - 730)					
101	LABORER, COMMON (GENERAL LABOR WORK)	2023-11-20	33.91	23.49	57.40
		2024-05-01	36.64	24.24	60.88

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE	
102	LABORER, SKILLED (ASSISTING SKILLED CRAFT JOURNEYMAN)	2023-11-20	33.91	23.49	57.40
		2024-05-01	36.64	24.24	60.88
103	LABORER, LANDSCAPING (GARDENER, SOD LAYER AND NURSERY OPERATOR)	2023-11-20	16.50	0.00	16.50
104	FLAG PERSON	2023-11-20	32.01	22.39	54.40
105	WATCH PERSON	2023-11-20	16.25	12.94	29.19
106	BLASTER	2023-11-20	36.91	23.49	60.40
		2024-05-01	39.64	24.24	63.88
107	PIPELAYER (WATER, SEWER AND GAS)	2023-11-20	37.41	23.49	60.90
		2024-05-01	40.14	24.24	64.38
108	TUNNEL MINER	2023-11-20	35.41	23.49	58.90
		2024-05-01	38.14	24.24	62.38
109	UNDERGROUND AND OPEN DITCH LABORER (EIGHT FEET BELOW STARTING GRADE LEVEL)	2023-11-20	35.41	23.49	58.90
		2024-05-01	38.14	24.24	62.38
110	SURVEY FIELD TECHNICIAN (OPERATE TOTAL STATION, GPS RECEIVER, LEVEL, ROD OR RANGE POLES, STEEL TAPE MEASUREMENT; MARK AND DRIVE STAKES; HAND OR POWER DIGGING FOR AND IDENTIFICATION OF MARKERS OR MONUMENTS; PERFORM AND CHECK CALCULATIONS; REVIEW AND UNDERSTAND CONSTRUCTION PLANS AND LAND SURVEY MATERIALS). THIS CLASSIFICATION DOES NOT APPLY TO THE WORK PERFORMED ON A PREVAILING WAGE PROJECT BY A LAND SURVEYOR WHO IS LICENSED PURSUANT TO MINNESOTA STATUTES, SECTIONS 326.02 TO 326.15.	2023-11-20	35.00	11.50	46.50
111	TRAFFIC CONTROL PERSON (TEMPORARY SIGNAGE)	2023-11-20	21.49	14.80	36.29

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
112	2023-11-20	16.04	0.00	16.04
QUALITY CONTROL TESTER (FIELD AND COVERED OFF-SITE FACILITIES; TESTING OF AGGREGATE, ASPHALT, AND CONCRETE MATERIALS); LIMITED TO MN DOT HIGHWAY AND HEAVY CONSTRUCTION PROJECTS WHERE THE MN DOT HAS RETAINED QUALITY ASSURANCE PROFESSIONALS TO REVIEW AND INTERPRET THE RESULTS OF QUALITY CONTROL TESTERS. SERVICES PROVIDED BY THE CONTRACTOR.				
SPECIAL EQUIPMENT (201 - 204)				
201	2023-11-20	42.49	25.20	67.69
	2024-04-29	44.67	26.40	71.07
202	2023-11-20	31.16	23.45	54.61
203	2023-11-20	20.00	0.00	20.00
LANDSCAPING EQUIPMENT, INCLUDES HYDRO SEEDER OR MULCHER, SOD ROLLER, FARM TRACTOR WITH ATTACHMENT SPECIFICALLY SEEDING, SODDING, OR PLANT, AND TWO-FRAMED FORKLIFT (EXCLUDING FRONT, POSIT-TRACK, AND SKID STEER LOADERS), NO EARTHWORK OR GRADING FOR ELEVATIONS				
204	2023-11-20	41.29	23.45	64.74
205	2023-11-20	35.00	2.86	37.86
PAVEMENT MARKING OR MARKING REMOVAL EQUIPMENT (ONE OR TWO PERSON OPERATORS); SELF-PROPELLED TRUCK OR TRAILER MOUNTED UNITS.				
HIGHWAY/HEAVY POWER EQUIPMENT OPERATOR				
GROUP 2	2023-11-20	43.38	25.20	68.58
	2024-04-29	45.61	26.40	72.01
302	HELICOPTER PILOT (HIGHWAY AND HEAVY ONLY)			
303	CONCRETE PUMP (HIGHWAY AND HEAVY ONLY)			
304	ALL CRANES WITH OVER 135-FOOT BOOM, EXCLUDING JIB (HIGHWAY AND HEAVY ONLY)			

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
305				
306				
307				
308				
GROUP 3	2023-11-20	42.81	25.20	68.01
	2024-04-29	45.01	26.40	71.41
309				
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322				
GROUP 4	2023-11-20	42.49	25.20	67.69
	2024-04-29	44.67	26.40	71.07
323				
324				
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332				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
333				
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368				
GROUP 5	2023-11-20	39.33	25.20	64.53

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
	2024-04-29	41.36	26.40	67.76
369	AIR COMPRESSOR, 600 CFM OR OVER (HIGHWAY AND HEAVY ONLY)			
370	BITUMINOUS ROLLER (UNDER EIGHT TONS)			
371	CONCRETE SAW (MULTIPLE BLADE) (POWER OPERATED)			
372	FORM TRENCH DIGGER (POWER)			
373	FRONT END, SKID STEER UP TO 1C YD			
374	GUNITE GUNALL (HIGHWAY AND HEAVY ONLY)			
375	HYDRAULIC LOG SPLITTER			
376	LOADER (BARBER GREENE OR SIMILAR TYPE)			
377	POST HOLE DRIVING MACHINE/POST HOLE AUGER			
378	POWER ACTUATED AUGER AND BORING MACHINE			
379	POWER ACTUATED JACK			
380	PUMP (HIGHWAY AND HEAVY ONLY)			
381	SELF-PROPELLED CHIP SPREADER (FLAHERTY OR SIMILAR)			
382	SHEEP FOOT COMPACTOR WITH BLADE . 200 H.P. AND OVER			
383	SHOULDERING MACHINE (POWER) APSCO OR SIMILAR TYPE INCLUDING SELF-PROPELLED SAND AND CHIP SPREADER			
384	STUMP CHIPPER AND TREE CHIPPER			
385	TREE FARMER (MACHINE)			
GROUP 6	2023-11-20	38.06	25.20	63.26
	2024-04-29	40.02	26.40	66.42
387	CAT, CHALLENGER, OR SIMILAR TYPE OF TRACTORS, WHEN PULLING DISK OR ROLLER			
388	CONVEYOR (HIGHWAY AND HEAVY ONLY)			
389	DREDGE DECK HAND			
390	FIRE PERSON OR TANK CAR HEATER (HIGHWAY AND HEAVY ONLY)			
391	GRAVEL SCREENING PLANT (PORTABLE NOT CRUSHING OR WASHING)			
392	GREASER (TRACTOR) (HIGHWAY AND HEAVY ONLY)			
393	LEVER PERSON			
394	OILER (POWER SHOVEL, CRANE, TRUCK CRANE, DRAGLINE, CRUSHERS, AND MILLING MACHINES, OR OTHER SIMILAR HEAVY EQUIPMENT) (HIGHWAY AND HEAVY ONLY)			
395	POWER SWEEPER			
396	SHEEP FOOT ROLLER AND ROLLERS ON GRAVEL COMPACTION, INCLUDING VIBRATING ROLLERS			
397	TRACTOR, WHEEL TYPE, OVER 50 H.P., UNRELATED TO LANDSCAPING			
TRUCK DRIVERS				
GROUP 1	2023-11-20	31.00	17.45	48.45
601	MECHANIC . WELDER			
602	TRACTOR TRAILER DRIVER			

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE
603				
TRUCK DRIVER (HAULING MACHINERY INCLUDING OPERATION OF HAND AND POWER OPERATED WINCHES)				
GROUP 2	2023-11-20	31.00	12.75	43.75
604				
FOUR OR MORE AXLE UNIT, STRAIGHT BODY TRUCK				
GROUP 3	2023-11-20	25.25	6.91	32.16
605				
BITUMINOUS DISTRIBUTOR DRIVER				
606				
BITUMINOUS DISTRIBUTOR (ONE PERSON OPERATION)				
607				
THREE AXLE UNITS				
GROUP 4	2023-11-20	23.70	6.91	30.61
608				
BITUMINOUS DISTRIBUTOR SPRAY OPERATOR (REAR AND OILER)				
609				
DUMP PERSON				
610				
GREASER				
611				
PILOT CAR DRIVER				
612				
RUBBER-TIRED, SELF-PROPELLED PACKER UNDER 8 TONS				
613				
TWO AXLE UNIT				
614				
SLURRY OPERATOR				
615				
TANK TRUCK HELPER (GAS, OIL, ROAD OIL, AND WATER)				
616				
TRACTOR OPERATOR, UNDER 50 H.P.				
SPECIAL CRAFTS				
701	2023-11-20	17.50	2.79	20.29
HEATING AND FROST INSULATORS				
702	2023-11-20	44.37	30.55	74.92
BOILERMAKERS				
	2024-01-01	46.00	31.93	77.93
703				
BRICKLAYERS				
FOR RATE CALL 651-284-5091 OR EMAIL DLLPREVWAGE@STATE.MN.US				
704	2023-11-20	32.47	24.10	56.57
CARPENTERS				
705				
CARPET LAYERS (LINOLEUM)				
FOR RATE CALL 651-284-5091 OR EMAIL DLLPREVWAGE@STATE.MN.US				
706	2023-11-20	43.00	23.72	66.72
CEMENT MASONS				
707	2023-11-20	43.67	27.49	71.16
ELECTRICIANS				
711	2023-11-20	16.63	6.38	23.01
GROUND PERSON				

LABOR CODE AND CLASS	EFFECT DATE	BASIC RATE	FRINGE RATE	TOTAL RATE	
712	IRONWORKERS	2023-11-20	43.00	34.11	77.11
		2024-04-28	46.00	34.11	80.11
713	LINEMAN	2023-11-20	50.86	23.06	73.92
714	MILLWRIGHT	2023-11-20	38.23	29.18	67.41
715	PAINTERS (INCLUDING HAND BRUSHED, HAND SPRAYED, AND THE TAPING OF PAVEMENT MARKINGS)	2023-11-20	17.50	0.00	17.50
716	PILEDRIIVER (INCLUDING VIBRATORY DRIVER OR EXTRACTOR FOR PILING AND SHEETING OPERATIONS)	2023-11-20	43.53	27.91	71.44
		2024-05-01	47.03	27.91	74.94
717	PIPEFITTERS . STEAMFITTERS	2023-11-20	41.97	25.92	67.89
719	PLUMBERS	2023-11-20	32.94	20.00	52.94
721	SHEET METAL WORKERS	2023-11-20	40.88	25.10	65.98
723	TERRAZZO WORKERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVVAGE@STATE.MN.US			
724	TILE SETTERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVVAGE@STATE.MN.US			
725	TILE FINISHERS	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVVAGE@STATE.MN.US			
727	WIRING SYSTEM TECHNICIAN	2023-11-20	41.42	18.16	59.58
728	WIRING SYSTEMS INSTALLER	2023-11-20	29.02	16.46	45.48
729	ASBESTOS ABATEMENT WORKER	2023-11-20	37.63	23.36	60.99
		2024-01-01	39.86	24.11	63.97
730	SIGN ERECTOR	FOR RATE CALL 651-284-5091 OR EMAIL DLI.PREVVAGE@STATE.MN.US			

CONSENT OF SURETY TO FINAL PAYMENT

AIA Document G707

(Instructions on reverse side)

OWNER
ARCHITECT
CONTRACTOR
SURETY
OTHER

TO OWNER:
(Name and address)

ARCHITECT'S PROJECT NO.:

CONTRACT FOR:

PROJECT:
(Name and address)

CONTRACT DATED:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of
(Insert name and address of Contractor)

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of
any of its obligations to
(Insert name and address of Owner)

, CONTRACTOR,

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

(Surety)

(Signature of authorized representative)

Attest:
(Seal):

(Printed name and title)



CAUTION: You should sign an original AIA document that has this caution printed in red. An original assures that changes will not be obscured as may occur when documents are reproduced. See Instruction Sheet for Limited License for Reproduction of this document.



INSTRUCTION SHEET

FOR AIA DOCUMENT G707, CONSENT OF SURETY TO FINAL PAYMENT

A. GENERAL INFORMATION

1. Purpose

This document is intended for use as a companion to AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims, on construction projects where the Contractor is required to furnish a bond. By obtaining the Surety's approval of final payment to the Contractor and its agreement that final payment will not relieve the Surety of any of its obligations, the Owner may preserve its rights under the bond.

2. Related Documents

This document may be used with most of the AIA's Owner-Contractor agreements and general conditions, such as A201 and its related family of documents. As noted above, this is a companion document to AIA Document G706.

3. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA, an AIA component chapter or a current AIA Documents List to determine the current edition of each document.

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B. CHANGES FROM THE PREVIOUS EDITION

Changes in the location of various items of information were made, without revision to the substance of the document.

C. COMPLETING THE G707 FORM

GENERAL: The bond form is the usual source of required information such as the contract date and the names and addresses of the Surety, Owner, Contractor and Project.

ARCHITECT'S PROJECT NO.: This information is typically supplied by the Architect and entered on the form by the Contractor.

CONTRACT FOR: This refers to the scope of the contract, such as "General Construction" or "Mechanical Work".

D. EXECUTION OF THE DOCUMENT

The G707 form requires both the Surety's seal and the signature of the Surety's authorized representative.

MINNESOTA LABOR AND WAGE RATE REQUIREMENTS

1.01 GENERAL

- A. Contractor shall conform to the requirements herein specified.
- B. The wage rates provided are in effect on the date of these documents and shall remain in effect for the entire project regardless of the start date or duration of the Work.

1.02 LABOR PROVISIONS

- A. Contractor shall have copies of these provisions on file at the job headquarters, and shall post a notice, approved by Engineer, in a conspicuous place at the site of the Work, informing employees that these provisions are available for their inspection. If a job headquarters is not provided, Contractor shall provide an individual copy to each employee on the job. A copy of the submitted notice will be provided to Owner.

1.03 EMPLOYMENT CLASSIFICATIONS

- A. All employees on the Project shall be classified as being in one of the following four categories, in accordance with the definitions given:
 - 1. Executive or Administrative
 - a. Employees in this category shall be classified in accordance with the definitions for Executive and Administrative employees as adopted by the Secretary of Labor, and in effect at the time of invitations for bids.
 - 2. Skilled
 - a. Skilled labor shall include the operators of complex, heavy power equipment and skilled craftsmen at the journeyman grade.
 - 3. Intermediate Grade
 - a. Intermediate Grade labor shall include:
 - 1) Operators of power equipment except complex, heavy power equipment; trucks of 1 and 1/2 tons or less (manufacturer's rated capacity); tractors of less than 20 horsepower (manufacturer's rated capacity), and passenger cars; and
 - 2) Persons performing any other labor that requires considerable training and experience.
 - 4. Unskilled
 - a. Unskilled labor shall include:
 - 1) Operators of trucks of 1 and 1/2 tons or less (manufacturer's rated capacity), operators of tractors of less than 20 horsepower (manufacturer's rated capacity), and operators of passenger cars; and
 - 2) Helpers of journeyman craftsmen and all other labor that requires no special skill or experience or the exercise of discretion or judgment.

1.04 LABOR INFORMATION

- A. In the selection of labor, Contractor may use the services of the Minnesota State Employment Service.

1.05 MINIMUM WAGE RATES

- A. The minimum hourly rates of wages required to be paid to the various laborers and mechanics employed by Contractor shall be an amount equal to the sum of the basic hourly wage rate plus applicable fringe benefits as noted in the schedule contained in the prevailing Wages for state Funded Construction projects of the Minnesota Department of Labor and Industry. These rates have been determined by the Minnesota Department of Labor and Industry pursuant to the provisions set forth in Minnesota Statutes, Sections 177.41 through 177.44 as applicable, to be those prevailing on the same type of work on similar construction in the immediate locality.

During the periods from the time an hourly employee is required to report for duty at the site of the Work until such time that they are released or permitted to leave the site of the Work, no deduction shall be made from their time for any delays of less than 30 consecutive minutes.

In the event the Contractor or subcontractor employees apprentice workers under the occupational training program of the State of Minnesota, Department of Education, or under the Division of Voluntary Apprenticeship of the State of Minnesota, Department of Labor and Industry, or under the Veterans Training Program of the United States Veterans Administration, they may pay wages to such apprentice workers at hourly rates approved by the appropriate agency regardless of the hourly rates specified in the schedule of wage rates to be paid to any classification of labor.

A Contractor or subcontractor may discharge their minimum hourly rate obligation as defined above by (a) making cash payments to the employee plus payments to an employees' fringe benefit program, funded or unfunded, that is established by collective bargaining agreements, the sum of which is equal to the minimum hourly rate; or (b) making payments in cash to the employee in the amount equal to the minimum hourly rate.

While the rates shown are at the minimum hourly rates required for the life of this Contract, this is not a representation that labor can be obtained at these rates. It is the responsibility of bidders to inform themselves as to local labor conditions and prospective changes or adjustments of wage rates. No increase in the Contract Price shall be allowed or authorized on account of payment or rates in excess of those listed herein.

All cash payments due to mechanics and laborers employed or working upon the site of the Work shall be paid unconditionally and not less often than once a week, and without subsequent deductions or rebate on any account regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and such laborers and mechanics.

The schedule shall be kept posted by the Contractor at the site of the Work in a conspicuous place where it can be easily seen by the workers.

If an employee has a question in regard to the minimum wage rate paid, they should communicate directly with their employer. If the issue remains unresolved, the employee should be informed that they may take their question to the Owner for solution.

Owner may withhold or cause to be withheld from the Contractor a portion of the amounts due to the Contractor as may be considered necessary to ensure payment to laborers and mechanics employed by the Contractor or any subcontractor on the Work the full amount of the minimum hourly rates required by the Contract.

1.06 PREVAILING HOURS OF LABOR

- A. The Prevailing Wages for State Funded Construction Contracts issued by the Minnesota Department of Labor and Industry, which are available from the Department of Labor and Industry, set forth the Prevailing Hours of Labor as 8 hours per day or 40 hours per week. In accordance with Minnesota Statutes Sections 177.41 through 177.44 as applicable, Subdivision 1, employees may not be permitted or required to work longer than the prevailing Hours of Labor unless the employee is paid for all hours in excess of the prevailing hours at a rate of at least 1 and 1/2 times their hourly basic rate of pay; nor shall they be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area.

1.07 REQUIRED CONTRACT PROVISIONS

- A. These Contract provisions shall apply to all Work performed on the Contract by the Contractor with their own organization and with the assistance of workmen under their immediate superintendence and to all Work performed on the Contract by piecework, station work, or by subcontract.

Contractor shall insert in each of their subcontracts all stipulations contained in these Required Contract Provisions and also a clause requiring their subcontractors to include these Required Contract Provisions

in any lower tier subcontracts which they may enter into, together with a clause requiring the inclusion of these provisions in any further subcontract that may in turn be made. The Required Contract Provisions shall in no instance be incorporated by reference.

A breach of any of the stipulations contained in these Required Contract provisions may be grounds for termination of the Contract.

1.08 STATEMENTS AND PAYROLLS

A. Payrolls and Payroll Records

1. 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, mechanics, apprentices, trainees, watchmen, and guards working at the site of the Work. Such records shall contain name, social security number, and address of each such employee, their correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever it is found by the Department of Labor, upon written request of the Contractor, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program, 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.
2. While performing work on the Contract, the Contractor shall furnish under oath signed by an owner or officer of the organization, to the contracting authority and the project owner every two weeks, a certified payroll report with respect to the wages and benefits paid each employee during the preceding weeks specifying for each employee the following:
 - a. Full name.
 - b. Individual identification number (e.g., Last four digits of social security number, full social security numbers and addresses shall not be submitted with certified payroll reports).
 - c. Prevailing wage master job classification.
 - d. Hours worked each day.
 - e. Total hours.
 - f. Rate of pay.
 - g. Gross amount earned.
 - h. Each deduction for taxes.
 - i. Total deductions.
 - j. Net pay for the week.
 - k. Dollars contributed per hour for each benefit (including name and address of administrator).
 - l. Benefit account number.
 - m. Telephone number for health and welfare, vacation or holiday, apprenticeship training, pension, and other benefit programs.
 - n. Contractor shall submit a statement indicating that the wage rates contained therein are not less than those determined by the Department of Labor and Industry, and that the classification set forth for each laborer or mechanic conform with the work they performed, i.e., Form MnDOT 21658A.
3. Contractor shall make the records required under the labor standards clauses of the Contract available for inspection by authorized representatives of the Owner and the Department of Labor and Industry, and shall permit such representatives to interview employees during working hours on the job.
4. The wages of labor shall be paid in legal tender of the United States, except that this will be considered satisfied if payment is made by negotiable check, on a solvent bank, which may be cashed readily by the employee in the local community for the full amount, without discount or collection charges of any kind. Where checks are used for payment, Contractor shall make all necessary arrangements for them to be cashed and shall give information regarding such arrangements.
5. No fee of any kind shall be asked or accepted by the Contractor or any of their agents from any person as a condition of employment on the Project.
6. No laborers shall be charged for any tools in performing their respective duties except for reasonable avoidable loss or damage thereto.

7. Every employee on the Work covered by this Contract shall be permitted to lodge, board, and trade where and with whom they elect, and neither Contractor nor their agents, nor their employees shall, directly or indirectly, require as a condition of employment that an employee shall lodge, board, or trade at a particular place or with a particular person.
8. No charge shall be made for any transportation furnished by the Contractor, or their agents, to any person employed on the Work.
9. No individual shall be employed as a laborer or mechanic on this Contract except on a wage basis, but this shall not be construed to prohibit the rental of teams, trucks, or other equipment from an individual.
10. It shall be Contractor's responsibility to determine the proper wage rates to be paid for each class of Work on this Contract.

1.09 PAYROLL CERTIFICATION

- A. With initial Application for Payment, submit statement from each contractor that prevailing wages were paid to personnel working on the Project.
- B. Copies of weekly payroll statements may be required by Owner.
- C. Contractor shall submit certification that they have complied with this section of the specifications before final payment will be made.

END OF DOCUMENT

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Work Included in Contract Documents
 - 2. Contract Information
 - 3. Work Under Other Contracts
 - 4. Contractor Use of Premises
 - 5. Occupancy Requirements
 - 6. Products Ordered in Advance
 - 7. Owner Furnished Products
 - 8. Work Restrictions
 - 9. Key Dates to Note
 - 10. Garbage Collection
 - 11. Construction Staking
 - 12. Machine Time (Hour)
 - 13. Grading for Sidewalks, Drives, and Alleys
 - 14. Seasonal Adjustment of Castings
 - 15. Seasonal Adjustment of Gate Valve Boxes
 - 16. Access to Businesses and Emergency Services
 - 17. Seasonal Roadway and Sidewalk Transition

1.02 WORK INCLUDED IN CONTRACT DOCUMENTS

- A. Description of the Project:
 - 1. Construction sanitary sewer, sanitary sewer services, water main, water services, storm sewer, drain tile, sump pump services, concrete curb and gutter, sidewalk, aggregate base, bituminous surfacing, lift station reconstruction, well rehabilitation, turf restoration, and miscellaneous items required to properly complete the improvements.

1.03 CONTRACT INFORMATION

- A. Type of Contract: Owner will award a Single Prime Contract.

1.04 WORK UNDER OTHER CONTRACTS

- A. Private Utility Companies:
 - 1. Utility Design and Coordination meetings have been held with the private utilities in the Project area. Contractor should anticipate some relocation work taking place within the Project area.
 - 2. The following utilities are known to be in conflict with some of the proposed construction. The following utilities will be relocating facilities in the Project area:
 - a. Silver Lake Public Utilities (Sanitary Sewer and Water)
 - b. Electric (Xcel Energy)
 - c. Telephone, Television, and Internet (Lumen)
 - d. Gas (CenterPoint Energy)
- B. Other Work at Site:
 - 1. Owner reserves the right to let other separate contracts for Work of the Project, or to pursue other Work at the Site with its own personnel.
 - 2. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
 - 3. Coordinate the Work of this Contract with work performed under separate contracts.

- C. Work Not Included:
 - 1. Work not included is either marked "NIC," or "by others," on Drawings or is noted in each section of Specifications.
 - 2. Provide all labor and materials required unless so specifically noted or marked.
 - 3. Install Work indicated to be furnished by others or Owner unless specifically stipulated to be furnished and installed by others or Owner.

1.05 CONTRACTOR USE OF PREMISES

- A. Confine operations at Site to areas permitted under contract or as directed by Engineer.
- B. Conform to site rules and regulations affecting Work while engaged in Project construction.
- C. Existing Structures:
 - 1. Keep existing driveways, playgrounds, playing fields, and adjacent streets clear and available to public in accordance with Owner's or local authority's requirements.
 - 2. Protect building and occupants during construction period.
 - 3. Repair damages caused to existing public and private property and structures due to operations of Contractor to the satisfaction of, and at no additional cost to Owner.
 - 4. Take complete field measurements affecting all existing construction, wiring, piping, and equipment in this Contract, and assume responsibility for proper fit between Work and existing structures and other equipment.
- D. Construction personnel may park only in areas designated by the Owner.
- E. Damaged Property:
 - 1. Patch and/or clean existing improvements and restore damage of property on, or adjacent to Site occasioned by this Work, including, but not limited to, lawns, walks, curbs, pavements, roadways, structures, and utilities which are cut or damaged by operations and are not designated for removal, relocation, or replacement in the course of construction.
 - 2. Public Property or Utilities: Comply with laws, ordinances, rules, regulations, standards, orders of utility owner or any public authority having jurisdiction.
 - 3. Provide written acceptance of restoration work by authority or Owner.
- F. Product Requirements:
 - 1. Confine stockpiling of materials or equipment and location of storage sheds and offices to areas approved by Owner and Engineer.
 - a. No storage of materials or equipment will be allowed on areas of the Project that are not actively under construction.
 - b. All stockpiles to meet SWPPP erosion control requirements.
 - c. Erosion control devices around stockpiles or staging areas shall be incidental to the project.
 - 2. If additional storage is necessary and is not allowed by Owner, obtain and pay for such storage offsite.
- G. Open Trenches: Contractor shall close all open trenches at the end of each working day.
- H. Ramping Driveways, Business Entrances, and Loading Docks: When construction progress allows, access will be restored at the end of each day using suitable materials to ramp up to property owner's driveway, entrance, or loading dock.
- I. The Contractor's operations shall be confined to the areas covered in rights-of-way and easements granted to the Owner. Any procedures by the Contractor beyond the limits indicated shall be the sole responsibility of the Contractor, who shall save the Owner harmless from any claim for damages due to trespassing.

1.06 OCCUPANCY REQUIREMENTS

- A. General Requirements:
 - 1. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
 - 2. Schedule the Work to accommodate this requirement.
 - 3. Coordinate activities which could cause interruption to Owner's activities.
 - 4. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Occupation During Construction:
 - 1. Owner will occupy the premises during entire construction period, with the exception of areas under construction.
 - a. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities, unless receiving written permission from Owner and authorities having jurisdiction.
 - b. Maintain existing exits, unless otherwise indicated.
- C. Owner Occupancy of Completed Areas of Construction:
 - 1. Owner reserves the right to place and install equipment as necessary in completed areas of the facilities and to occupy such completed areas prior to Substantial Completion in accordance with the Supplementary Conditions. Such use shall not constitute acceptance of such portions of the Work or relieve the Contractor of any obligations except for improper use or damage caused by employees or agents of Owner.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 3. Mechanical and electrical systems shall be fully operational and required tests and inspection successfully completed.
 - 4. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
 - 5. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.07 PRODUCTS ORDERED IN ADVANCE

- A. Storage:
 - 1. Products will be allowed to be stored at the Site prior to commencement of construction activities.
 - 2. Contractor shall store such items as directed by Owner.

1.08 OWNER FURNISHED PRODUCTS

- A. Items furnished by Owner will be identified in the Specification sections.
- B. Owner's Responsibilities:
 - 1. Arrange for, and deliver Owner reviewed Shop Drawings, Product Data and samples to Contractor.
 - 2. Arrange and pay for product delivery to Site.
 - 3. At time of delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections and service.
- C. Contractor's Responsibilities:
 - 1. Review Owner reviewed Shop Drawings, Product Data and samples.
 - 2. Receive and unload products at Site; inspect for completeness or damage, jointly with Owner.
 - 3. Provide support systems to receive Owner's equipment.
 - 4. Protect Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
 - 5. Install and otherwise incorporate Owner-furnished items into the Work.
 - 6. Repair or replace items damaged after receipt, except that damage caused by Owner's employees or agents.

1.09 WORK RESTRICTIONS

- A. On-Site Work Hours:
 - 1. Normal business working hours of 7:00 a.m. to 7:00 p.m. Monday through Friday.
 - 2. Weekend Hours: 7:00 a.m. to 3:00 p.m. Saturdays as approved by Engineer, if requested and approved one week in advance. No work allowed on Sundays.
 - 3. Legal Holidays: Work not allowed.
 - 4. Hours for Utility Shutdowns: As approved by Engineer.
 - 5. Hours for Core Drilling or Noisy Activity: As approved by Engineer.
- B. Existing Utility Interruption:
 - 1. Do not interrupt utilities serving facilities occupied by Owner or others without written permission by Engineer or Owner.
 - 2. Notify Engineer not less than 2 days in advance of proposed utility interruptions.
 - 3. Contractor shall be responsible for notifying all affected property owners of utility shutdowns, interruptions, and/or temporary connections. Contractor shall coordinate with Owner and Engineer at least 72 hours prior to these activities. Contractor shall notify affected property owners at least 48 hours prior to these activities.

1.10 KEY DATES TO NOTE

- A. Garbage Pickup: Thursday
- B. Recycling Pickup: Every other Thursday
- C. Town Festival: August 1–3, 2025; August 7–9, 2026
- D. GSL Students at Lakeside Elementary:
 - 1. Last Day 2024 school year: May 28, 2025
 - 2. First Day 2025 school year: September 2, 2025
 - 3. Last Day 2025 school year: May 29, 2026
 - 4. First Day 2026 school year: September 8, 2026

1.11 GARBAGE COLLECTION

- A. After the preconstruction conference and prior to start of construction Work, Contractor shall meet with the Owner, Engineer, and the local garbage collection agency to develop a plan for maintaining weekly garbage collection for all residents and businesses affected by the Project. Subsequent meetings should be scheduled to modify the plan as construction moves forward.
- B. It shall be the Contractor's responsibility to collect, move, and return all garbage (tape house number on all garbage cans), recycling, and other refuse containers on the Project that cannot be directly accessed by the garbage collection agency. Contractor shall designate his own work forces and equipment to accomplish this task. No separate payment will be made to the Contractor for this Work.
- C. Failure to complete this Work will result in Work being completed by the Owner or the Owner's representatives with twice the cost thereof for both labor and equipment being deducted from any monies due Contractor.

1.12 CONSTRUCTION STAKING

- A. Engineer shall provide necessary staking for all Work on this Project. (Initial Staking.) Contractor shall notify Engineer 48 hours prior (excluding weekends) to any staking needs.
- B. Contractor shall be responsible for any re-staking.

1.13 MACHINE TIME (HOUR)

- A. Pay item shall provide for investigative excavation (minimum 1.0 cubic yard backhoe, operator, and laborer) as preapproved by the Engineer; all other related items shall be incidental.
- B. Engineer may request investigative excavation for efforts and items that are outside of normal construction and pay item activities.
- C. Work must be authorized by the Engineer to be eligible for payment.

1.14 GRADING FOR SIDEWALKS, DRIVES, AND ALLEYS

- A. Any common excavation or embankment for sidewalks, drives, and alleys shall be incidental.
- B. Aggregate base needed for sidewalks, drives, and alleys shall be incidental.

1.15 SEASONAL ADJUSTMENT OF CASTINGS

- A. The Project includes installation of new castings on new sanitary and storm structures.
- B. Casting Assembly (Sanitary or Storm) assumes one initial casting adjustment and a second casting adjustment at the time final wear.
- C. Metal adjusting rings will be allowed for making casting adjustments to the final wear course surface level.

1.16 SEASONAL ADJUSTMENT OF GATE VALVE BOXES

- A. Seasonal adjustment of gate valve boxes in preparation of the wear course paving the following season shall be incidental.

1.17 ACCESS TO BUSINESSES AND EMERGENCY SERVICES

- A. At least one access to each business within the project area shall be maintained at all times. Accommodations shall be made to notify patrons of temporary road closures and temporary detours during required utility and roadway work. Intersections and driving surfaces shall be restored and opened to traffic in a timely manner.
- B. Utility and roadway work will be occurring throughout the majority of the City. Contractor to coordinate with the Fire Department during construction to maintain access at all times for emergency services.

1.18 SEASONAL ROADWAY AND SIDEWALK TRANSITION

- A. Contractor shall provide for a smooth, hard surface transition between any existing street and a reconstructed street until the final wear placement.
 - 1. The seasonal roadway transitions shall be incidental and shall be paved with the appropriate thickness of bituminous mixture. Transition length and profile must be smooth for the driving public and for plow operations and must be accepted by the Engineer.
- B. Any seasonal sidewalk transitions shall be incidental, shall be ADA compliant, and shall be a hard surface with temporary bituminous or concrete and able to support sidewalk snow removal equipment.
- C. Contractor will be responsible for any maintenance of pavement surface between construction seasons.
- D. Material, placement, and removal of temporary surface is incidental.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 12 16

WORK SEQUENCE

PART 1 GENERAL

1.01 SUMMARY

- A. General identification of Work sequence.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 31 13 - Coordination
 - 3. Section 01 33 00 - Submittal Procedures
 - 4. Section 01 75 00 - Starting and Adjusting
 - 5. Section 26 05 01 - Demolition
 - 6. Section 40 23 60 - Wastewater Process Piping Testing

1.02 QUALITY ASSURANCE

- A. Coordinate all equipment shutdowns, startups, and general scheduling with Engineer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 GENERAL

- A. Construct Work in stages to accommodate the Owner's, County's, and MnDOT's requirements during the construction period.
- B. Under any emergency condition, modification and connections are to be pursued on a 24-hour per day basis and 7 days per week.
- C. Determine type and extent of temporary facilities the Project requires to maintain continuous operation.
- D. Provide all temporary connections, parallel temporary lines, temporary power, temporary bulkheads, temporary equipment, and temporary operations necessary to perform Work.
- E. Submit a detailed Phasing Schedule in accordance with Section 01 33 00. Schedule to include:
 - 1. Construction dates for each component of Work identified in each phase.
 - 2. Description of Work sequence.
 - 3. Description of interaction with existing plant facilities.
 - 4. Temporary pumping, piping, and utility services to maintain operability for facility.
 - 5. Traffic Control measures.
 - 6. Resubmit until approved by Engineer.
- F. Review existing facility with Owner to become familiar with potentially difficult items that must remain in service. No Work procedures will be permitted that require shutting down of any portion of existing facility, except as authorized by Engineer.

- G. Owner will need to access all parts of the site at all times. While new and existing entry ways are under construction/modification, maintain a means of access to all parts of the site at all times.
- H. Provide Owner written notice (10) weekdays in advance to start of Work at a new facility and equipment as noted in the Work Sequence. Include anticipated start date, anticipated duration of Work, and an updated Work Schedule. Provide written notice using "Operation Impact Notice" form at end of section. Separate forms shall be submitted for each impact and resubmitted until approved by Owner and Engineer.
- I. Provide Owner written notice (7) weekdays in advance of removing a treatment process from service or otherwise altering the normal operation of treatment processes due to construction. 7 day notice does not include federal holidays. Indicate start date of Work, anticipated duration of Work, Work to be completed, and contingencies if Work is not completed as anticipated. Owner shall be afforded an opportunity to provide comments prior to start of Work.
- J. Paving of the final bituminous wear course shall occur the next construction season following the base course paving and before the Final Completion date.
- K. All other Work items shall be completed on or before the interim completion dates set in the Agreement and the phasing plan.

3.02 SEQUENCING REQUIREMENTS

- A. General: Refer to Drawings Sheet 38 for designated Areas.
 - 1. Area 1 - Station 12+00 to Highway 7 shall be up to gravel within 4 weeks of start of Work.
 - 2. Area 2 - Cannot begin until Substantial Completion of Area 1.
 - 3. Area 3 - Cannot begin until Substantial Completion of Area 2.
 - 4. Area 4 - Cannot begin until Substantial Completion of Area 3.
 - a. Shall be Substantially Completed on or before July 25, 2025, or cannot begin until August 10, 2025.
 - 5. Area 5 - Cannot begin until Substantial Completion of Area 2.
 - 6. Area 6 - Can be completed concurrently with Areas 1 through 5.
 - 7. Area 7 - Cannot begin until Substantial Completion of areas 4 and 5.
 - 8. Area 8 - Cannot begin until June 2, 2025.
 - a. Shall be Substantially Complete on or Before August 25, 2025.
 - 9. Area 9 - Cannot begin until Substantial Completion of Area 8.
 - 10. Area 10:
 - a. Cannot begin until Substantial Completion of Area 9.
 - b. Cannot begin until rehabilitation of Wellhouse 2.
 - 1) Wellhouse 1 shall be complete prior to Wellhouse 2.
 - 11. Area 11 - Can be completed concurrently with any other areas.
 - a. Shall be up to gravel within 4 weeks of starting any given street section.
- B. The following is a list of sequencing requirements. This is not intended to be exhaustive, nor does it relieve the Contractor of any responsibility in developing or implementing a Phasing Schedule.
- C. Startup, Training, or Initiation of Operation
 - 1. Startup, training, or initiation of operation for new equipment shall not occur on Friday, Saturday, Sunday, or within 3 calendar days of federal holidays.
- D. Access and Operation
 - 1. Owner will continue operations of treatment facilities during construction operations.
 - 2. Keep existing facility in service until operation of new facility has been reliably demonstrated.
 - 3. Do not commence with demolition of existing components without consent of the Owner and Engineer.
 - 4. Truck access shall be maintained throughout the site during course of the Work. Interruptions to access shall be no more than 4 consecutive days.

E. Utilities

1. Electrical

- a. Existing electrical panels must remain in operation until new panels and equipment are in service.
- b. As processes and equipment are started-up and put in operation, the controls for those processes and equipment shall be 100 percent functional in automatic and manual control modes.
- c. Refer to Section 26 05 01.

2. Natural Gas

- a. Existing natural gas meters, regulators, valves, and controls must remain in operation until new equipment is in service.

F. Wastewater Sequencing

1. Demolition of existing wastewater treatment facilities may not occur until new force main, Cleveland Lift Station, Main Lift Station controls and metering manhole are operational.

a. Force Main

- 1) Force main shall be installed, pressure tested, and backfilled to surrounding grade to be considered operational.
- 2) Valves, piping, and accessories shall be installed and functional to be considered operational.
- 3) Piping, valves, and accessories have been satisfactorily tested and approved by the Engineer per Section 40 23 60.

2. Main Lift Station controls

- a. Proposed Work include installation of a new Main Lift Station pump control panel, level instrumentation and electrical components.
- b. Contractor shall provide the temporary pumping and hauling of wastewater from the Main Lift Station wetwell to the Silver Lake Wastewater Lagoons and coordinate with the City of Silver Lake.
- c. Contractor shall provide a written bypass plan a minimum 30 days prior to bypassing wastewater flow for comment by the Owner and Engineer.
- d. Contractor shall pump wastewater from the Main Lift Station wetwell to the Silver Lake Wastewater Lagoons during installation of the new Main Lift Station controls with temporary force main piping. Means of hauling wastewater can also be used during bypassing procedures. Refer to the Drawings for details.
- e. Temporary pumping shall conform to the following requirements:
 - 1) Minimum pump design flow rate: 690 gallons per minute at 130 TDH.
 - 2) Average day total flow: 189,000 gallons.
 - 3) Temporary power and controls for pumping equipment.
 - 4) Additional requirements as described in Section 01 51 00.
- f. Temporary pumping shall include, at a minimum, one operator to stay with the pumping operation and/or one operator to drive hauled wastewater to the wastewater lagoons.
- g. Temporary pumping shall remain in place until the new Main Lift Station controls are installed and tested for both hand and automatic operation of the existing lift station pumps.
- h. Main Lift Station controls shall operate without the need for operator intervention due to construction related issues for a minimum of 7 continuous days to be considered operational. Temporary pumping can be removed once the Main Lift Station controls are considered operational as long as all the installations at the Metering Manhole (Alternate 5) have been completed.

3. Metering Manhole (Alternate 5)

- a. Proposed Work include installation of a new metering manhole. This work will take place only if Alternate 5 is chosen to be part of this project.
- b. Contractor shall provide the temporary pumping and hauling of wastewater from the Main Lift Station wetwell to the Silver Lake Wastewater Lagoons and coordinate with the City of Silver Lake.
- c. Contractor shall provide a written bypass plan a minimum 30 days prior to bypassing wastewater flow for comment by the Owner and Engineer.
- d. Contractor shall pump wastewater from the Main Lift Station wetwell to the Silver Lake Wastewater Lagoons during installation of the new Metering Manhole with temporary force

- main piping. Means of hauling wastewater can also be used during bypassing procedures. Refer to the Drawings for details.
- e. Temporary pumping shall conform to the following requirements:
 - 1) Minimum pump design flow rate: 690 gallons per minute at 130 TDH.
 - 2) Average day total flow: 189,000 gallons.
 - 3) Temporary power and controls for pumping equipment.
 - 4) Additional requirements as described in Section 01 51 00 Temporary Utilities.
 - f. Temporary pumping shall include, at a minimum, one operator to stay with the pumping operation and/or one operator to drive hauled wastewater to the wastewater lagoons.
 - g. Temporary pumping shall remain in place until the new metering manhole is installed, piped, coated, backfilled and tested. Piping, valves, and accessories must be satisfactorily tested and approved by the Engineer per Section 40 23 60.
 - h. Metering Manhole shall be tested for a minimum of 7 continuous days to be considered operational. Temporary pumping can be removed once the Metering Manhole is considered operational as long as all the installations at the Main Lift Station have been completed.
4. Cleveland Lift Station
- a. Contractor shall provide a written bypass plan a minimum 30 days prior to bypassing wastewater flow for comment by the Owner, Engineer, and City of Silver Lake.
 - b. Contractor shall pump wastewater from the existing Cleveland Lift Station to the discharge manhole during installation of the new Cleveland Lift Station and coordinate with the City of Silver Lake. Existing lift station pumps and controls will need to be moved from the existing lift station to the new lift station during this time. Refer to the Drawings for details on locations of temporary bypassing.
 - c. Temporary pumping shall conform to the following requirements:
 - 1) Minimum pump design flow rate: 550 gallons per minute at 36.7 TDH.
 - 2) Average day total flow: 149,000 gallons.
 - 3) Temporary power and controls for pumping equipment.
 - 4) Additional requirements as described in Section 01 51 00.
 - d. Temporary pumping shall include, at a minimum, one operator to stay with the pumping operation.
 - e. Temporary pumping shall remain in place until new Cleveland Lift Station is operational as described below.
 - f. Demolition of the existing Cleveland Lift Station may not occur until new force main, Cleveland Lift Station, and controls are operational.
 - g. Fully operational Cleveland Lift Station includes backup power, controls, instrumentation and pumping. Valves, piping, and accessories shall be installed and functional before testing of the new lift station. Cleveland Lift Station must be installed, piped, coated, backfilled and tested.
 - h. Force main shall be installed, pressure tested, and backfilled to surrounding grade to be considered operational. Piping, valves, and accessories must be satisfactorily tested and approved by the Engineer as referred to in Section 40 23 60.
 - i. Lift station shall operate without the need for operator intervention due to construction related issues for a minimum of seven (7) continuous days to be considered operational.
 - j. Lift station equipment shall be installed with manufacturer startup representative onsite to perform startup procedures. Refer to Section 01 75 00.
 - k. Contractor shall coordinate with the Owner preferred pump maintenance provider to be onsite during startup.
5. Removal and replacement of fence and gates at wastewater pond site:
- a. Woven wire fence replacement, vehicle gate, pedestrian gate and security sign installation can be performed at any time throughout the project.
 - b. Contractor shall provide temporary fencing for any area unfenced during normal construction hours.
 - c. Contractor must contact the Owner before performing this work as access will be needed to the site.
 - d. Contractor shall maintain access to the site and coordinate with the City of Silver Lake to continue operations.

6. Primary Pond Control Structure (Alternate 6)
 - a. Proposed Work include installation of a new primary pond control structure between Primary Pond #1 and #2. This work will take place only if Alternate 6 is chosen to be part of this project.
 - b. Control structure installation can take place any time throughout the project.
 - c. Contractor is responsible for coordinating demolition and installation of new control structure with the Engineer and City of Silver Lake. Operations staff must have continued access to the pond site to continue normal operations.
 - d. Do not commence with demolition of existing facility without consent of Owner and Engineer.
 - e. The Contractor is responsible for pumping associated with transfer of water to drawdown ponds as necessary to complete the work. The Contractor is responsible for the removal of accumulated solids and sludge as necessary to complete Work. Disposal of accumulated solids shall comply with all local, state, and federal requirements. All equipment associated with pumping and removal of accumulated solids and sludge is the responsibility of the Contractor.
 - f. Operation of new control structure must wait until thin wall tube tests are complete and shown to meet requirements for the clay liner installation. Piping and accessories must be satisfactorily tested and approved by the Engineer as referred to in Section 40 23 60.
 - g. The Owner discharges effluent from the secondary pond cell May 1 to May 31, and October 1 to October 31. Contractor shall coordinate with Owner for pumping of water from primary pond cells as required for Work such that pumping corresponds to secondary pond cell discharge and the ability to pump between primary pond cells or primary and secondary ponds cells as the Owner directs. No pumping shall occur at times not authorized by Owner.

END OF SECTION

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SECTION 01 21 00

ALLOWANCES

PART 1 GENERAL

1.01 SUMMARY

- A. Administrative and procedural requirements governing handling and processing allowances.
- B. Types of Allowances:
 - 1. Lump-sum allowance.
- C. Schedule of Allowances.
- D. Related Sections:
 - 1. Section 26 00 00 - General Provisions for Electrical Systems
 - 2. Section 33 21 11 - Well Rehabilitation

1.02 DEFINITIONS

- A. A monetary amount or product quantity established by Owner to be included in Bid for an otherwise undefined item.
- B. Contingency Allowance: Reserve amounts to be included in Contract Price to cover unforeseen conditions.
- C. Lump-Sum Allowance: Amount to be included in Contract Price to cover selection of products after Contract has been awarded.

1.03 SELECTION AND PURCHASE

- A. At earliest feasible date after Contract award, advise Engineer of date when final selection and purchase of each product or system described by an allowance must be completed in order to avoid delay in performance of Work.
- B. When requested by Engineer, obtain proposals for each allowance for use in making final selections; include recommendations relevant to performance of Work.
- C. Purchase products and systems as selected by Engineer from designated supplier.

1.04 SUBMITTALS

- A. Proposals for Purchase of Products or Systems: Submit in form specified for Change Orders.
- B. Invoices or Delivery Slips: Submit to indicate actual quantities of materials delivered to Site.

1.05 LUMP SUM/UNIT COST ALLOWANCE

- A. Costs Included:
 - 1. Include the following costs; submit invoice from manufacturer to Engineer.
 - a. Wholesale cost of material.
 - b. Shipping cost.
 - c. Tax.
- B. Costs Not Included in Allowance (Include in Base Bid):
 - 1. Contractor/Subcontractor overhead and profit.

2. Labor for installation.
3. Accessory materials.
4. Incidental costs such as equipment rental.

1.06 UNUSED MATERIAL

- A. Return unused material to supplier for credit to Owner, after installation has been completed and accepted.
- B. When it is not economically practical to return material for credit, prepare unused material for storage by Owner and deliver when directed by Engineer.
- C. Disposal of material not wanted by Owner is Contractor's responsibility.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect products covered by allowance promptly upon delivery for damage or defects.

3.02 PREPARATION

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

3.03 SCHEDULE OF ALLOWANCES

- A. Lump Sum Allowance: Include allowance of \$5,000 to be used to pay electric utility to install new CT cabinets and meters for new electrical and gas services at the lift stations as specified in Section 26 00 00.
- B. Lump Sum Allowance: Include allowance of \$10,000 to be used for repairs to Well #1 pump and motor as specified in Section 33 21 11, as directed by Engineer.
- C. Lump Sum Allowance: Include allowance of \$10,000 to be used for repairs to Well #2 pump and motor as specified in Section 33 21 11, as directed by Engineer.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Alternates to be submitted to Owner with Bid for consideration of inclusion with Contract.
 - 2. Submittal procedures.
 - 3. Establishment of Contract Price and Time.
- B. Related Sections:
 - 1. Document 00 21 13 - Instructions to Bidders: Award of Contract
 - 2. Document 00 41 00 - Bid Form: Bid for each Alternate
 - 3. Notice of Award: Alternates accepted by Owner for incorporation into Work

1.02 DEFINITION

- A. Alternate: The net amount to be added to or deducted from the Base Bid Price for Work identified in Schedule of Alternates.

1.03 PROCEDURES

- A. Determine the full extent of Work affected by proposed Alternates.
- B. Coordinate related work and modify adjacent work as required to ensure that each accepted Alternate is complete and fully integrated into Work.
- C. Include as part of each Alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- D. Conform to Contract Documents for requirements for performance, appearance, workmanship, and materials not modified under the alternate bids.

1.04 SELECTION AND AWARD OF ALTERNATES

- A. Acceptance or Rejection: Alternates quoted on Bid will be reviewed and accepted or rejected at the Owner's option.
- B. Bids and alternates will be evaluated in accordance with the Instructions to Bidders.
- C. Accepted alternates will be reflected in the final Contract price.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Lake Avenue - Complete Reconstruction.

- B. Alternate No. 2: Frank Street, Center Street, and East Avenue (Complete Reconstruct).
- C. Alternate No. 3: Cleveland Street, Utilities East of Grove Avenue (Complete Reconstruct).
- D. Alternate No. 4: Oliver Avenue, Summit Avenue, and Howard Street (Cured-In-Place Pipe Lining).
- E. Alternate No. 5: Metering Manhole.
- F. Alternate No. 6: Primary Pond Control Structure.

END OF SECTION

SECTION 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Administrative and procedural requirements for handling requests for substitutions.
- B. The following is not included in this Section:
 - 1. Procedural requirements governing Contractor's selection of product options (Section 01 60 00).

1.02 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment and methods of construction required by Contract Documents proposed by Contractor.
- C. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by Owner or Engineer.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.
 - 4. "Alternates" identified on the Basis of Bid Schedule.

1.03 BID FORM

- A. Bid Form is based on a Total Bid Price contract using "Basis of Bid" items which have been identified and described in the Contract Documents and are identified in the "Basis of Bid" Schedule of the Bid Form. This schedule contains one or more names of manufacturers considered "Basis of Bid".
- B. Total Bid Price noted in Bid Form shall include installed prices of "Basis of Bid" items, not "Alternate" manufacturers.
- C. Installed prices shall include labor and material cost, profit and overhead, plus cost for all necessary appurtenances to provide a complete system.

1.04 SUBSTITUTION OF "BASIS OF BID" ITEMS: APPLICATION, REVIEW, AND APPROVAL PROCEDURES

- A. Manufacturers or suppliers who believe their equipment or products can meet the specified performance and material requirements of listed "Basis of Bid" equipment, and, with minor exception, the technical requirements of the Contract Documents, are encouraged to submit a qualifications package for an "Alternate" item.
- B. Bidder's desiring to quote a price for an "Alternate" item in lieu of a "Basis of Bid" item may, at their option, write in the name of a manufacturer in Column 2 of the "Basis of Bid" Equipment Schedule located in the Bid Form and note the installed price of that item in the space provided. Contractor is responsible for all costs including, but not limited to, engineering costs and constructions costs for modifications required to incorporate "Alternate" items into the Project.
- C. Bidder shall not use the "Alternate" installed price for any proposed "Alternate" item in preparing the Total Bid Price.

- D. "Alternate" products will not be accepted unless they conform to the Contract Documents in all respects, except for make, manufacturer, minor details, or differences necessary to avoid patent infringements.
- E. Engineer shall be sole authority for determining conformance of "Alternate" products with Contract Documents. Engineer shall not be required to demonstrate or "prove" such products are not equal to "Basis of Bid" items.
- F. Qualification Package
 - 1. For each "Alternate" item proposed by the Bidder a separate qualification package shall be submitted under separate cover, bound with protective cover, and identified by Section number and title, and product manufacturer's and supplier's name. Submit in a sealed sturdy box or suitable container with the Bid Form attached to or enclosed in the box or container.
 - a. If electronic submittal, provide as a separate PDF file and identified by Section number and title, and product manufacturer's and supplier's name.
 - 2. Qualification packages shall include the following. If an item does not apply, indicate so in submittal.
 - a. A complete set of drawings, specifications, catalog cut-sheets, and detailed descriptive material. This information shall identify all technical and performance requirements stipulated in the Contract Documents.
 - b. A complete set of Drawings showing all changes or deviations from the Contract Documents necessary for installation of the "Alternate" product(s). Contractor is responsible for all costs associated with these changes.
 - c. Detailed information for all buy-out items such as hardware, motors, bearings, reducers, belts, sheaves, motor controllers, and instrumentation.
 - d. Lists showing materials of construction of all components, including all buy-out items.
 - e. All required American Iron and Steel (AIS) certifications.
 - f. Manufacturer's recommended spare parts, including all buy-out items.
 - g. Information on equipment field erection requirements, including total weight of assembled components and weight of major sub-assemblies.
 - h. A maintenance schedule showing required maintenance, frequency of maintenance, lubricants, and other items required at each regular preventative maintenance period, including all buy-out items.
 - i. Electrical requirements and schematic diagrams.
 - j. Detailed written documentation with discussion of all deviations of equipment, including buy-out items, from Contract Documents.
 - k. Detailed written documentation of all process, mechanical, electrical, and structural changes and requirements for incorporating "Alternate" products into Project. Redesign and Contract Drawing revisions to accommodate such products will be prepared by Engineer during Shop Drawing review process. Contractor shall reimburse Owner for such additional costs based on Engineer's hourly billing rates, plus reimbursable expenses at cost.
 - l. A listing of manufacturer's experience as specified in applicable specification section. Manufacturer must have satisfactory experience per the applicable specification section for the item being considered.
 - 3. Failure to furnish preceding information shall be cause for rejection of a proposed "Alternate" item for use on this Project.
 - 4. Substitutions or modifications to the qualifications package will not be considered after opening of the Bids.
- G. Shop Drawings
 - 1. Acceptance of "Alternate" items and their qualification packages, or naming of "Basis of Bid" equipment, does not eliminate need for Shop Drawing submittals and reviews during construction, nor does it eliminate requirement that equipment manufacturer meet requirements of Contract Documents.
 - 2. Shop Drawings shall be furnished in accordance with Section 01 33 00.

1.05 SUBSTITUTION OF “NON-BASIS OF BID” ITEMS OR “OR EQUALS”

- A. Where “non-Basis of Bid” products, materials, or methods are accompanied by “or equal”, or other language of same effect, Contractor’s requests to use unnamed products, materials, or methods are considered requests for substitutions, and are subject to following requirements.
- B. After Contract has been executed, Owner and Engineer may consider formal requests for substitution of “non-Basis of Bid” products in place of those specified, under following conditions:
 - 1. Requests for substitution will be considered if received within 60 days after commencement of the work. Requests received more than 60 days after commencement of the work may be considered or rejected at the discretion of Engineer.
 - 2. Submit requests with the following form and in accordance with procedures required for change order proposals.
 - 3. Request is accompanied by complete data on proposed substitution substantiating compliance with Contract Documents, including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of proposed substitution with products specified or named by Addenda, with data relating to Contract time schedule, design, and artistic effect where applicable, and its relationship to separate contracts.
 - 4. Request is accompanied by accurate cost data on proposed substitution in comparison with product specified, whether or not modification of Contract Sum is to be a consideration.
- C. Requests for substitution when forwarded by Contractor to Engineer are understood to mean that Contractor:
 - 1. Has personally investigated proposed substitute product and determined that it is equal or superior in all respects to that specified.
 - 2. Will provide same guarantee for substitution as that specified.
 - 3. Certifies that cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate contracts and Engineer’s redesign costs, and that Contractor waives all claims for additional costs related to substitution which subsequently become apparent.
 - 4. Will coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.
- D. 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 substantial revision of Contract Documents.
- E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.
- F. No equipment shall be supplied by a manufacturer not regularly engaged in the manufacturing and production of the specified equipment. Manufacturer must have installed and had in satisfactory use for a period of not less than five (5) years, a minimum of ten (10) installations within the United States of equivalent equipment specified and shall submit evidence of such.
- G. Contractor shall pay all costs for installation and construction associated with substitute material or systems.
- H. Contractor shall pay all costs incurred by Owner and Engineer for redesign work required to incorporate substitute material or systems. Reimbursement shall be based on Engineer’s hourly billing rates, plus reimbursable expenses at cost.
- I. Substitution Conditions:
 - 1. Contractor’s substitution request will be received and considered by Engineer when one or more of the following conditions are satisfied, as determined by Engineer, otherwise requests will be returned without action except to record noncompliance with these requirements:
 - a. Extensive revisions to Contract Documents are not required.
 - b. Proposed changes are in keeping with the general intent of Contract Documents.
 - c. The request is timely, fully documented and properly submitted.

- d. Contractors and suppliers will be expected to provide the specified product unless prior approval is received from Engineer's office in sufficient time so that all bidders can be notified through an addendum.
 - e. The specified product or method of construction cannot be provided within the contract time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.
 - f. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - g. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other considerations of merit, after deducting offsetting responsibilities Owner may be required to bear. Additional responsibilities for Owner may include additional compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, or separate contractors, and similar considerations.
 - h. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where Contractor certifies that the substitution will overcome the incompatibility.
 - i. The specified product or method of construction cannot be coordinated with other materials, and where Contractor certifies that the proposed substitution can be coordinated.
 - j. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.
 - k. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the work, provide uniformity and consistency, and to assure compatibility of products.
- J. Limitations: Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- K. Substitution Causing Redesign: Engineer time for redesign as a result of substitution, will be charged to Owner, then deducted by Construction Change Directive from Contract Amount.
- L. Engineer's Action:
- 1. Request After Bid:
 - a. If necessary, within one week of receipt of the request for substitution, Engineer will request additional information or documentation necessary for evaluation of the request.
 - b. Within two weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, Engineer will notify Contractor of acceptance or rejection of the proposed substitution.
 - c. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name.
 - d. Acceptance will be in the form of a change order.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SUBSTITUTION REQUEST FORM

TO: Attn: Colin Marcussen, PE
 Short Elliott Hendrickson Inc.
 cmarcusen@sehinc.com

PROJECT: Silver Lake Infrastructure Improvements Project - Silver Lake, MN

SECTION NO.	ARTICLE NO.	SPECIFIED PRODUCT	PROPOSED SUBSTITUTION	
A.		Does the substitution affect dimensions shown on Drawings?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
B.		Does the substitution affect other trades?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
C.		Does the manufacturer's guarantee differ from that specified?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
D.		If you indicated "Yes" to Items A, B, or C above, attach a thorough explanation on your company letterhead.		
E.		If there are other differences between proposed substitution and specified product, attach a thorough explanation on your company letterhead. If differences are not noted and acknowledged in writing by Engineer, product must comply with specification requirements.		
F.		The proposed substitution was used within the last 24 months on the following project:		
		Project Name _____		
		Location _____		
		Engineer _____		
		Telephone No. _____		
G.		Has the proposed substitution been used on an SEH project within the last 12 months? Yes <input type="checkbox"/> No <input type="checkbox"/>		
		If yes, which project? _____		

All questions must be answered. Incomplete forms will not be reviewed.

Submitted By: _____

Signature

Firm

Address

Date

Phone

E-mail

For Use by Design Consultant	
<input type="checkbox"/>	Not Accepted, Not Enough Information
<input type="checkbox"/>	Not Accepted, Does Not Appear to be Equal
<input type="checkbox"/>	Accepted <input type="checkbox"/> Accepted as Noted
<input type="checkbox"/>	Received Too Late
By _____	
Date _____	
Remarks _____	

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SECTION 01 29 10

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Procedures for Administration of Applications for Payment:
 - 1. Application for Payment:
 - a. Coordination.
 - b. Format.
 - c. Typical Application.
 - 2. Additional Requirements:
 - a. Initial Application.
 - b. Substantial Completion.
 - c. Final Payment.

- B. Related Sections:
 - 1. Document 00 73 00 - Supplementary Conditions
 - 2. Section 01 33 00 - Submittal Procedures
 - 3. Section 01 77 00 - Closeout Procedures

1.02 APPLICATIONS FOR PAYMENT

- A. Coordination: Each application for payment shall be consistent with previous applications and payments as certified by Engineer and paid by Owner.

- B. Application for Payment Forms: Provided by Engineer.

- C. Typical Application:
 - 1. Payment Application Times: Each progress payment date is indicated in either the Supplementary Conditions, the Agreement, or as set at the Preconstruction Meeting.
 - 2. Period of Work Covered: Length of time for construction Work covered by each Application for Payment is indicated in the Agreement or as set at the Preconstruction Meeting.
 - 3. Preparation:
 - a. Complete every entry on form, including notarization and execution by person authorized to sign legal documents on behalf of Contractor.
 - b. Incomplete applications will be returned without action.
 - c. Entries must include data on Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 - d. Include amounts of Change Orders and Work Change Directives issued prior to last day of construction period covered by application.
 - 4. Transmittal: Submit 1 executed copy of each Application for Payment to Engineer by means ensuring timely receipt.

1.03 ADDITIONAL REQUIREMENTS

- A. Initial Application for Payment:
 - 1. Coordinate submittals as required by Section 01 33 00.
 - 2. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.

- B. Substantial Completion:
 - 1. Coordinate submittals as required by Sections 01 33 00 and 01 77 00.
 - 2. Following issuance of Certificate of Substantial Completion, submit Application for Payment.

3. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.
- C. Final Payment Application:
1. Coordinate submittals as required by Sections 01 33 00 and 01 77 00.
 2. Administrative actions which must precede or coincide with submittal of final Application for Payment include:
 - a. Completion of Project requirements.
 - b. Completion of items specified for completion after Substantial Completion.
 - c. Assurance that unsettled claims will be settled.
 - d. Assurance that Work not complete and accepted will be completed without undue delay.
 - e. Removal of temporary facilities and services.
 - f. Removal of surplus materials, rubbish, similar elements.
 - g. Final cleaning.
 3. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 13

COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Project Coordination
 - 2. Job Site Administration

1.02 COORDINATION BY GENERAL CONTRACTOR

- A. Coordinate use of premises under direction of Owner.
- B. Coordinate scheduling, submittals, and Work to ensure efficient and orderly sequence of installation.
 - 1. Coordinate activities for mutual benefit and cooperate to facilitate the general progress of the Work.
 - 2. Each subcontractor shall be thoroughly familiar with all provisions governing the Work of other contractors, and shall obtain from such contractors all information as may be required to coordinate Work with theirs.
 - 3. Each trade shall perform its Work in proper sequence and arrangement in relation to other activities and shall join their Work to that of others in accordance with the intent of the Drawings and specifications.
 - 4. Each trade shall give due notice and proper information for any special provisions necessary in the placing or setting of Work that may come in contact with Work of other contractors.
- C. Inspect the Contract Documents for Work of others that is inter-related, and afford other trades every reasonable opportunity for the installation of their Work. Coordinate Work of various specification sections having interdependent responsibilities.
- D. Prepare coordination drawings where off-site fabricated products and materials are by separate entities and must accurately interface. Coordination drawings shall indicate how Work, shown by separate Shop Drawings, will interface and shall indicate sequence for installation.
- E. Any discrepancies identified by the Contractor shall be brought to the attention of the Engineer for clarification and resolution.
- F. Coordinate space requirements and installation of mechanical and electrical Work.
 - 1. Follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building.
 - 2. Utilize space efficiently to maximize accessibility for other installations, maintenance, and repairs.
 - 3. Conceal pipes, ducts, and wiring within the construction in finished areas, except as otherwise indicated.
 - 4. Coordinate locations of fixtures and outlets with finish elements.
 - 5. All final decisions as to the right-of-way and run of interfering pipes, ducts, etc., shall be made by Engineer at Project meetings.

1.03 JOB SITE ADMINISTRATION

- A. Supervise and direct the Work. Employ and maintain a full time, qualified supervisor or superintendent to act as Contractor's representative at the Site.
- B. Enforce good order and conduct among contractors, installers, and construction employees.

- C. Require installers to inspect conditions under which Work is to be performed. Installer shall report all unsatisfactory conditions in writing to Contractor. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the Contract Documents. Where manufacturer provides contradictory instructions, notify Engineer immediately and request clarifications.
- E. Recheck measurements and dimensions of the Work, as an integral step of starting each installation.
- F. Coordinate enclosure of Work with required inspections and tests, so as to minimize necessity of uncovering Work for that purpose.
- G. Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to Engineer.
- H. Supervise performance of the Work to ensure that none of the Work, whether completed or in progress, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- I. Clean and perform maintenance as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Coordinate completion and clean up of Work.

1.04 SUBMITTALS

- A. Provide listing of Contractor's principal staff assignments and consultants, including name, home and work addresses, and telephone numbers.
- B. Provide supervisor's or superintendent's name, home and work address, and telephone numbers.
- C. Provide names, work address, telephone numbers, samples of signature, and limits of authority of each individual authorized to sign change orders, field modifications, and monthly pay requests for Contractor.

1.05 FIELD CONDITIONS

- A. Before ordering material or commencing Work, check and verify all dimensions and conditions. Notify Engineer of any omissions or discrepancies immediately.
- B. Field measurements shall be furnished in a timely manner to suppliers and fabricators who require them to complete their Work. Ascertain the requirement for such measurements at the earliest practical date and make every reasonable effort to expedite the affected Work.
- C. Conflicts: Engineer has exercised reasonable professional care to ensure there are no conflicts between the Work of the various trades. Such conflicts, however, may exist and no warranty to the contrary is made or implied.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Procedures for Administration of Project Meetings:
 - 1. Preconstruction Conference
 - 2. Progress Meetings
 - 3. Preinstallation Conferences

- B. Related Sections:
 - 1. Document 00 21 13 - Instructions to Bidders
 - 2. Section 01 31 13 - Coordination
 - 3. Section 01 33 00 - Submittal Procedures

1.02 PRECONSTRUCTION/SITE MOBILIZATION CONFERENCE

- A. Scheduled by Engineer after Notice of Award, prior to commencement of construction for:
 - 1. Execution of Owner-Contractor Agreement and exchange of preliminary submittals if not previously completed.
 - 2. Clarification of Owner and Contractor responsibilities in use of the Site and review of administrative procedures.

- B. Attendees: Owner, Engineer, USDA Rural Development Area Specialist, Consultants, Contractors, major subcontractors, other concerned parties represented by persons familiar with and authorized to conclude matters relating to Work.

- C. Agenda:
 - 1. Representatives:
 - a. Owner, Engineer, Contractor, Rural Development
 - b. All other attendees
 - 2. Coordination with Utilities and Rights-of-Way:
 - a. Telephone
 - b. Gas
 - c. Electric
 - d. Cable TV & Other Utilities
 - e. Public Rights-of-Way (State, County, Township, etc.)
 - f. Silver Lake Public Works
 - g. Explain any portion of project not available to Contractor.
 - h. Utility and highway reps may leave after these discussions.
 - 3. Responsibilities of Consulting Engineer:
 - a. Administer & interpret the Contract per approved Contract Documents.
 - b. Review and approve/reject Shop Drawings, progress schedules, and partial payment requests.
 - c. Observe construction and provide Resident Project Representative services.
 - d. Certify contractor payment requests and prepare Change Orders as required.
 - e. Certify construction compliance with Contract Documents and applicable codes/regulations.
 - f. Certify AIS compliance with regards to RUS Bulletin 1780-26.
 - g. Provide Certificate of Substantial Completion.
 - h. Provide final inspection and inspect to confirm completion of "punch list" items.
 - i. Perform "eleventh month" warranty inspection and provide list of repairs covered by Contractor's guarantee.
 - j. As necessary during construction, the Engineer's consultant(s) will visit the construction site to determine compliance with the accepted Contract Documents and codes/regulations.

- k. Engineer shall provide copies of inspection reports and progress meeting minutes to Owner, Rural Development Area Office and MN RD State Engineer.
- l. Contact RD Eng. To schedule AIS site visit when construction reaches 50% complete.
- 4. Responsibilities of Owner:
 - a. Attend periodic inspections with Contractors, Engineer, and Rural Development.
 - b. Attend monthly (weekly if applicable) progress meetings, substantial completion inspection and final inspection.
 - c. Initiate, review, and approve/reject Change Orders and partial payment estimates and forward to Rural Development Area Office for review and approval.
 - d. Coordinate communication to Contractor through the Engineer. Owner is not to direct the Contractor's work.
 - e. Settlement of all contractual and administrative issues.
 - f. Where the owner directly procures AIS products, the owner must obtain manufacturers' certification letters and provide copies to consulting engineers and contractors.
- 5. Responsibilities of Rural Development Representatives:
 - a. To observe and monitor the project to protect the Government's interest.
 - b. To observe and monitor the compliance of AIS requirements including a onsite visit.
 - c. To accept/reject partial payment estimates & approve/reject change orders.
 - d. To make periodic, pre-final, and final inspections with Contractor and Engineer.
 - e. Where local or state agencies provide inspections of construction, a final inspection of the project will be made by these agencies prior to Rural Development's final inspection.
- 6. Responsibilities of Contractor:
 - a. Complete the project construction in accordance with the Contract Documents.
 - b. Superintendent is to keep a daily log of general accomplishments, accidents or events that may cause a delay, and weather related items.
 - c. Carry out construction in accordance with all applicable codes.
 - d. Carry out construction in accordance with all AIS requirements and required tracking of materials.
 - e. Contract Documents shall be kept on site along with copies of all tests and reports. If conflicts arise between the Contract Documents and requirements of other agencies, the more restrictive will apply.
 - f. Contractor shall obtain permits as required by Contract and call for inspections as required by local or state agencies and Rural Development.
 - g. Prepare and maintains progress charts.
 - h. Attend all progress meetings, substantial and final inspections, and "eleventh month" warranty inspection.
 - i. The Contractor must provide space and protection for storage of materials and equipment at his/her own expense.
- 7. Responsibilities of Other Agencies:
 - a. Interim Lender, PFA, MDOH, MPCA, etc.
- 8. General Discussion of Construction Contract:
 - a. Initiating Construction
 - 1) The Notice to Proceed shall be issued after the interim loan closing, the pre-construction conference, and when the Owner, interim lender, and Rural Development give their consent.
 - b. Completion Time for the Contract:
 - 1) Notice to Proceed
 - 2) Substantial Completion
 - 3) Final Completion
 - 4) Milestones Completion
 - 5) Liquidated damages will be as specified in the Contract
 - c. Request for Extension of Contract Time:
 - 1) Extensions of the Contract Time must conform to the General Conditions of the Contract and be requested as a change order with Rural Development concurrence. Records supporting conditions contributing to the need for a time extension must be submitted along with the change order.

- d. Procedures for Making Partial Payments:
 - 1) Application for payment is prepared by the Contractor, reviewed and approved by the Engineer and Owner, and then submitted to Rural Development for review and disposition.
 - a) Pay Requests can be prepared and routed for signature electronically.
 - b) The Owner shall not disburse interim loan funds without the approval of all parties.
 - 2) Monthly Progress Meeting Date.
 - 3) Cut Off Date for submission to Engineer.
 - 4) Cut Off Date for submission to Owner.
 - 5) Payment for materials on hand must be on site and secure with supporting documentation showing supplier has been paid. Lien Waivers will be required before any stored materials will be paid on any partial pay estimate.
 - 6) Retainage
 - 7) Guarantee on completed Work
 - 8) Other requirements of the Contract and Specifications which deserve special discussion by all parties.
- e. Key Dates to Note
- f. Easements Temporary/Permanent - Status
- g. Material Testing - QC
- h. Permit Status
- i. Yard/Staging/Temporary Sanitary Facilities
- j. Service Line Marking/Tree Removal
- k. Dye Testing Service Lines
- l. Temporary Water Service Plans
- m. Televising Sanitary Sewer
- 9. Contractor's Schedule
- 10. Sub Contracts
- 11. Status of Materials or equipment furnished by Owner
- 12. Change Orders
- 13. Staking of Work
- 14. Project Observation
- 15. Labor Requirements
- 16. American Iron and Steel (AIS) Compliance Statement
- 17. Environmental Mitigation Measures
- 18. Placement of Project Signs and Posters
- 19. Other Issues:
- 20. Signatures

1.03 PROGRESS MEETINGS

- A. Contractor and Engineer:
 - 1. Schedule and administer weekly construction progress meetings throughout progress of Work.
 - 2. Make physical arrangements, prepare agenda and distribute with notice of each meeting to participants and to Engineer, 2 days in advance of meeting date.
 - 3. Preside at meetings, record meetings and distribute copies within 2 days to participants, and entities affected by decisions at the meetings.
- B. Attendees:
 - 1. Contractor, job superintendent, subcontractors and suppliers, other entity concerned with current progress or involved in planning, coordination or performance of future activities; Owner, Engineer, professional consultants as appropriate to agenda.
 - 2. Attendees shall be familiar with Project and authorized to conclude matters relating to progress.
- C. Agenda:
 - 1. Items of significance that could affect progress, including topics for discussion as appropriate to current status of Project, minimally:
 - a. Approval of minutes of last meeting.
 - b. Review of Work progress.
 - c. Field observations, problems and decisions.

- d. Identifications of problems which impede planned progress.
- e. Review of submittal schedule and status of submittals.
- f. Review of off-site fabrication and delivery schedules.
- g. Maintenance of progress schedule.
- h. Corrective measures to regain projected schedules.
- i. Planned progress during succeeding Work period.
- j. Coordination of projected progress.
- k. Maintenance of quality and work standards.
- l. Effect of proposed changes on progress schedule and coordination.
- m. Other business relating to Work.
- n. Erosion control, SWPPP requirements.

1.04 PREINSTALLATION CONFERENCES

- A. When required in individual specification sections, or as requested by Contractor, convene a preinstallation conference at Site prior to commencing Work of the Section.
- B. Attendees: Require attendance of entities directly affecting, or affected by, Work of the Section.
- C. Notification: Notify Engineer 4 days in advance of meeting date.
- D. Contractor Duties:
 - 1. Prepare agenda, preside at conference, record minutes, and distribute copies (2 to Engineer) within 2 days.
- E. Agenda:
 - 1. Review conditions of installation.
 - 2. Review preparation and installation procedures.
 - 3. Coordinate with related Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 32 16
PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Format
 - 2. Content
 - 3. Revisions to Schedules
 - 4. Submittals

- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 29 10 - Applications for Payment
 - 3. Section 01 33 00 - Submittal Procedures

1.02 FORMAT

- A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or Operation, identifying first workday of each week.

- B. Sequence of Listings: The Table of Contents of this Project Manual. The chronological order of the start of each item of work.

- C. Scale and Spacing: To provide space for notations and revisions.

- D. Sheet Size: Minimum 11 by 17 inches. Multiples of 8-1/2 by 11 inches.

1.03 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

- B. Identify each item by specification section number.

- C. Identify Work of separate stages, separate floors, and other logically grouped activities.

- D. Provide sub-schedules for each stage of Work identified in Section 01 11 00.

- E. Provide sub-schedules to define critical portions of the entire schedule.

- F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

- G. Provide separate schedule of submittal dates for Shop Drawings, Product Data, and Samples, including Owner furnished products and products identified under Allowances, and dates reviewed. Submittals will be required from Engineer. Indicate decision date for selection of finishes.

- H. Indicate delivery dates for Owner furnished products and products identified under Allowances.

1.04 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

1.05 SUBMITTALS

- A. Submit initial schedules within 7 days after date of Notice to Proceed. After review, resubmit required revised data within 7 days.
- B. Submit revised Progress Schedule with each Application for Payment.
- C. Submit 2 copies which will be retained by Engineer.
- D. Distribute copies of reviewed schedules to Site file, subcontractors, suppliers, and other concerned parties.
- E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements Included:
 - 1. Procedures
 - 2. Schedule of Values
 - 3. Shop Drawings
 - 4. Product Data
 - 5. Samples
 - 6. List of Proposed Subcontractors
 - 7. List of Proposed Suppliers
 - 8. Safety Data Sheets
 - 9. Payment Schedule
 - 10. Start-up Reports
 - 11. Transfer of Spare Parts

1.02 PROCEDURES

- A. Deliver submittals to Engineer at address listed in Project Manual with a Transmittal.
- B. Transmit each item under Engineer-accepted form.
 - 1. Identify Project, Contractor, subcontractor, major supplier.
 - 2. Identify pertinent Drawing sheet and detail number, and specification Section number.
 - 3. Identify deviations from Contract Documents.
 - 4. Provide space for Engineer and consultant review stamps.
- C. Submit initial progress schedules and schedule of values in duplicate within 10 days after date of Owner-Contractor Agreement. After review by Engineer, revise and resubmit as required.
- D. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- E. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.
- F. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- G. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.03 SCHEDULE OF VALUES

- A. Submit typed schedule on Contractor's standard form or schedule approved by Engineer.
- B. Format:
 - 1. Table of Contents of this Project Manual.
 - 2. Identify each line item with number and title of the major technical sections.
- C. Include in each line item amount of Allowances specified in Section 00 41 00 Bid Form.
- D. Include in each line a directly proportional amount of Contractor's overhead and profit.

- E. Revise schedule to list Change Orders for each application for payment submittal.

1.04 SHOP DRAWINGS

- A. Shop Drawings will not be accepted for review by Engineer until after they have been checked and approved by the Contractor as evidenced by their approval stamp and signature.
- B. Submit all Shop Drawings electronically in pdf format via e-mail to the RPR and Engineer.
 - 1. All submittals shall contain a detail index of the items included as part of the submittal.
 - 2. Copy of electronic file sizes larger than 150 megabytes shall be submitted in pdf format via USB thumb drive and mailed to the Engineer by the Contractor at the Contractor's expense.
 - 3. Submit showing system fabrication, installation drawings including plans, elevations, section details of components, and configuration between system and adjoining systems.
 - 4. Clearly indicate manufacturer recommended care and storage instructions at the beginning of each submittal package as applicable.
 - 5. Each submittal shall include only the items for a single applicable specification section.
- C. The Contractor shall rank each shop drawing based on cost-sensitivity and criticality to determine the priority for shop drawing review by the Engineer. Cost-sensitivity refers to equipment/parts that has the greatest potential for cost escalation. Criticality refers to critical path items to achieve the project schedule and/or work sequence taking into account availability and lead times. The priority shall be clearly identified on each shop drawing submitted.
- D. Once reviewed Contractor shall provide 2 legible hard copies of the reviewed shop drawings (one copy for Owner and one copy for Engineer). Reviewed is defined as reviewed by all applicable disciplines and marked either "reviewed" or "furnish as corrected" or "furnish as noted".

1.05 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, testing compliance, warranty, and other data; supplement manufacturers' standard data to provide information unique to the Work.
- B. Submit all Product Data electronically in pdf format via e-mail to the RPR and Engineer.
- C. Submit manufacturer's printed instructions for delivery, storage, assembly, installation start-up, adjusting, finishing, and maintenance.

1.06 SAMPLES

- A. Submit full range of manufacturer's standard colors, textures, and patterns for Engineer's selection.
- B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing Work.
- C. Include identification on each sample, giving full information.
- D. Submit the number specified in respective specification section; 1 will be retained by Engineer. Reviewed samples that may be used in the Work are indicated in the technical sections.
- E. Field Samples:
 - 1. Provide field samples of finishes as required by individual technical section.
 - 2. Install sample complete and finished.
 - 3. Acceptable samples in place may be retained in completed Work.

1.07 LIST OF PROPOSED SUBCONTRACTORS

- A. Submit a list of subcontractors who will provide Work on the Project.

- B. The submitted list shall include:
 - 1. Name of Subcontractor
 - 2. Address
 - 3. Type of work to be provided
 - 4. Contact list for administrative and supervisory personnel.

1.08 LIST OF PROPOSED SUPPLIERS

- A. Submit a list of suppliers who will provide materials, equipment or components principle to the Work.
- B. The submitted list should include:
 - 1. Name of supplier.
 - 2. Address.
 - 3. Equipment, material or component to be provided.
 - 4. Contact list for administrative and supervisory personnel.

1.09 SAFETY DATA SHEETS

- A. Submit SDS to the Site on all products with chemical emissions and as called for in individual technical sections.
- B. Provide 2 printed hard copies to Owner with turnover of all products with chemical emissions and as called for in individual technical sections.

1.10 PAYMENT SCHEDULE

- A. Payment schedule will be provided by the Engineer at the preconstruction conference.
- B. Contractor progress payment will be made on a monthly basis.

1.11 START-UP REPORTS

- A. Submit written report to Engineer indicating equipment/system has been properly installed and functions properly.
- B. Report shall be submitted within 10 days of equipment/system verification.
- C. Report shall be signed by manufacturer's representative or third-party testing firm.

1.12 TRANSFER OF SPARE PARTS

- A. Submit written report to Engineer indicating the turnover of spare parts to the Owner.
 - 1. Include the following items:
 - a. Date of transfer
 - b. Quantity of each spare part transferred
 - c. Name of each spare part transferred which corresponds to part name as shown in Shop Drawings and O&M manual.
 - d. Manufacturer pat number (if available).
 - e. Signature of Contractor representative responsible for turnover
 - f. Signature of Owner representative accepting turnover.
- B. Spare parts shall be turned over to Owner within 10 business days of Owner training and prior to equipment start-up.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL FOR STREET AND UTILITY CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for quality control.
 - 2. Inspection and testing services to assist in determination of work with specifications and regulations.
 - 3. Requirements for Contractor cooperation.
 - 4. Responsibility for payment.
 - 5. Schedule of required tests.
- B. Contractor Responsibility: These required services do not relieve Contractor of responsibility for compliance with any requirements.
- C. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 31 19 - Project Meetings

1.02 REFERENCES

- A. ASTM:
 - 1. D3740 - Minimum Requirements for Agencies Engaged in Testing or Inspection of Soil and Rock
 - 2. E329 - Requirements for Agencies Engaged in Testing or Inspection of Materials Used in Construction
- B. MnDOT:
 - 1. Quality Control: Inspections, tests, related actions including reports, performed by independent agencies and governing authorities, as well as directed by Contractor.
 - 2. 2024 SALT Schedule of Materials Control - Local Government Agency

1.03 DEFINITIONS

- A. Quality Control: Inspections, tests, related actions including reports, performed by independent agencies and governing authorities, as well as directed by Contractor.

1.04 SUBMITTALS

- A. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards (NBS) during most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Specialist and responsible officer.
- C. After each inspection and test, submit two written copies of report to Engineer and to Contractor no later than 3 working days after completion of inspection or test. Include:
 - 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

D. When requested by Engineer, provide interpretation of test results.

1.05 QUALITY ASSURANCE

A. Testing:

1. Owner shall employ and pay for services of an independent testing laboratory to perform specified inspection and testing.
2. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

B. Laboratory Qualifications:

1. Authorized to operate in state in which Project is located.
2. Qualified in accordance with referenced ASTM standard to acceptance of Engineer.
3. Staff: Maintain a full time registered Engineer Specialist on staff to review services.
4. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

C. Regulatory Requirements: Comply with requirements of ASTM D3740 and E329.

1.06 RESPONSIBILITIES

A. Contractor Responsibility:

1. Quality control testing or inspections scheduled to be Contractor's responsibility.
 - a. Air and deflection testing of sanitary sewer.
 - b. Bacteriological testing of water main.
 - c. Hydrostatic testing of water main.
 - d. Conductivity testing of water main.
 - e. Hydrostatic testing of sanitary force main and process piping.
 - f. Conductivity testing of sanitary force main and process piping.
 - g. Testing procedures related to process equipment.
 - h. Primary Pond Control Structure (Alternate 6): Thin wall hydraulic conductivity tests (ASTM D1587) of clay liner material for each primary pond cell that was disturbed and recompacted.
 - i. Tracer wire conductivity.
 - j. Clean and televise all sanitary sewer main.
 - k. Proof rolling.
 - l. Gradations.
 - m. Percent Crushing.
 - n. Quality Tests.
2. Code Compliance Testing: Quality control required by codes or ordinances, or by plan approval authority, made by legally constituted authority unless otherwise provided in Contract Documents.
3. Verification of conformance of the Work within specified construction tolerances.
4. Contractor's Convenience Testing.
5. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring inspections and testing services.
6. Provide incidental labor and facilities to:
 - a. Provide access to Work to be tested.
 - b. Obtain and handle samples at the Site or at source of products to be tested.
 - c. Facilitate tests and inspections, and storage and curing of test samples.
7. Coordinate with each independent agency the sequence of activities to accommodate required services with minimum delay in progress of Work and to avoid removing and replacing Work. Schedule times for quality control.

- B. Owner Responsibility:
 - 1. Quality control not specifically indicated as Contractor's responsibility, or to be provided by another identified entity.
 - 2. Owner reserves the right to perform the core density and thickness testing of wear course as part of the quality control process as outlined in MnDOT 2360. Payment will be at the Owner's expense.
- C. Laboratory Responsibility:
 - 1. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 2. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or Products.
 - 3. Perform additional inspections and tests required by Engineer.
 - 4. Limits on Laboratory Authority:
 - a. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - b. Laboratory may not approve or accept any portion of the Work.
 - c. Laboratory may not assume any duties of Contractor.
 - d. Laboratory has no authority to stop the Work.
- D. Retest Responsibility:
 - 1. Where results of quality control prove unsatisfactory and do not indicate compliance of related Work with requirements of the Contract Documents, retests are responsibility of Contractor, regardless of whether the original test was Contractor's responsibility.
 - 2. Retest of Work revised or replaced by Contractor is Contractor's responsibility, where required tests were performed on original Work.
 - 3. Retesting costs will be deducted from Contract amount by Change Order.
 - 4. Provide 2 retests for each failed test.
- E. Responsibility for Associated Services:
 - 1. Cooperate with independent agencies performing required quality control.
 - 2. Provide such auxiliary services as reasonably requested.
 - 3. Notify testing agency sufficiently in advance of operations to permit assignment of personnel.
 - 4. These auxiliary services include, but are not necessarily limited to:
 - a. Cooperate with independent agencies performing required quality control.
 - b. Provide such auxiliary services as reasonably requested.
 - c. Notify testing agency sufficiently in advance of operations to permit assignment of personnel.
 - d. Providing access to Work.
 - e. Taking samples or assistance with taking samples.
 - f. Delivery of samples to test laboratories.
 - g. Security and protection of samples and test equipment at Site.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 ADJUSTING

- A. Upon completion of quality control performed on Work, repair damaged Work, restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

3.02 PROTECTION

- A. Protect Work exposed by or for quality control service activities, and protect repaired Work.

3.03 RESPONSIBILITY FOR ADJUSTING AND REPAIR

- A. Contractor's responsibility, regardless of assignment of responsibility for quality control.

3.04 FIELD QUALITY CONTROL

- A. Secure inspection and acceptance of subgrades and fill layers before subsequent construction is permitted.
- B. In accordance with MnDOT 2024 SALT Schedule of Materials Control - Local Government Agency and MnDOT 2020 Standard Specifications for Construction except as amended in this specification.
- C. Owner shall employ and pay for the following specified inspection and testing.
- D. As a minimum, the following tests will be required:
 - 1. The following minimum inspections and testing shall be conducted with the results being reported to the Engineer and Contractor before the testing agency representative leaves the construction Site.
 - 2. In addition to testing locations selected by Contractor, the Engineer reserves the right to select various testing locations. These locations can be varied in both depth and horizontal location:
 - a. Roadway Subgrade Testing:
 - 1) Quality Compaction:
 - a) Compact until no further consolidation.
 - b. Trench Backfill Testing (Mainline):
 - 1) Standard Proctor:
 - a) One minimum (as needed) provided to Engineer within 24 hours after test is completed.
 - 2) In-Place Density and Moisture:
 - a) Below 3 feet:
 - (1) One test per 24-inch lift per 300 L.F.
 - c. Trench Backfill Testing (Services):
 - 1) Standard Proctor:
 - a) One test every 5 services minimum for each area of service line construction, provided to Engineer within 24 hours after test is completed.
 - 2) In-Place Density and Moisture:
 - a) Upper 3 feet:
 - (1) One test each on a minimum of two random service trenches per day per work area (each crew) of service line construction.
 - b) Below 3 feet:
 - (1) One test each on a minimum of two random service trenches per day per work area (each crew) of service line construction and taken in the depth range of 5 feet to 6 feet.
 - c) Additional testing of service trenches may be done at the discretion of the Engineer as soil conditions, trench depths, Contractor compaction efforts, and Contractor operations dictate.
 - d. Structural Backfill Testing (Lift station and Metering Manhole):
 - 1) Standard Proctor:
 - a) One minimum (as needed) provided to Engineer within 24 hours after test is completed.
 - b) In-Place Density and Moisture: A minimum of 2 compaction test for every two vertical feet of fill placed around each structure.
 - e. Primary Pond Control Structure Backfill Testing (Alternate 6):
 - 1) Standard Proctor:
 - a) One minimum (as needed) provided to Engineer within 24 hours after test is completed.
 - 2) In-Place Density, Moisture, and Hydraulic Conductivity:
 - a) A minimum of 1 compaction test for every two vertical feet of fill placed for berm dike core along both sides of dike. Minimum of 4 compaction tests shall be performed at each location that the existing pond liner has been replaced.

- b) Perform two 3-inch thin-walled hydraulic conductivity tests at each location that the existing pond liner has been replaced and properly compacted. Tests shall be performed in accordance with ASTM D5084 and have a hydraulic conductivity of 1×10^{-7} cm/s or less.
 - c) Embankment shall be placed in lift no thicker than 12-inches and compacted to 95 percent of standard proctor.
 - d) Clay liner shall be placed in lift no thicker than 6-inches and compacted to 98 percent of standard proctor.
 - e) Clay liner material shall be placed in the positive range of optimum moisture for compaction.
- 3) Clay Liner:
- a) Existing liner material shall be tested prior to reuse and shall conform to the following schedule for reuse:

Reference	Specifications
ASTM D4318, Liquid Limit	Greater than or equal to 25%
ASTM D4318, Plasticity Index	Greater than or equal to 12%
ASTM D422, Sieve Analysis, ASTM D1140, Hydrometer	95% (W/W) passing 100 sieve 50% (W/W) passing 200 sieve
ASTM D5084, Permeability	Less than 1×10^{-7} cm/sec when compacted to 98% Standard Proctor Density at optimum water content with an average effective confining stress of no more than 2.5 psi

- b) New liner shall be step excavated into the existing liner with one 6-inch by 3-foot step and thoroughly compacted. The step surface shall be scarified for compaction of new liner material above.
- f. Granular Material (by type, use, and source):
- 1) Gradation:
 - a) One per 1000 tons (3 minimum).
 - 2) Standard Proctor:
 - a) One minimum.
 - 3) In-Place Density and Moisture:
 - a) One per 300 L.F. (3 minimum).
- g. Aggregate Base Testing:
- 1) Gradation:
 - a) One per 1000 tons (3 minimum).
 - b) Aggregate base prepared on site through a pulverization (reclamation) process shall be sampled by the Contractor during production or stockpiling for production quality control (QC). Companion samples shall be provided to the Owner. Quality assurance (QA) testing for reclaimed aggregate shall be conducted in accordance with MnDOT SD-15 for aggregate base placement.
 - 2) 2) Standard Proctor:
 - a) One minimum.
 - 3) In-Place Density and Moisture:
 - a) One per 300 L.F. (3 minimum).
- h. Concrete Testing:
- 1) Slump:
 - a) One per first 0.25 C.Y. plus 1 per 100 C.Y. or fraction thereof thereafter.
 - 2) Air Entrainment:
 - a) One per first 0.25 C.Y. plus 1 per 100 C.Y. or fraction thereof thereafter.
 - b) Additional intermediate testing of air entrainment may be done at the discretion of the Engineer.
 - 3) Compression Testing:
 - a) Cast three cylinders per set:
 - (1) One at 7 days
 - (2) One at 28 days
 - (3) One for hold

- b) Cast one per first 25 C.Y. plus one per 100 C.Y. or fraction thereof thereafter
- 4) Standard Field Tests to be performed on fresh concrete each time cylinders are cast:
 - a) Slump
 - b) Air Content
 - c) Temperature

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SECTION 01 51 00

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Temporary utility services and facilities including, but not limited to:
 - 1. Temporary water supply system.
 - 2. Construction water.
 - 3. Electric power service.
 - 4. Lighting.
 - 5. Heat.
 - 6. Sewers and drainage.
- B. Related Requirements:
 - 1. Section 01 12 16 - Work Sequence
 - 2. Section 01 57 00 - Temporary Controls

1.02 MEASUREMENT AND PAYMENT

- A. Temporary Water Supply System:
 - 1. Lump Sum.
 - 2. Includes traffic control and erosion control devices required by state and local regulations.
- B. Sewer Bypass Pumping: Lump Sum.
 - 1. Included in the following lump sum bid items
 - a. Cleveland Lift Station
 - b. Main Lift Station
 - 2. Includes traffic control and erosion control devices required by state and local regulations.
- C. Temporary Drainage: Incidental to applicable earthwork pay item.
- D. Temporary Utilities not otherwise listed above are incidental to the installation of proposed applicable permanent utility improvements and include:
 - 1. Devices required by Section 01 57 00.
 - 2. Costs associated with required tests and inspections.
 - 3. Costs associated with bypass pumping related to maintaining sewer flows.
 - 4. Costs associated with header-pipe ramping and trenching.

1.03 REFERENCES

- A. ANSI - A10 Series Safety Requirements Standards
- B. AWWA - C651 Disinfecting Water Mains
- C. FM Global
- D. NECA - NJG-6 - Temporary Job Utilities and Services
- E. NEMA
- F. NFPA:
 - 1. 70 - National Electrical Code
 - 2. 241 - Safeguarding Construction, Alteration, and Demolition Operations

G. Underwriter's Laboratory (UL)

1.04 COORDINATION

- A. Contractor shall coordinate tests and inspections required by state and local health departments and AWWA C651. Results of tests shall be submitted to Engineer for review.
- B. Coordinate all equipment shutdowns, startups, and general scheduling with Engineer.
- C. Utility interruptions required for tie-ins:
 - 1. Determine requirements, time constraints, etc. for installing temporary service to the Site, or to make connections to existing service.
 - a. Shall be requested by Contractor in writing to Engineer.
 - b. Shall not commence until Contractor has received written response from Engineer.
 - c. Engineer reserves the right to restrict the time and duration of interruption.
 - 2. Arrange with utility companies for service interruption, where necessary, to make connections for temporary services.

1.05 SUBMITTALS

- A. Submit an overall Temporary Water Supply System Plan for approval within 10 days after award of Contract and 5 days prior to initiating any construction.
- B. Submit an overall Sanitary Sewer Bypass Plan for approval within 10 days after award of Contract and 5 days prior to initiating any construction.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary utilities and related services.
- B. Comply with requirements of NECA NJG-6, NFPA 241, ANSI A10, AWWA C651 Series Standards.
- C. Comply with applicable NEMA, NECA, and UL standards and governing regulations for materials and layout of temporary electric service.
- D. Where local laws and regulations conflict with the requirements of NEMA, NFPA, ANSI, AWWA, or NECA, comply with the most stringent requirements.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Provide all required materials and equipment for temporary utilities, services, and facilities.
- B. Used materials and equipment may be used, if acceptable to Engineer.
- C. Provide only materials and equipment that are suitable for intended use and comply with appropriate standards.
- D. Temporary materials not completely removed upon completion of Work shall conform to American Iron and Steel (AIS) requirements as applicable.

2.02 UTILITIES

- A. Where local utility company provides only a portion of temporary utility, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations and requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide each temporary service and facility ready for use at each location when service or facility is first needed.
- B. Locate temporary utilities where they will serve Project and result in minimum interference with performance of the Work.
- C. Maintain, relocate, modify, and extend utilities as required during course of Work.
- D. Use qualified trade persons for installation of temporary utilities.

3.02 TEMPORARY WATER SUPPLY SYSTEM

- A. During construction, maintain potable water service to existing users on a continuous basis at all existing fixtures until service from newly installed mains can be constructed, tested, and placed into service.
- B. Owner will pay for water used in the temporary water distribution system.
- C. Connection to water supply shall be approved by Owner where usage can be metered and system sanitation can be maintained.
- D. Where necessary, Contractor shall provide temporary backflow prevention assemblies at connection of temporary water utilities. Contractor shall be responsible for certification, maintenance, and operation of temporary backflow prevention assemblies.
- E. Verify location of and obtain temporary water supply at or near site and install piping, hoses, fittings, etc. required to distribute it as required by the Work.
- F. Maintain temporary distribution system to avoid damage to existing or new permanent distribution system.
- G. Damages to existing or new permanent distribution systems related to connection of temporary water supply system shall be corrected and paid for by the Contractor.
- H. Damages to permanent plumbing related to temporary building connections shall be corrected and paid for by the Contractor.
- I. Disinfect temporary service lines, headers, connections, and appurtenances in accordance with Minnesota Health Department and AWWA C651 rules and regulations.
- J. Protect temporary water system from freezing.

3.03 CONSTRUCTION WATER

- A. Contractor will pay for water used for construction purposes.
- B. Water is available from the City of Silver Lake.
- C. City of Silver Lake will establish rates and conditions.
- D. Secure water necessary for construction and testing and pay service connection charges.

- E. Install water service and distribution piping of sizes and pressures adequate for construction purposes only where approved by Owner and Engineer.
- F. Where available supply of potable water is inadequate, provide non-potable water for purposes other than drinking and washing.
- G. Where non-potable water is used, provide warning signs on the discharge end of each length of hose and at the shut-off nozzles.
- H. Where shut-off nozzles are used at water hose discharge, provide heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system.
- I. Trades needing a larger source of water are responsible for the source and distribution.
- J. Exercise control over usage to conserve water.
- K. Sterilize temporary water piping for potable water prior to use.
- L. Maintain distribution system to avoid damage to existing or new construction.
- M. Avoid damage to permanent plumbing at source of temporary water.

3.04 ELECTRIC POWER SERVICE

- A. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of Work.
- B. Contractor shall pay for electricity used for construction purposes.
 - 1. Electrical service shall be provided and installed by Contractor.
 - 2. Any Trade requiring power with different characteristics than provided shall arrange and pay for access to such power.
- C. Whenever an overhead floor or roof deck has been installed, install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in area of Work.
- D. Install service and grounding in compliance with NFPA 70. Include necessary meters, transformers, overload protected disconnect, and main distribution switch gear.
- E. Connect temporary service to local electric power company main as directed by electric company officials.
- F. Install temporary service with an automatic ground-fault interrupter feature, activated from circuits of the system.
- G. Install circuits of adequate size and proper characteristics for each use.
 - 1. Run wiring overhead and rise vertically where wiring will be least exposed to damage from construction operations.
 - 2. Install rigid steel conduit or equivalent raceways for wiring that must be exposed on grade, floors, decks, or other areas of possible damage or abuse.
- H. Provide identification/warning signs at power outlets that are other than 110 to 120 volt power.
- I. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110 to 120 volt plugs into higher voltage outlets.
- J. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.

- K. Use only grounded extension cords.
 - 1. Use "hard-service" cords where exposed to abrasion and traffic.
 - 2. Use single lengths or waterproof connectors to connect separate lengths of electric cords.

3.05 LIGHTING

- A. Install local switching of temporary lighting, spaced to allow lighting to be turned off in patterns to conserve energy and retain light suitable for work-in-progress, access traffic, security check, and Project lock-up.
- B. Provide not less than one 200-watt incandescent lamp per 1,000 square feet of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature.
 - 1. In corridors and similar traffic areas, provide not less than one 100-watt incandescent lamp every 50 feet.
 - 2. In stairways and at ladder runs, locate not less than one 100-watt incandescent lamp for illuminating each landing and flight.
- C. Install and operate temporary lighting that will fulfill security and protection requirements, without the necessity of operating entire temporary lighting system.
- D. Provide general service incandescent lamps of wattage required for adequate illumination.
- E. Protect lamps with guard cages or tempered glass enclosures.

3.06 HEAT

- A. Provide temporary heat for performance of the Work, curing or drying of recently installed work, or protection of work-in-place from adverse effects of elements.
- B. Provide temporary heating units, tested and labeled by UL, FM, or other recognized trade association related to the fuel being consumed.
- C. Select units known to be safe and without deleterious effect upon work-in-place or being installed.
 - 1. Except where conditions make it necessary to use another system, and where use of the permanent heating system is available and authorized by Engineer, provide properly vented self-contained liquid propane gas or fuel oil heaters with individual space thermostatic controls for temporary heat.
- D. Coordinate ventilation requirements to produce indicated ambient condition required, to prevent accumulations of dust, fumes, vapors or gases, and to minimize consumption of fuel or energy.
- E. Coordinate use of existing facilities with Owner.
- F. Temporary heating and ventilation required by Work under Contract shall be provided and paid by Contractor requiring same.
- G. Extend and supplement with temporary units as required to maintain specified conditions for construction operations, and to protect materials and finishes from damage due to temperature or humidity.
- H. After Enclosure:
 - 1. Owner will allow installation and use of permanent heating system for temporary heat after building is weather-tight and concrete floor slabs have been poured.
 - 2. Cost of temporary heat after enclosure shall be borne by Contractor.
 - a. Contractor shall install new filters at time of Substantial Completion.
- I. Maintain a minimum temperature for the following locations:
 - 1. Maintain a minimum temperature of 50 degrees in permanently enclosed portions of the structures and areas where finished Work has been installed.

2. Maintain a minimum temperature of 70 degrees in office, laboratories, meeting rooms, or other administrative spaces at all times during construction.
3. Maintain a minimum temperature of 70 degrees in temporary field offices at all times during construction.

3.07 SEWERS AND DRAINAGE

- A. Temporary Sanitary Sewer Service:
 1. During construction, maintain flow in sanitary sewers and force mains on a continuous basis until service from newly constructed mains can be restored.
 2. Provide pumps, portable generators, hoses and related items appurtenant to the Work.
 3. When necessary to pump sewage overnight, provide an operator to stay with the pumping operation until construction resumes the next day.
 4. Sewer service lines to individual users may be disconnected for a period not to exceed 4 hours in any one day.
 5. Operate temporary service in a safe and efficient manner, do not overload or allow unsanitary conditions, public nuisances, or hazardous conditions to develop or persist on the Site.
 6. Refer to Section 01 12 16 for more information regarding bypass pumping procedures.
- B. Temporary Storm Sewer Service:
 1. If existing sewers are available for temporary drainage near Site prior to completion of permanent sewers, provide temporary connections to remove effluent that can be lawfully discharged into sewers.
 2. If existing sewers cannot be used for discharge, provide drainage ditches, dry wells, waste stabilization ponds, and similar discharge facilities to remove effluent that can be lawfully discharged in that manner.
 3. If neither existing sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
- C. Before discharge into sewers or drainage facilities, filter out excessive amounts of soils, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways.
- D. Provide temporary filter beds, settlement tanks, separators, and similar devices if necessary.
- E. Maintain temporary sewers and drainage facilities in a clean, sanitary condition.
- F. Provide and maintain temporary earthen embankments and similar barriers in and around construction excavations and subgrade construction, sufficient to prevent flooding.

3.08 OPERATION, TERMINATION, AND REMOVAL

- A. Enforce strict discipline in use of temporary services and facilities at the Site.
 1. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse.
 2. Do not permit temporary installations to be abused or endangered.
 3. Do not allow hazardous, dangerous, or unsanitary conditions to develop or persist on Site.
- B. Operate temporary services and facilities in a safe and efficient manner.
 1. Do not overload temporary services or facilities.
 2. Protect from damage by freezing temperatures and similar elements.
 3. Prevent water-filled piping from freezing by use of ground covers, insulation, draining, or by temporary heating.
 4. Maintain distinct markers for underground lines.
 5. Protect from damage during excavation operations.
- C. Unless Engineer requests that it be maintained for a longer period of time, remove each temporary service and facility promptly when no longer needed, when it has been replaced by the authorized use of a permanent facility, or no later than Substantial Completion.

- D. Complete or restore permanent Work which may have been delayed because of interference with temporary service or facility.
- E. Repair damaged Work, clean exposed surfaces, and replace Work which cannot be satisfactorily repaired.
- F. Materials and facilities that constitute temporary services and facilities are, and will remain, the property of Contractor.
- G. At Substantial Completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during construction, including but not limited to:
 - 1. Replace air filters and clean inside of ductwork and housings.
 - 2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - 3. Replace lighting system lamps that are burned out or noticeably dimmed.

END OF SECTION

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SECTION 01 52 19

TEMPORARY SANITARY FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide temporary closet or privy.
- B. Maintain throughout Project duration.
- C. Type and location subject to Engineer's approval.
- D. Number of privy's needed subject to Engineer's discretion, depending on location of project areas at any given time.
- E. Remove upon completion of Project.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 55 10

ACCESS ROADS AND PARKING AREAS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Access roads.
 - 2. Parking.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 31 13 - Coordination
 - 3. Section 01 51 00 - Temporary Utilities

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Construction - Contractor's option.
- B. Earthwork, base, paving and topping that will become permanent construction - as specified.

PART 3 EXECUTION

3.01 ACCESS ROADS

- A. Construct and maintain temporary access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate as Work progress requires.
- D. Provide detours as necessary for unimpeded traffic flow.
- E. Locate as indicated on Drawings or approved by Engineer.
- F. Provide unimpeded access for emergency vehicles.
- G. Maintain 20-foot width driveways with turning space between and around combustible materials.
- H. Provide means of removing mud from vehicle wheels before entering streets.

3.02 PARKING

- A. Arrange for or provide temporary parking areas to accommodate use of construction personnel.
- B. Designated existing on-site streets and driveways may be used for construction traffic.
 - 1. Tracked vehicles not allowed.
 - 2. Do not allow heavy vehicles or construction equipment in parking areas.
- C. When Site space is not adequate, provide additional off-site parking.

- D. Locate as indicated or approved by Engineer.

3.03 PERMANENT PAVEMENTS AND PARKING FACILITIES

- A. Prior to Substantial Completion, base for permanent roads and parking areas may be used for construction traffic.
- B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
- C. Permanent parking structures may not be used by construction personnel without permission of Owner.

3.04 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing and permanent paved areas used for construction.
 - 1. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.05 REMOVAL, REPAIR

- A. Remove temporary materials and construction when permanent paving is usable or at Substantial Completion.
- B. Repair facilities damaged by use to original or specified condition.

END OF SECTION

SECTION 01 55 25

**MAINTENANCE OF TRAFFIC
(MnDOT 1404)**

PART 1 GENERAL

1.01 SUMMARY

- A. Temporary procedures and equipment for safely maintaining and controlling traffic within and near Site during construction.
- B. Related Sections:
 - 1. Section 02 41 33 - Removing Pavement and Miscellaneous Structures
 - 2. Section 32 17 23 - Pavement Marking
 - 3. Section 34 41 20 - Traffic Signs and Devices
- C. Method of Measurement:
 - 1. Measure all required procedures and equipment on a Lump Sum basis, except as otherwise noted.
 - 2. Procedural and equipment revisions resulting from minor changes or field adjustments will be considered incidental.
- D. Basis of Payment:
 - 1. Payment for temporary maintenance of traffic shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 2. Progress payment amounts will be determined by percentage of total Work completed based on the following schedule:

Percent of Contract Completed	Percent of Item Paid
5	30
25	50
50	70
75	90
100	(Final) 100

1.02 REFERENCES

- A. AASHTO:
 - 1. Roadside Design Guide
 - 2. Manual for Assessing Safety Hardware (MASH)
- B. ANSI/ISEA 107 - Standard for High-Visibility Safety Apparel and Headwear
- C. MnDOT:
 - 1. 1404 - Maintenance of Traffic
 - 2. 1710 - Traffic Control Devices
 - 3. 2102 - Pavement Marking Removal
 - 4. Standard Signs Manual
 - 5. Standard Plate No. 8337D - Temporary Portable Precast Concrete Barrier
- D. Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) Part 6 - Temporary Traffic Control, and "Field Manual for Temporary Traffic Control Zone Layouts"
- E. Minnesota Traffic Engineering Manual Chapter 8 - Temporary Traffic Control

1.03 DEFINITIONS

- A. Long-term Temporary Traffic Control Zone: Any temporary traffic control zone that occupies a location more than 3 days.
- B. Intermediate-term/Night Temporary Traffic Control Zone: Any temporary traffic control zone that occupies a location during hours of darkness or up to 3 days.
- C. Short-term Temporary Traffic Control Zone: Any temporary traffic control zone that occupies a location greater than 15 minutes during daylight hours.

1.04 SUBMITTALS

- A. Preconstruction:
 - 1. Traffic Control Plan.
 - 2. Names, addresses, and phone numbers of 2 local persons who will respond to requests for maintenance.
- B. At least 24 hours prior to construction and upon request, present all traffic control devices intended for use on the Project to Engineer to ensure conformance with MN MUTCD and MnDOT Standard Signs Manual.

1.05 QUALITY ASSURANCE

- A. Permits: Obtain necessary permits from MnDOT, counties, and cities to allow for signing, barricading, and Work within rights-of-way as necessary to complete Project.
- B. Operations: Conduct all operations in accordance with the MN MUTCD and Field Manual for Temporary Traffic Control Zone Layouts.
- C. Flaggers:
 - 1. Contractor shall furnish flagpersons as required to adequately control traffic. Flagpersons shall conform to the requirements set forth in the MN MUTCD.
 - 2. Contractor shall provide all flaggers with the MnDOT Flagger Handbook and shall observe the rules and regulations contained therein. This handbook shall be in the possession of all flaggers while flagging on the Project. Flaggers shall not be assigned other duties while working as authorized flaggers.
 - 3. Flagpersons shall wear high visibility retroreflective safety vests, pants, and hats at all times while actively flagging on the Project. High visibility apparel shall comply with current Minnesota OSHA Rules 5207.0100 and 5207.1000.
 - 4. Contractor shall provide 2-way radios for flagpersons.
 - 5. Flagperson shall have a STOP/SLOW sign with a 5-foot minimum staff.
 - 6. Flaggers shall not override in-place signals, stop signs, or control interchanges. Only law enforcement officials are permitted to control these items.

1.06 DESIGN REQUIREMENTS

- A. Maintain traffic on in-place, temporary or permanent roadway, or a combination of these.
- B. Access to individual properties fronting a roadway under construction may be maintained on in-place or permanent roadway, or via an Engineer-approved gravel surface.
- C. Provide and maintain proper signing, flagpersons (as appropriate) and warning devices in order to:
 - 1. Close or restrict traffic on a roadway.
 - 2. Provide adequate detour information.
 - 3. Protect Work, workers, and motorists.
 - 4. Be consistent with requirements of "Detour Plan" enclosed in Drawings.
 - 5. Inform motorists of pending construction and direct motorist through Work zone.

- D. Lanes:
 - 1. Minimum 12 feet.
 - 2. Continuous throughout Project, and may be adjacent to each other or separated.

1.07 SEQUENCING AND SCHEDULING

- A. Closure and Detour Requests:
 - 1. Submit request for short-term lane closure to Engineer at least 24 hours prior to time of closure.
 - 2. Submit request to close street and divert traffic to Engineer at least 3 working days prior to time of closure.
 - 3. Authority to divert or close shall be subject to Engineer's approval.
 - 4. Contact proper agency and Engineer at least 72 hours prior to restricting traffic on roadways scheduled for short-term lane closures only.

- B. Advance Notice:
 - 1. Provide minimum 72-hour notice for all road closures and detours to the following:
 - a. Engineer.
 - b. MnDOT Dispatcher at District 8.
 - c. Minnesota State Patrol.
 - d. McLeod County Sheriff's Office.
 - e. Silver Lake Fire Department.
 - f. Local Ambulance Dispatcher.
 - g. Silver Lake Public Works Department.
 - h. McLeod County Department of Public Works.
 - i. Local School District.
 - j. MTC or other local transit.
 - k. Postal Service.
 - 2. Notification of postal service, delivery services, and postal recipient shall be made 5 days prior to relocation.
 - 3. Notify proper railroad agency a minimum of 48 hours prior to beginning any Work at or adjacent to railroad property.
 - 4. Provide minimum 48-hour notice for all road closures and detours to all affected residences and businesses, showing when closures and detours will occur and duration expected.
 - 5. Meet with businesses affected by each restriction of access and coordinate Work to allow for deliveries to be made to each affected business during construction.
 - 6. The Contractor shall provide 72-hour advance notice of the placement of both the base course and wearing course applications for all streets to be paved.

- C. Restrictions:
 - 1. Inclement Weather: Lane closures will not be permitted during inclement weather or when Engineer determines such closure will be a hazard to traffic.
 - 2. Nighttime Work, approved in advance by Engineer:
 - a. Provide adequate lighting as necessary to supplement or replace existing street lighting so Work, personnel, equipment, traffic control devices, and flaggers are visible to motorists.
 - b. Workers shall wear reflectorized jumpsuits during nighttime construction.
 - 3. Railroads: No Work shall be done on railroad property without the proper railroad agency approval, permit, and notification.
 - 4. Do not close or restrict traffic on 2 adjacent parallel streets at the same time.
 - 5. Traffic may be restricted on any street requiring milling, miscellaneous roadwork, and/or surfacing, subject to the following:
 - a. Local traffic shall be maintained during edge milling operations.
 - b. ROAD WORK AHEAD signs shall be placed in advance of milling operations and flagpersons provided as necessary to guide traffic through construction area.
 - c. Streets may be closed or have access restricted to traffic for full-width milling and for surfacing, consistent with hours specified, or local traffic may be maintained consistent with above provisions.
 - d. Coordinate milling, miscellaneous roadwork and surfacing with street reconstruction to afford local residents access to the vicinity of their homes.

- e. Drop-offs where traffic will cross from or to the in-place surface, or from or to the milled surface, shall be tapered and/or chamfered so as to provide for safe passage of traffic.
 - f. ROUGH ROAD AHEAD and BUMP signs shall be placed at locations determined by Engineer after milling operations have been completed.
 - g. Do not mill any notches for surfacing tapers until immediately prior to paving, except that, as approved by Engineer, notches may be milled if a temporary bituminous taper is installed and maintained until surfacing taper is installed.
6. The previous restrictions may be modified as necessary to ensure safe traffic operations.

1.08 TRAFFIC CONTROL PLAN

- A. Submit an overall Traffic Control Plan for approval within 10 days after award of Contract and 5 days prior to initiating any construction.
- B. As construction progresses, provide on a weekly basis an updated Traffic Control Plan to Engineer, for approval and suggested modifications, covering the following 2 weeks of Work. Plan will reflect the instructions specified and will include:
 1. Planned sequence of construction operations.
 2. Proposed street closures or restrictions and estimated dates.
 3. Provisions for routing detoured traffic.
 4. Signs and devices to be used.
- C. Acceptance: Each Traffic Control Plan is subject to acceptance, rejection or suggested revision by Engineer.
- D. Revisions:
 1. Contractor shall revise Traffic Control Plan accordingly, based on current phase of work. No additional compensation shall be made for revisions/additions to the Traffic Control Plan to accommodate the specific work sequence as undertaken by the Contractor.
 2. Revisions to Traffic Control Plan are subject to approval of Engineer.
- E. No construction operations may begin without complete approval of the Plan.
- F. Final Bituminous Course:
 1. A separate plan for traffic control may be prepared for installation of the final bituminous binder and wear courses.
 2. Plan does not have to adhere to above restrictions, but shall be prepared in detail and submitted to Engineer for approval.
 3. Engineer will determine viability of planned sequence and may accept, reject, or suggest alterations to this separate plan.
 4. Do not begin installation of final bituminous binder and wear course, crosswalks, or pavement markings without complete approval of this separate plan by Engineer, or without inclusion of these elements in the above-referenced sequence of construction.

1.09 CONTRACTOR REQUEST FOR DETOUR

- A. Contractor may request through traffic be detoured consistent with provisions and restrictions specified.
- B. Request shall contain information needed to justify request and select routes to be established.
- C. If arrangements can be made that are satisfactory to agencies having jurisdiction over roads to be used, contracting authority may then, at its sole discretion, establish an approved detour subject to the following conditions. Contractor, at Contractor's expense, shall:
 1. Design, provide, install, maintain, and remove all necessary traffic control devices on detour roads.
 2. Reimburse Owner for all expenses incurred in maintaining and restoring detour roads, except for snow removal.

3. Fulfill their obligations for maintenance of local traffic by furnishing, placing, and maintaining traffic control devices and other traffic protection measures required on roads undergoing improvements.

1.10 WINTER SUSPENSION

- A. Make passable and open road to traffic during periods of authorized winter suspension to eliminate need to maintain detours.
- B. When Work is resumed after winter suspension, Contractor shall replace or renew any Work lost or damaged during suspension, and shall remove, to the extent directed by Engineer, any temporary construction or materials used in maintenance thereof.
- C. When winter suspension results from an extension of Contract Time due to fault or negligence on the part of Contractor, Contractor shall not suspend operations until roads or temporary facilities which are being used by traffic are in such condition that only routine maintenance will be required to adequately accommodate through and local traffic during the anticipated period of suspension. In this instance, all maintenance of roads, temporary facilities, as well as traffic control devices will be Contractor's responsibility and will be classified as incidental Work.

1.11 INSPECTION AND MAINTENANCE

- A. Maintain traffic control devices on a 24-hour basis throughout term of the Contract, including Work suspensions.
 1. Repair or replace as necessary:
 - a. Devices that are damaged or moved.
 - b. Lights that cease to function properly.
 - c. Barricade weights that are damaged or fail to stabilize barricade.
- B. Inspection:
 1. Check devices twice daily, including end of workday.
 2. Conduct 1 night (after work hours) inspection of devices each week.
 3. Immediately correct deficiencies in alignment visibility and reflectivity.
- C. Traffic Control Checklist:
 1. Complete attached checklist each day of each week that traffic control devices are used on Project.
 2. Submit completed checklist to Engineer or designated representative each day at a mutually agreeable time.
 3. Failure to submit checklist by agreed-upon time will be considered "noncompliance" in maintaining traffic control devices and may be subject to daily charge set forth under MnDOT 1807 - Failure to Complete the Work On Time.
 4. Additional copies of the traffic control devices checklist will be available from Engineer.
- D. Notice:
 1. Furnish names, addresses, and phone numbers of 2 local persons who will respond to requests for maintenance to the following:
 - a. Engineer.
 - b. McLeod County Sheriff's Office.
 - c. Silver Lake Public Works Department.
 - d. MnDOT Dispatcher at District 8.
 - e. McLeod County Department of Public Works.
- E. Provide a means of receiving maintenance requests on a 24-hour basis.
- F. Respond to maintenance requests within 2 hours. Failure to respond to maintenance requests will result in Work being completed by Owner with twice the cost thereof being deducted from any monies due Contractor.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Signs:
 - 1. Provide required signs in accordance with MN MUTCD, MnDOT Standard Signs Manual, Minnesota Traffic Engineering Manual, Field Manual, AASHTO MASH, Drawings, and as approved by Engineer. See Section 34 41 20.
 - 2. Retroreflective Sheeting:
 - a. Fabricate all temporary rigid orange warning and rigid orange guide signs with either Type HP FLO (High Performance Fluorescent Sign Sheeting for Rigid Temporary or Permanent Signs) or Sign Sheeting for Rigid Temporary Fluorescent Orange Signs, and Markers (Type IX FLOW).
 - b. Fabricate all rigid signs installed, other than those with orange backgrounds, on a temporary basis with Type HP (High Performance Sheeting for Rigid Permanent Signs) or Sign Sheeting for Rigid Permanent Signs, Delineators, and Markers (Type IX).
 - c. Inplace signs that still apply during temporary operations may remain in place with no change in sign sheeting required.
 - 3. Advance Signing Notice: Provide 10 calendar days advance signing notice, as follows:
 - a. Closure notice (G20-X1) signs on road to be closed to traffic.
 - b. Work Zone Advance notice (G2-X2) signs where noted in Paragraph 3.01 of this Section.
 - c. Alternatives to sign G20-X2 will be allowed if approved by Engineer.
 - 4. Size, legend, and layout of signs shall be approved by Engineer prior to sign manufacture.
- B. Barricades:
 - 1. Provide 8-foot, Type III barricades in accordance with current MnDOT Standard Plate 8000K.
 - 2. Provide at least 1 Type III barricade in a closed lane for every 1,000 feet of lane closure.
- C. Barriers: Provide temporary portable precast concrete barriers in accordance with current MnDOT Standard Plate 8337D.
- D. Channelizing Devices: Provide channelizing devices in accordance with MN MUTCD Section 6F.63, and Minnesota Traffic Engineering Manual 8-6.04.
- E. Ballast:
 - 1. Sandbags will be the only acceptable weight to stabilize traffic control devices.
 - 2. During freezing conditions, mix sand for bags and impact barrels with a deicer to prevent sand from freezing.
 - 3. Place sandbags on each foot of traffic control device as needed to be stabilized.
- F. Extra Materials:
 - 1. In addition to traffic control devices approved by Engineer prior to each stage of construction, or as shown in Traffic Control Drawings, Engineer may require more traffic control as traffic conditions warrant.
 - 2. Store the following at a convenient location within Project limits of each portion of Project for use in an emergency, as approved by Engineer:
 - a. Minimum of 10 extra Type I barricades with flashers.
 - b. Minimum of 5 extra Type III barricades.
 - c. Minimum of 10 extra drums.
 - 3. No direct compensation will be made for furnishing, storing, and erecting these traffic control devices.
- G. Flashing Arrow Boards: Provide in accordance with MN MUTCD, and Minnesota Traffic Engineering Manual.
- H. Portable Changeable Message Sign: Provide in accordance with Minnesota Traffic Engineering Manual 8-6.07.

- I. Pavement Markings: Provide pavement markings in accordance with MN MUTCD and Minnesota Traffic Engineering Manual.

PART 3 EXECUTION

3.01 SCHEDULE OF WORK

- A. Streets that will be reconstructed may be closed to through traffic.
- B. Short-term lane closures, short-term spot road closures, or restrictions of traffic to 1 lane may be utilized on the following streets:
 - 1. Streets with sanitary sewer main or manhole improvements not related to reconstruction.
- C. Access to individual residences and businesses fronting all roadways in the Project area must be maintained in accordance with Phasing Plan, unless otherwise approved by affected property owner and Engineer.
- D. Conduct operations to allow emergency services access to all areas within the Project.

3.02 PREPARATION

- A. Flagpersons: Utilize flagpersons on any roadway that is restricted to 1 lane of traffic, except as approved by Engineer.
- B. Conduct operations to allow continual fire and police access to all areas within Project.
- C. Inplace Facilities:
 - 1. Signs: See Section 34 41 20.
 - a. Do not remove signs unless authorized by Engineer.
 - b. Carefully remove and store designated signs and posts for reinstallation.
 - c. Replace signs and posts damaged or lost during removal or construction.
 - d. Carefully remove and deliver signs and posts to appropriate agency (MnDOT, City of Silver Lake, McLeod County) as directed by Engineer.
 - e. Provide flaggers as directed when "STOP" or other prohibition signs are removed.
 - f. Relocate or temporarily mount and maintain required regulatory, warning, guide, and street name signs along streets that remain open to traffic.
 - g. Reinstall all signs not being replaced in accordance with MN MUTCD and Minnesota Traffic Engineering Manual.
 - 2. Mailboxes:
 - a. Prior to proceeding with any Work, relocate any mail and other delivery boxes within construction area and as designated by Engineer, to a location that will allow delivery during construction.
 - b. Remove and place on homeowner's property mailboxes designated by Engineer. Homeowner is responsible for postal service during construction.
 - c. Postal service and other affected delivery services shall approve all locations and installations.
 - d. Temporary mailbox banks may be utilized in accordance with the following:
 - 1) Accessible to postal service and postal recipient at all times.
 - 2) Numerous mailbox banks may be utilized to minimize distances from postal recipients.
 - 3) Provide materials to construct temporary mailbox banks.
 - e. Property owner's posts, cross members, and mailboxes not used during temporary relocation shall be properly stored by Contractor.
 - f. If postal delivery is not achieved, Work shall stop immediately and remain stopped until the situation is corrected.
 - 3. Traffic Signals:
 - a. During construction, the Staging and Traffic Control Plan will require modifications to in-place signal systems.
 - b. Staging Plan shall identify modifications to be made.

- c. Contractor shall ensure that a traffic control signal system is in operation at each intersection at all times, except as otherwise approved by Engineer.
 - d. An all-way stop condition may be installed at an intersection if the following conditions are met:
 - 1) The all-way stop condition is part of a suitable traffic plan or sequence of construction for the Project approved by Engineer.
 - 2) All signal cable, signal equipment, and signal hardware required for system is either on Site or in Contractor's stock and available for immediate installation.
 - 3) Roadway construction activities require removal of portions of existing traffic signal system.
 - 4) STOP (R1-1) signs shall be 48 inches by 48 inches, and shall be placed on left and right sides of all approaches to intersection.
 - 5) STOP AHEAD (W3-1a) signs shall be 48 inches by 48 inches, with orange warning flags, and installed on both sides of all approaches to intersection at locations directed by Engineer.
 - e. Under no conditions will the all-way stop condition be allowed during winter or other non-construction periods.
 - f. Maintain street name identification at all times.
 - 1) Provide temporary ground mounted signs when mast arm signs are removed.
 - g. Maintain and protect in-place equipment not being modified, replaced, or abandoned, as approved by Engineer.
 - h. Contact the proper agency at least 72 hours prior to need for modifications to signal system. Agency may authorize Contractor to make modifications, or may require agency personnel be present to make modifications.
4. Pavement Markings:
- a. See Section 32 17 23.
 - b. For long-term lane closures and traffic shifts, remove all pavement markings that conflict with temporary traffic control operations in accordance with MnDOT 2102.
 - 1) Minimize damage to pavement structure or surface texture.
 - 2) Repair damaged areas as directed by the Engineer.
 - a) Repairs shall be considered incidental.
 - c. Removal and replacement of these pavement markings shall be considered incidental to Traffic Control.

3.03 INSTALLATION

- A. For signs that will be in-place for longer than 30 days, mount signs on posts driven into ground at proper height and lateral offset as detailed in MN MUTCD. For signs in-place for less than 30 days, or if this is not possible, maintain signs on portable supports or barricades.
- B. Signs shall not be mounted on metal drums.
- C. Placement of signs and barricades shall proceed in direction of traffic flow.
- D. Cover traffic control devices inconsistent with traffic patterns.

3.04 TRAFFIC PROTECTION

- A. Do not deposit, store materials, or park equipment on or adjacent to any roadway open to traffic that will interfere with safe flow of traffic.
- B. Provide traffic barriers and crash cushions according to the Traffic Control Layouts and details in the Drawings, guidelines of Part 6 of the MN MUTCD and AASHTO's "Roadside Design Guide."
- C. Keep roadways that are open to traffic free from earth materials and debris.

- D. During construction, provide devices to protect traffic and pedestrians from drop-offs, openings, falling objects, splatter or other hazards.
 - 1. Open excavations/drop-offs adjacent to traveled roadway:
 - a. Schedule operations so as to minimize traffic exposure to uneven lanes, milled edges, and edge drop-offs.
 - b. Close a traffic lane, auxiliary lane, or shoulder on any road open to traffic when construction operations cause a drop-off greater than 4 inches adjacent to that lane or shoulder, unless adequately protected by traffic barrier.
 - c. Sign and delineate any drop-off less than 4 inches caused by construction operations, as shown in the Field Manual.
 - d. When excavations on roadways open to traffic exceed 1 foot in depth:
 - 1) Provide continuous portable concrete barriers for entire length of excavation.
 - 2) Include suitable end treatment consisting of tapered barrier sections, impact attenuators, or combination thereof.
 - 3) Place warning lights at 50-foot intervals.
 - e. Place portable concrete barriers with end treatments according to Part 6 of the MN MUTCD and AASHTO's "Roadside Design Guide."
 - 2. In lieu of precast concrete barrier, barrels and barricades may be used during construction, as approved by Engineer, provided that:
 - a. Construction work is actively done in or directly adjacent to excavation.
 - b. Workers are present.
 - c. It is daylight hours; or, if nighttime hours, there is additional lighting of the open excavation.
 - d. Traffic is in a single lane (alternating) or a single lane in each direction with parking removed.
 - e. Barrels or barricades can be set outside the minimum widths required for traffic and at intervals as directed by Engineer.

- E. Pedestrian Access and Traffic:
 - 1. Provide continuous access to all adjacent residences and businesses.
 - 2. Provide temporary boardwalk where in-place sidewalk is removed.
 - 3. When access to business entrances is prohibited, coordinate with business owners to provide protection and direction for alternate entrances.
 - 4. Provide signs, barricades, flasher, snow fence or other devices as required to protect pedestrians adjacent to Work.
 - 5. Cover newly poured concrete sidewalk with plywood after curing compound is applied to provide access at business entrances.

3.05 REMOVAL OF DEVICES

- A. After signs are removed, remove sign posts as soon as possible.
- B. Removal of signs and barricades shall start at the end of construction areas and proceed toward oncoming traffic, unless otherwise directed by Engineer.

3.06 RESTORATION AND ADJUSTMENT

- A. Replace any device found to be defective.
- B. Replace reflective material on both new and used traffic control devices whose effectiveness, in Engineer's opinion, has been substantially reduced from traffic or other causes.
- C. Keep traffic control signs and devices furnished in legible condition, including removing any grime deposited on devices by traffic, natural causes, or by nature of Work being performed.
- D. Relocate any traffic control device that is misplaced due to Contractor or subcontractor operations.
- E. Following construction, reinstall mail and other delivery boxes in convenient locations and in compliance with United States Postal Service (USPS) regulations.
 - 1. Replace any box or supporting member that is damaged during construction.
 - 2. Permanent installation shall be acceptable to postal service, delivery service, and property owner.

3.07 ADDITIONAL TRAFFIC CONTROL DEVICES

- A. Furnish and install additional traffic control devices ordered by Engineer.
- B. Install and maintain devices in a functional and legible condition at all times.
- C. Method of Measurement:
 - 1. Measure flashers, barricades, reflectorized drums, 48-inch by 48-inch signs, portable changeable message signs, and flashing arrow boards by number of individual units of each type, multiplied by number of calendar days each unit is in service.
 - 2. Measure standard signs of each type (other than 48-inch by 48-inch signs) by face area of signs furnished, multiplied by number of calendar days each square foot of sign is in service.
 - 3. Measure special construction signs by face area thereof, furnished and installed as specified.
- D. Basis of Payment:
 - 1. All activities required by or relating to this section will be considered incidental.
 - 2. No direct payment will be made.
 - 3. No additional compensation or time extension will be granted due to actions brought against the Contractor for failure to comply with pollution control requirements.

END OF SECTION

TRAFFIC CONTROL INSPECTION CHECKLIST

PROJECT NUMBER _____

1. Are any traffic control devices missing?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____
2. Do any traffic control devices need repair?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____
3. Were any traffic control devices replaced or repaired?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____

4. Are any lights/flashers not functioning?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____
5. Were any lights/flashers replaced or repaired?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____

6. Are any traffic control devices improperly placed?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____
7. Were all traffic control device positions corrected?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	

8. Do any traffic control devices need cleaning?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	How Many? _____
9. Were all traffic control devices cleaned?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	

THIS TRAFFIC CONTROL INSPECTION WAS PERFORMED BY:

_____ of _____
(Name) (Title) (Name of Contractor)

ON ____ / ____ / ____ AT ____ (AM PM)

ADDITIONAL COMMENTS:

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SECTION 01 57 00

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Drainage control.
 - 2. Dust control.
 - 3. Erosion and sediment control.
 - 4. Noise control.
 - 5. Pollution control.
 - 6. Site cleaning.

- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 12 16 - Work Sequence
 - 3. Section 02 41 19 - Selective Demolition
 - 4. Section 02 44 00 - Abandonment of Facilities
 - 5. Section 31 23 10 - Excavation and Embankment
 - 6. Section 31 23 19 - Dewatering

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements: As a minimum, comply with local, state, and federal requirements.

1.03 MEASUREMENT AND PAYMENT

- A. Temporary Controls are incidental to the installation of proposed applicable permanent utility improvements:

1.04 DRAINAGE CONTROL

- A. Reference: See Section 31 23 10.

- B. Maintain excavations free of water.
 - 1. Grade Site to drain.
 - 2. Provide, operate, and maintain pumping equipment.
 - 3. Protect Site from puddling or running water.

1.05 DUST CONTROL

- A. Reference: See Section 31 25 10.

- B. Execute Work by methods to minimize raising dust from construction operations.

- C. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.06 EROSION AND SEDIMENT CONTROL

- A. Reference: See Section 01 57 12.

- B. Prevent erosion and sedimentation:
 - 1. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas.

2. Minimize amount of bare soil exposed at one time.
3. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
4. Use selective placement at construction fill and waste areas to avoid erosive surface silts or clays.
5. Periodically inspect earthwork to detect evidence of erosion and sedimentation.
6. Promptly apply corrective measures.

1.07 NOISE CONTROL

- A. Comply with local noise ordinances.
- B. Avoid use of tools or equipment that produce harmful noise.
- C. Restrict use of noise-making tools and equipment to hours of use that will minimize noise complaints from persons or businesses near Site.
- D. Provide noise suppression barriers or equipment used to perform the Work.

1.08 SITE CLEANING

- A. Keep Site neat, clean, free of debris.
- B. Prevent papers, cardboard or other debris from blowing around Site or onto adjacent property.
- C. Contractor shall provide and pay for dumpsters for collection of trash.
- D. Control accumulation of waste materials and rubbish. Collect and dispose of all trash from the Site at regular intervals.
- E. Separate and recycle applicable materials.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 57 12

STORMWATER MANAGEMENT AND EROSION CONTROL (MnDOT 1717.2)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes temporary and permanent prevention and control of soil erosion.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 31 25 10 - Stormwater Management
 - 4. Section 32 92 12 - Establishing Turf and Controlling Erosion
 - 5. Section 33 41 00 - Storm Sewer Systems
- C. Basis of Payment:
 - 1. All expenses shall be borne by Contractor with no direct compensation.
 - 2. Failure to comply with established erosion control measures will result in withholding of progress payments by Owner.

1.02 REFERENCES

- A. MnDOT 1717.2 - Stormwater Management and Erosion Control
- B. MPCA:
 - 1. Protecting Water Quality in Urban Areas, 2000
 - 2. Minnesota Stormwater Manual

1.03 SUBMITTALS

- A. Site plan and schedule for accomplishment of Work within, adjacent to, or affecting surface water.
- B. Provide the name of the individual responsible for meeting the requirements of this Specification, and ensuring compliance with the NPDES/SDS Permit (if applicable), and any watershed district permits (if applicable).
- C. Submit erosion control schedule weekly to Engineer including the following:
 - 1. Proposed erosion and sediment control installations and timeline.
 - 2. Permanent turf establishment plan and timeline.
 - 3. Incorporating grading operations into the erosion control plan.
 - 4. Corrective action plans from previous week's corrective action report.
 - 5. Proposed erosion control measures during work suspensions.
- D. Proof of coverage under permit MNR100001 - NPDES/SDS Construction Stormwater Permit.

1.04 QUALITY ASSURANCE

- A. Refer to "Protecting Water Quality in Urban Areas" - Best Management Practices for Minnesota.
- B. For operations that disturb 1 acre or more of land area, apply online for an NPDES/SDS Construction Stormwater Permit (Form MNR100001) as soon as possible. For operations that disturb 50 acres or more, apply online at least 30 days prior to the start of construction. Coverage must be obtained prior to the start of land disturbing activities.
 - 1. Conduct inspections required by NPDES/SDS Construction Stormwater Permit.

2. Maintain inspection log as required by the NPDES/SDS Construction Stormwater Permit.
 3. Complete and attach SWPPP to NPDES/SDS Construction Stormwater Permit. Keep copy on Site. See MPCA website for more information: <http://www.pca.state.mn.us>.
- C. Obtain all necessary permits from the responsible regulatory agencies.
1. For erosion control measures not shown on Drawings.
 2. Before working in surface waters.

1.05 SEQUENCING AND SCHEDULING

- A. Construct drainage facilities and turf establishment concurrently with earthwork operation.
- B. Complete construction and finishing operation on a drainage area basis to minimize erosion.
- C. Incorporate erosion control measures at the earliest practical time during construction.
- D. Install erosion control measures as directed prior to disturbance of in-place ground cover in critical areas that are tributary to public waters.

1.06 EMERGENCY EROSION CONTROL

- A. Emergency Basis:
1. Sudden occurrence of a serious and urgent nature that is beyond normal maintenance of erosion control items and which requires immediate mobilization and movement of necessary personnel, equipment, and materials to emergency site.
 2. Emergency will require immediate corrective Work followed by installation of erosion control measures.
- B. Mobilization: Within 24 hours of notice by Engineer.

1.07 MAINTENANCE

- A. Maintain all erosion control facilities to provide proper function throughout Project.
- B. Should Contractor fail to maintain erosion control measured specified, Owner may hire another firm to maintain the erosion control measures. Costs associated with hiring another firm will be deducted from Contract amount.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Ensure minimum interference with roads, streets, walks, adjacent occupied or used facilities. Do not close or obstruct without permission from authorities having jurisdiction.
- B. Shape exposed soil areas to permit runoff with minimal erosion.
- C. Install safeguards to prevent water pollution from haul roads, work platforms or other temporary construction facilities.
- D. Restore all plant, equipment, or other supplementary operation sites to prevent siltation and erosion.
- E. Repair any off-site damage resulting from failure to install or maintain erosion control measures.

3.02 PROTECTION

- A. Contractor is advised to refer to "Protecting Water Quality in Urban Areas."

END OF SECTION

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SECTION 01 57 19

AIR, LAND, AND WATER POLLUTION (MnDOT 1717)

PART 1 GENERAL

1.01 SUMMARY

- A. Provide control of pollution from construction sites and related activities.
- B. Related Sections:
 - 1. Section 01 57 12 - Stormwater Management and Erosion Control
 - 2. Section 31 25 10 - Stormwater Management
- C. Basis of Payment:
 - 1. No direct payment will be made. All activities required by or relating to this section will be considered incidental.
 - 2. No additional compensation or time extension will be granted due to actions brought against the Contractor for failure to comply with pollution control requirements.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conduct all operations to prevent, control and abate the pollution of air, land and water in accordance with the rules, regulations and standards adopted and established by the following agencies:
 - a. Minnesota Department of Natural Resources
 - b. Minnesota Pollution Control Agency
 - c. Minnesota Department of Transportation
 - d. U.S. Army Corps of Engineers

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROTECTION OF WATERS

- A. Schedule and conduct all operations to minimize soil erosion and prevent siltation and the resultant turbidity of public waters.
- B. Prevent pollution of flowing or impounded waters from particulate or liquid matter that may be harmful to fish and wildlife or detrimental to public use.
- C. Remove sediment from aggregate wash operations by filtration or settlement prior to discharge into public waters.
- D. Do not discharge wash water or waste from concrete mixing operations into streams or public waters.

3.02 SPECIAL REQUIREMENTS

- A. Minimize crossing of streams and rivers with hauling equipment.

- B. Provide temporary bridging where stream crossings are necessary.
- C. Remove temporary bridging as soon as crossings are no longer necessary.

END OF SECTION

SECTION 01 57 33

APPLICATION OF WATER FOR DUST CONTROL (MnDOT 2130)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and applying water to the roadbed for dust control purposes when specifically designated by Engineer.
- B. Related Sections:
 - 1. Section 01 51 00 - Temporary Utilities
- C. Method of Measurement:
 - 1. Measure specifically designated water by volume in 1,000 (M) gallon increments.
 - 2. Deduct for volumes wasted through Contractor's failure to coordinate application with other operations as required.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of water for dust control shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT 2130 - Application of Water for Dust Control

PART 2 PRODUCTS

2.01 MATERIALS

- A. Distributor Requirements:
 - 1. Pressure type.
 - 2. Self-propelled.
 - 3. Mounted on pneumatic-tired wheels.
 - 4. Water supply tank with distributing bars to ensure uniform application.
 - 5. Pump capacity to provide uniform application at any rate up to 250 gallons per minute.

PART 3 EXECUTION

3.01 APPLICATION

- A. Apply water in the locations and at the rates or amounts directed by Engineer.
- B. Apply water within 3 hours of Engineer's direction.

END OF SECTION

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SECTION 01 58 13

PROJECT SIGNS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Provide one Project identification sign.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures

1.02 DESIGN REQUIREMENTS

- A. Professionally designed and lettered sign including the following information:
 - 1. See Temporary Construction Sign for Rural Development Projects sign example under Miscellaneous Forms and Requirements. Project sign to be designed and constructed according to example.
 - 2. Payment for Project sign shall be paid by Lump Sum.

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Submit Shop Drawings showing content, layout, lettering, colors, sizes, and grades of members.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structure and Framing: New wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4-inch thick standard large sizes to minimize joints.
- C. 8-foot by 4-foot.
- D. Rough Hardware: Galvanized.
- E. Paint and Primers: Exterior quality, 2 coats; sign background of color as selected.
- F. Lettering: Exterior quality paint, contrasting colors as selected.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install at Project entrance locations as designated by Engineer.
- B. Install signs within 7 days after date fixed by Notice to Proceed.
- C. Erect supports and framing on secure foundation, free standing, rigidly braced and framed to resist wind loadings of 50 mph.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean. Repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore area.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements governing:
 - a. Products.
 - b. Delivery, storage and handling.
 - 2. The following is not included in this section: Product Substitution Procedures (Section 01 25 13).

1.02 PRODUCT DEFINITIONS

- A. Products:
 - 1. Unless indicated otherwise, the term "products" represents new material, machinery, components, equipment, fixtures, and systems forming the Work.
 - 2. Does not include machinery and equipment used for preparation, fabrication, conveying, or erection of the Work.
- B. Named Products: Items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
- C. Materials: Products that are substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed as part of the Work.
- D. Equipment: A product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.03 PRODUCT QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
- B. Limited Quantities:
 - 1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete Project requirements in a timely manner, consult with Engineer for a determination of the most important product qualities before proceeding.
 - 2. Qualities may include attributes relating to:
 - a. Visual appearance.
 - b. Strength.
 - c. Durability.
 - d. Compatibility.
 - 3. When a determination has been made, select products from sources that possess these qualities to the fullest extent possible.

1.04 PRODUCT REQUIREMENTS

- A. Minimum Requirements: Comply with specifications and referenced standards.
- B. Product Provision: Provide products complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.

- C. Components: Items required to be supplied in quantity within a specification section shall be the same and shall be interchangeable.
- D. Compatibility of Options: When Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- E. Existing Products: Do not use materials and equipment removed from existing premises, except as specifically required or permitted by Contract Documents.
- F. Nameplates:
 - 1. Except for required labels and operating data, do not attach or imprint manufacturer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
 - 2. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - 3. Equipment Nameplates:
 - a. Provide one (1) permanent nameplate on each item of service-connected or power-operated equipment.
 - b. Provide one (1) duplicate nameplate for each item of service-connected or power-operated equipment to be delivered to Owner.
 - c. Locate on an easily accessible surface that is inconspicuous in occupied spaces.
 - d. Provide the following information and other essential operating data on nameplate:
 - 1) Name of product and manufacturer.
 - 2) Model and serial number.
 - 3) Capacity.
 - 4) Speed.
 - 5) Ratings.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General Requirements:
 - 1. Deliver, store and handle products in accordance with the manufacturer's recommendations.
 - 2. Schedule and coordinate the delivery of materials to ensure personnel and equipment will be available at the Site.
 - 3. Sequence deliveries to avoid delays but minimize on-site storage.
 - 4. Prevent damage, deterioration, soiling, and loss, including theft.
 - 5. Repair or replace damaged materials at no additional cost to Owner.
- B. Packing and Shipping: Deliver products to the jobsite in manufacturer's sealed containers bearing the manufacturer's name and brand, and appropriate UL labels for fire hazard and fire resistance classification.
- C. Acceptance at Site:
 - 1. Promptly inspect shipments to ensure that:
 - a. Products comply with requirements.
 - b. Quantities are correct.
 - c. Products are undamaged.
 - 2. Replace damaged or defective materials.
- D. Storage and Protection:
 - 1. Store with manufacturer's seals and labels intact and legible.
 - 2. Store sensitive products in weather-tight, climate-controlled enclosures.
 - 3. Cover products subject to deterioration with impervious sheet covering, providing ventilation to avoid condensation.
 - 4. For exterior storage of fabricated products, place on sloped supports, above ground.
 - 5. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
 - 6. Provide off-site storage and protection when Site does not permit on-site storage or protection.

7. Protect stored materials from damage by adjacent work, falling debris, or equipment.
8. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

1.06 PRODUCT SELECTION

- A. Product selection is governed by the Contract Documents, and governing regulations by previous project experience.
- B. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
- C. Semi-Proprietary Specification Requirements:
 1. Where 2 or more products or manufacturers are named, provide 1 of the products indicated. No substitutions will be permitted.
 2. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal", comply with Section 01 25 13 or other Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
 3. Contractors and suppliers will be expected to provide the specified product unless prior approval is received from Engineer's office in sufficient time to notify Bidders through addendum.
- D. Descriptive Specification Requirements: Where specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
- E. Performance Specification Requirements:
 1. Where specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.
 2. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
 3. General overall performance of a product is implied where the product is specified for a specific application.
- F. Compliance with Standards, Codes and Regulations: Where the specifications only require compliance with an imposed code, standard or regulation, select a product that complies with applicable standards, codes and regulations.
- G. Visual Matching:
 1. Where specifications require matching an established sample, Engineer's decision will be final on whether a proposed product matches satisfactorily.
 2. Where no product available within the specified category matches satisfactorily but complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product, or for noncompliance with specified requirements.
- H. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that comply with other specified requirements. Engineer will select the color, pattern and texture from the product line selected.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CLEANING AND PROTECTION

- A. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 01 71 13

**MOBILIZATION
(MnDOT 2021)**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes preparatory Work for construction operations.
- B. Related Sections:
 - 1. Section 01 51 00 - Temporary Utilities
 - 2. Section 01 52 19 - Temporary Sanitary Facilities
 - 3. Section 01 58 13 - Project Signs
- C. Basis of Payment:
 - 1. Payment for mobilization shall be at the contract unit price as listed on the Bid Form. Additional mobilizations that may be required for specific work items or to conform to the provisions of the Contract Times shall be included in this item.
 - 2. Payment will be made as follows:

Cost Percent of Contract Completed	Percent of Mobilization Item Paid
10	50
30	75
50	95
100	(Final) 100

1.02 REFERENCES

- A. MnDOT 2021 - Mobilization

1.03 PERFORMANCE REQUIREMENTS

- A. Movement of personnel, equipment, supplies, and incidentals to the Site.
- B. Establishment of Contractor offices and facilities.
- C. Installation of temporary sanitary facilities.
- D. Installation of Project signs.
- E. Commencement of Work.

1.04 SUBMITTALS

- A. Required Submittals Prior to Mobilization:
 - 1. Approved Project Schedule.
 - 2. Shop Drawing Schedule.
 - 3. List of Proposed Subcontractors.
 - 4. List of Proposed Suppliers.
 - 5. Material and Procedural Submittals as Required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 75 00

STARTING AND ADJUSTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Starting systems.
 - 2. Testing, adjusting, and balancing.
 - 3. Demonstration and instructions.

- B. Related Sections:
 - 1. Section 01 21 00 - Allowances
 - 2. Section 01 33 00 - Submittal Procedures
 - 3. Section 01 77 00 - Closeout Procedures
 - 4. Section 01 78 23 - Operation and Maintenance Data
 - 5. Individual Technical Sections

1.02 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment systems.

- B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

- C. Verify wiring and support components for equipment are complete and tested.

- D. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

- E. Submit a written report in accordance with Section 01 33 00 that equipment or system has been properly installed and is functioning correctly.
 - 1. Written start-up report shall be amended and re-submitted if modifications are required to satisfactory operation of the system.
 - 2. Re-submitted and amended start-up reports shall be witnessed, generated, and signed by a manufacturer representative.
 - 3. Costs associated with the re-submitting of start-up reports shall be paid by Contractor.

1.03 TESTING, ADJUSTING, AND BALANCING

- A. Contractor will appoint, employ, and pay for services of an independent firm, approved by Owner, to perform testing, adjusting and balancing.

- B. Reports will be submitted by the independent firm to Engineer indicating:
 - 1. Observations and results of tests.
 - 2. Compliance or non-compliance with manufacturer's requirements and with the requirements of the Contract Documents.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 DEMONSTRATION AND INSTRUCTIONS

- A. A manufacturer's representative who is knowledgeable about the project shall meet with Owner's personnel prior to date of final inspection to provide instruction in proper operation and maintenance:
 - 1. Utilize operation and maintenance manuals as basis for instructions.
 - 2. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
 - 3. Include a detailed review of the following items:
 - a. Maintenance manuals.
 - b. Record documents.
 - c. Spare parts and materials.
 - d. Tools.
 - e. Lubricants.
 - f. Fuels.
 - g. Identification systems.
 - h. Control sequences.
 - i. Hazards.
 - j. Cleaning.
 - k. Warranties.
 - l. Maintenance agreements and similar continuing commitments.
 - 4. Manufacturer's representative shall demonstrate the following procedures to Owner's personnel prior to date of final inspection:
 - a. Startup.
 - b. Shutdown.
 - c. Emergency operations.
 - d. Noise and vibration adjustments.
 - e. Safety procedures.
 - f. Economy and efficiency adjustments.
 - g. Effective energy utilization.
 - h. Troubleshooting.
 - i. Maintenance.
- B. Prepare and insert additional data in operations and maintenance manuals if need for additional data becomes apparent during instructions.
- C. Owner may video tape above procedures.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Administrative and procedural requirements for contract closeout, including:
 - 1. Submittals.
 - 2. Inspection procedures.
 - 3. Warranties.
 - 4. Record document submittals.
 - 5. Final cleaning.
- B. Related Sections:
 - 1. Section 01 78 23 - Operation and Maintenance Data
 - 2. Specific requirements for individual units of work are included in appropriate technical sections

1.02 SUBSTANTIAL COMPLETION

- A. Complete the following before requesting Engineer's inspection for certification of Substantial Completion for each phase of work. List items that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Obtain, submit releases enabling Owner unrestricted use of the Work and access to services and utilities.
 - 3. Regulatory requirements:
 - a. Where required, obtain occupancy permits, operating certificates, similar releases.
 - b. Obtain elevator inspection from State Inspector.
 - 4. Bonding and insurance:
 - a. Consent of Surety to Reduction In or Partial Release of Retainage.
- B. Inspection Procedures:
 - 1. When prerequisites are complete, submit request in writing to Engineer stating that all requirements are satisfied, and requesting inspection.
 - 2. Upon receipt of Contractor's request for inspection, Engineer will either proceed with inspection or advise Contractor of unfilled prerequisites.
 - 3. Following initial inspection, Engineer will either prepare Certificate of Substantial Completion, or advise Contractor of work which must be performed before certificate will be issued. Engineer will repeat inspection when requested and when assured that work has been substantially completed.
 - 4. Results of completed inspection will form the basis of requirements for Final Acceptance.

1.03 FINAL ACCEPTANCE

- A. Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Submittals:
 - a. Lien Waivers (from all subcontractors and suppliers).
 - b. Certificate of Substantial Completion.
 - c. Contractor's Affidavit of Payment of Debts and Claims.
 - d. Consent of Surety (if Performance Bond provided).
 - 1) To Partial Release of Retainage (AIA G707A).
 - 2) To Final Payment (AIA G707).
 - e. Assurance that unsettled claims will be settled.
 - f. Proof that fees and similar obligations have been paid.
 - g. Evidence of final, continuing insurance coverage complying with insurance requirements.

- h. Form IC-134, Affidavit for Obtaining Final Settlement of Contract with State of Minnesota and any of its Political or Governmental Subdivisions.
- i. RD 1924-10, Release of Claimants
- j. Notarized certification of compliance with wage rate requirements.
- k. Certified copy of Engineer's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and has been endorsed and dated by Engineer.
- l. RD 1924-9, Certificate of Contractor's Release.
- 2. Warranties: Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, and similar documents.
- 3. Maintenance:
 - a. Materials (each type and color).
 - b. Maintenance instructions.
- 4. Miscellaneous Record Submittals:
 - a. Refer to other sections of specifications for requirements of miscellaneous record keeping and submittals in connection with actual performance of work.
 - b. Complete miscellaneous records, place in good order, properly identified and bound or filed, ready for continued use and reference.
- 5. Records:
 - a. Test/adjust/balance records.
 - b. Startup performance reports.
- B. Record Drawings: Submit to Engineer a set of record prints marked to show "as-built" conditions for work of contract.
- C. Adjusting:
 - 1. Repair and restore marred exposed finishes.
 - 2. Touch up of painting of marred surfaces.
 - 3. Complete final cleaning requirements.
- D. Final Payment Request:
 - 1. Include certificates of insurance for products and completed operations where required.
 - 2. Updated final statement, accounting for final additional changes to Contract Sum.
 - 3. Final liquidated damages settlement statement, acceptable to Owner.
- E. Re-inspection Procedure:
 - 1. Engineer will re-inspect work upon receipt of notice that work, including punch list items resulting from earlier inspections, has been completed, except for items whose completion has been delayed because of circumstances that are acceptable to Engineer.
 - 2. Engineer will either prepare a certificate of final acceptance, or will advise Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 - 3. If necessary, re-inspection procedure will be repeated.

1.04 TRANSFER OF SITE TO OWNER

- A. Deliver tools, spare parts, extra materials and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
- B. Change door locks to Owner's access. Advise Owner's personnel of changeover in security provisions.
- C. Advise Owner of changeover in heat and other utilities.
- D. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

1.05 OPERATING AND MAINTENANCE INSTRUCTIONS/DEMONSTRATIONS

- A. Arrange for each installer of operating equipment and other work requiring regular or continuing maintenance, to meet at Site with Owner's personnel to provide necessary basic instruction in proper

operation and maintenance of entire work. Where installers are not experienced in required procedures, include instruction by manufacturer's representatives.

- B. Provide detailed review of following items:
 - 1. Maintenance manuals.
 - 2. Record documents.
 - 3. Spare parts and materials.
 - 4. Tools.
 - 5. Lubricants.
 - 6. Fuels.
 - 7. Identification systems.
 - 8. Control sequences.
 - 9. Hazards.
 - 10. Cleaning materials and procedures.
 - 11. Warranties, bonds, maintenance agreements similar continuing commitments.

- C. As part of this instruction for operating equipment, demonstrate following procedures:
 - 1. Start-up.
 - 2. Shut-down.
 - 3. Emergency operations.
 - 4. Noise and vibration adjustments.
 - 5. Safety procedures.
 - 6. Economy and efficiency adjustments.
 - 7. Effective energy utilization.

- D. Provide a video of above procedures.

PART 2 PRODUCTS

2.01 CLEANING AGENTS

- A. Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned.

- B. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. Provide final cleaning, following manufacturer's written instructions.

- B. Conduct cleaning and waste-removal operations to comply with local laws and ordinances, and federal and local environmental and antipollution regulations.

- C. Employ experienced workers or professional cleaners for final cleaning.

- D. Comply with safety standards for cleaning.
 - 1. Do not burn waste materials.
 - 2. Do not bury debris or excess materials on Owner's property.
 - 3. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
 - 4. Remove waste materials from Site and dispose of lawfully.

- E. Clean Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- F. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.
1. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 2. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 3. Remove tools, construction equipment, machinery, and surplus material from Site.
 4. Remove snow and ice to provide safe access to building.
 5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 7. Sweep concrete floors broom clean in unoccupied spaces.
 8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 9. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 10. Remove labels that are not permanent.
 11. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 12. Replace parts subject to unusual operating conditions.
 13. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 14. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 15. Clean ducts, blowers, and coils if units were operated without filters during construction.
 16. 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.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for operation and maintenance data:
 - 1. Submittals.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 75 00 - Starting and Adjusting
 - 3. Section 01 77 00 - Closeout Procedures
 - 4. Individual Technical Sections

1.02 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Form and Format for physical copies:
 - 1. Organize operation, maintenance data for equipment prepared in the form of an instruction manual of manageable size.
 - 2. All submittals shall contain a detail index of the items included as part of the submittal.
 - a. At a minimum sections shall include the items described in Part 1.04 of this specification.
 - 1) A separate section shall be provided for each piece of equipment included.
 - 3. Submit preliminary draft (and any subsequent drafts) of contents electronically in pdf format via the Project website for review.
 - 4. Once approved by Engineer, bind into individual heavy-duty, 2-inch, 3-ring vinyl-covered binders with pocket folders, each set of data, marked with appropriate identification on both front and spine of each binder.
 - 5. Text shall be manufacturer's printed data or typewritten data on 20-pound paper; page size 8-1/2-inch by 11-inch. Computer generated data shall be by letter quality printers or laser printers.
 - 6. Clearly mark each sheet of product data to specify products, component parts, and data applicable to installation; delete inapplicable information.
 - 7. Drawings and photographs shall have reinforced, punched binder tabs. Bind in with text, folding larger drawings to size of text pages.
- C. Form and Format for electronic copies:
 - 1. Preliminary draft submittal:
 - a. Submit all Shop Drawings electronically in pdf format via the Project website.
 - b. Electronic file sizes larger than 150 megabytes shall be submitted in pdf format via USB thumb drive and mailed to the Engineer by the Contractor at the Contractor's expense.
 - 2. Final submittal:
 - a. Include (1) electronic copy in pdf format via USB thumb drive.
 - b. USB thumb drive shall be inside of a sleeve which is affixed to the binder cover.
 - c. USB thumb drive shall be clearly labeled as to the content of the drive.
- D. Submittal Schedule:
 - 1. Submit 1 electronic copy of preliminary draft of contents no later than 45 calendar days after approval of Shop Drawings.
 - 2. Submit one (1) electronic copy and two (2) individually bound copies of completed data in final form not later than 7 calendar days prior to first instruction of Owner personnel.
 - 3. If instruction of Owner personnel is not required, submit completed data no later than 14 calendar days prior to final inspection.

4. Submit one (1) electronic copy of additional requested data no later than 21 calendar days following instruction of Owner personnel.

1.03 QUALITY ASSURANCE

- A. Preparation of Project-specific data shall be by personnel trained and experienced in maintenance and operation of described products, equipment, systems, materials, or finishes.
- B. Photocopies: Drawings shall be legible and suitable for photocopying. All materials shall be reproducible. On material that contains data on several types/sizes/models of equipment, the specific type/size/model provided shall be clearly highlighted.

1.04 CONTENTS

- A. Table of Contents: Include with each volume, with each product or system description identified.
- B. Directory:
 1. List names, addresses and telephone numbers of:
 - a. Engineer.
 - b. Contractor.
 - c. Manufacturers and suppliers, including local source of supplies and replacement parts.
- C. Data to be Included:
 1. Assembly, installation, alignment, inspection procedures.
 2. Critical tolerances.
 3. Startup procedures.
 4. Complete parts listing.
 5. Spare parts listing.
 6. Emergency instructions.
 7. Fabrication drawings.
 8. Copies of warranties.
 9. Recommended "turn-around" cycles.
 10. Inspection procedures.
 11. Shop Drawings and Product Data.
 12. Fixture lamping schedule.
- D. Data for Equipment and Systems:
 1. Provide manufacturer's printed operation and maintenance instructions.
 2. Provide sequence of operation and as-installed control diagrams by controls manufacturer.
 3. Provide composite wiring diagrams for supervisory control systems. Include wiring diagrams showing connections between equipment wiring, electrical wiring, and supervisory control system wiring.
 4. For equipment, include description of unit and component parts. Give function, normal operation characteristics and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replacement parts.
 5. For panelboard circuit directories, indicate electrical service characteristics, controls, and communications. Include as-installed color coded wiring diagrams.
 6. Provide manufacturer's printed operation and maintenance instructions, including start-up, break-in, and normal operation instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operation instructions.
 7. For maintenance and preventative maintenance procedures include routine procedures; guide for "trouble-shooting;" and alignment, adjusting, balancing, and checking instructions.
 8. Provide servicing and lubrication schedule, and list of lubricants required.
 9. Provide manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance. Include recommended items and quantities to be stocked as spare parts.

E. Data for Materials and Finishes:

1. For building products, applied materials, and finishes, include manufacturer's product data with catalog number, size, composition, and color and texture designations.
2. List instructions for care, maintenance, and preventative maintenance; include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. For moisture-protection and weather exposed products, include manufacturer's product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

F. Warranty

1. Warranty shall clearly state applicability for items included in the manual.
2. Include additional warranties as required for all equipment in the manual.
3. Refer to Specification Section 01 78 37 Product Warranties for additional requirements.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 78 37

PRODUCT WARRANTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements include administrative and procedural requirements for:
 - 1. Warranties
 - 2. Warranty submittals
- B. Related Sections
 - 1. Document 00 72 00 - General Conditions
 - 2. Section 01 33 00 - Submittal Procedures
 - 3. Section 01 77 00 - Closeout Procedures
 - 4. Individual Technical Sections

1.02 DEFINITIONS

- A. Standard Product Warranties: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to Owner.
- B. Special Warranties: Written warranties required by, or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for Owner.

1.03 WARRANTY REQUIREMENTS

- A. Warranty:
 - 1. Contractor shall warrant their work for labor and material for 2-year minimum from Substantial Completion, regardless of date of shipment or duration of storage on site. This includes material and equipment purchased by Contractor, Subcontractors, or suppliers.
 - 2. Warranty requirements noted in individual sections may exceed this 2-year minimum; if it does, the warranty shall apply for the stipulated time in the technical specifications for both material and labor.
- B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on the Work that incorporates the products.
- F. Owner's Recourse: Written warranties made to Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall

warranty periods be interpreted as limitations on time in which Owner can enforce such other duties, obligations, rights or remedies.

1. 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.
- G. Right of Refusal: Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- H. Cost for any evaluation or inspections, removal, shipment, repair and installation by Contractor shall be included in warranty, as well as correction of defective work.
- I. Any part found to be defective is, upon request, to be returned to the manufacturer's factory, freight prepaid.

1.04 SUBMITTALS

- A. Warranty Commencement:
 1. Submit duplicate, notarized copies of written warranties to Engineer prior to the date certified for Substantial Completion. Engineer's Certificate of Substantial Completion shall be the commencement date for warranties.
 2. When a designated portion of the Work is completed and occupied or used by Owner, by separate agreement with Contractor during the construction period, submit properly executed warranties to Engineer within 15 days of completion of that designated portion of the Work.
 3. For items of Work delayed beyond the date of Substantial Completion, provide updated submittal within 10 days of acceptance by Owner, listing date of acceptance as start of warranty period.
- B. Special Warranty:
 1. When a special warranty is required to be executed by Contractor, or Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to Owner through Engineer for approval prior to final execution.
 - a. Execute and assemble documents from subcontractors, suppliers, and manufacturers.
 - b. Refer to individual sections of Divisions 2 through 46 for specific content requirements, and particular requirements for submittal of special warranties.
- C. Form of Submittal:
 1. At final completion compile 2 copies of each required warranty and bond properly executed by Contractor, subcontractor, supplier, or manufacturer.
 2. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.
 3. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-inch by 11-inch paper.
 - a. Identify each binder on the front and the spine with the typed or printed title "Warranties and Bonds," the project title or name, and the name of Contractor.
 - b. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Selective demolition of interior partitions, systems, and building components designated to be removed.
 - 2. Selective demolition of exterior facade, structures, and components designated to be removed.
 - 3. Removal of abandoned utilities and wiring systems.
 - 4. Salvaging and disposal of removed items.
 - 5. Removal and disposal of sludge, grit, and accumulated organic or inorganic debris from structures which may accumulate or be in contact with wastewater, wastewater byproducts, or other potentially hazardous substances.
 - 6. Refer to Section 26 05 01 for details on electrical items.
- B. Work to be performed by others:
 - 1. Salvaged items to be removed by Owner for reinstallation by Owner:
 - a. Items will be identified at pre-demolition meeting.
- C. Related Sections:
 - 1. Section 01 12 16 - Work Sequence
 - 2. Section 02 41 33 - Removing Pavement and Miscellaneous Structures
 - 3. Section 02 44 00 - Abandonment of Facilities
 - 4. Section 26 05 01 - Electrical Demolition
 - 5. Section 31 11 00 - Clearing and Grubbing
 - 6. Section 31 23 16 - Structure Excavations and Backfills

1.02 REFERENCES

- A. Industry Standard - "Safety Requirements for Demolition Operations American National Standard for Construction and Demolition Operations," ASSE A10.6

1.03 SUBMITTALS

- A. Qualification Data: For demolition firm.
- B. Schedule of demolition activities, indicating:
 - 1. Detailed sequence of selective demolition and removal Work, with starting and ending dates for each activity.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Locations of proposed dust and noise control temporary partitions and means of egress.
 - 6. Coordination of Owner's continuing occupancy of portions of existing building.
 - 7. Means of protection for items to remain and items in path of waste removal from building.
- C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- D. Predemolition Photographs or Videotapes: Show existing condition of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damaged caused by selective demolition operations.

1.04 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Be familiar with and comply with all pertinent federal, state and local regulations for demolition and disposal.
- C. Obtain and File Required Documentation:
 - 1. EPA.
 - 2. MPCA.
 - 3. MN Department of Health.
 - 4. Local or County Solid Waste Management.
 - 5. Landfill.
- D. Predemolition Conference: Conduct conference at Site with Engineer to review methods and procedures related to selective demolition.

1.05 PROJECT/SITE CONDITIONS

- A. Existing Piping or Utilities:
 - 1. Contact Gopher State One Call (1.800.252.1166) for location of underground utilities.
 - 2. Determine requirements for disconnecting, capping and protection.
 - 3. Repair damaged utilities or piping at no cost to Owner.
- B. Uncharted or Incorrectly Charted Existing Piping or Utilities:
 - 1. Consult utility and Owner immediately for directions.
 - 2. Cooperate with Owner and utility companies to keep services and facilities in operation.
 - 3. Repair damaged utilities to satisfaction of utility and Owner.
- C. Site Access: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1.06 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 - 1. Method of Measurement:
 - a. Pond Fence Removal:
 - 1) Measure by distance in linear feet of fence removed.
 - b. Pond Vehicle Gate Removal:
 - 1) Measure each gate removed.
 - c. Piping:
 - 1) Measure by distance in linear feet removed.
 - d. Fittings:
 - 1) Measure each size and type individually as a unit.
 - 2. Basis of Payment
 - a. Payment for acceptable quantities shall be at the Contract Unit Price as listed on the Bid Form.
 - b. All associated Work items shall be considered incidental.
- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Main Lift Station
 - d. Primary Pond Control Structure (Alternate 6)
 - e. Well Removals and Installs

PART 2 PRODUCTS

2.01 MATERIALS FOR PROTECTION

- A. Materials not specifically described but required for complete and proper protection shall be selected by Contractor, subject to acceptance of Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Before beginning Work, visit site to verify existing conditions.
 - 2. Verify that demolition and alterations may be performed in accordance with design, pertinent codes and regulations.
 - 3. Bring questions regarding alterations to attention of Engineer.
 - 4. Coordinate work with Engineer to minimize inconvenience to Owner and occupants of building, if any.
- B. Discrepancies: Immediately notify Engineer. Do not proceed with Work in areas of discrepancy until fully resolved.
- C. No removals for installation of the new metering manhole will take place if Alternate 5 is not chosen. Bypass connection to existing force main will still take place even if Alternate 5 is not chosen. Refer to Drawings for details.
- D. No removals for installation of the new primary pond control structure will take place if Alternate 6 is not chosen. Refer to Drawings for details.

3.02 NOTIFICATION AND DOCUMENTATION

- A. Prior to commencing Work, obtain, complete, and file required permits and forms.
- B. Notify Owner of schedule for shut-off of utilities serving occupied spaces.
- C. Provide Owner with written notice of intent to begin cleaning of wastewater structures for a structure or facility with a minimum 10 business day notice prior to Work.
- D. Verify that utilities have been disconnected and capped.
- E. Notify the appropriate authorities, in the required time, prior to demolition and disposal:
 - 1. EPA.
 - 2. MPCA.
 - 3. MN Department of Health.
 - 4. Local or County Solid Waste Management.
 - 5. Landfill.

3.03 PREPARATION

- A. Erect barricades and other protective devices as required to protect:
 - 1. Existing construction designated to remain.
 - 2. Installed work and materials of other trades.
 - 3. Materials and finishes on areas adjacent to demolition Work.
 - 4. Workers, passersby, occupants of adjoining space and/or adjacent property.
 - 5. Access and egress from existing building. Ensure that functionally and legally required exits and exitways remain free, unobstructed during entire course of Project.

- B. Shoring, Bracing, Support:
 - 1. Provide interior and exterior devices to support portions of building and prevent movement, settlement, collapse of structures to be demolished and adjacent facilities.
 - 2. Strengthen or add new supports when required during progress of selective demolition.
- C. Provide temporary weather and fire protection.
- D. Dust Control:
 - 1. Moisten areas and items that will not be damaged by water.
 - 2. Provide dust barriers between areas of demolition and occupied spaces.

3.04 DEMOLITION

- A. Carefully, neatly remove construction, materials, ceilings, finishes, as indicated on Drawings, as specified, or as required by construction.
- B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- C. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- D. The following information based upon existing drawings is provided for the Contractor's use:
 - 1. Refer to record drawings included in Appendix of Specifications.
- E. Owner will dewater wastewater structures to the following elevations unless otherwise noted:
 - 1. 2-foot side water depth as measured at the structure sidewall from the highest point of invert elevation and includes storage volume of any sumps, cones, or sloped tank floors.
- F. Contractor shall remove all remaining accumulations of water, sludge, scum, grit, rags, and other debris remaining in basins following Owner dewatering.

3.05 DISPOSAL OF MATERIALS

- A. Salvaged Materials (See Schedule at end of Section):
 - 1. Carefully salvage designated items for reuse and properly store at location provided by Contractor.
 - 2. Remove from Site salvaged material not designated to be reused.
 - 3. Items to be turned over to Owner: Properly store at location provided by Owner.
- B. Recyclable Materials:
 - 1. Recycle materials required by law at certified recycling centers, including but not limited to:
 - a. Fluorescent light bulbs.
 - 2. Recycle as many materials as reasonably possible.
- C. Debris:
 - 1. Remove from building as Work progresses.
 - 2. Maintain premises in neat, clean condition.
 - 3. Remove from Site weekly (minimum).
 - 4. Legally transport and dispose of rubble, refuse, or waste generated by Work at "permitted" location off Site in safe manner.
 - 5. Burning of combustible materials not permitted on Site.
- D. Hazardous Materials: Comply with applicable regulations, laws and ordinances concerning removal, handling and protection against exposure or environmental pollution for items including, but not limited to:
 - 1. Non-friable asbestos such as vinyl asbestos floor tile.

2. Fluorescent light ballasts unless stamped indicating that ballast is PCB free, or tested to indicate such.
 3. CFs in air conditioning units, refrigerators, and other compressors.
 4. Lead-based paints.
 5. All wastewater, sludge, grit, scum, and accumulated organic and inorganic debris, shall be disposed of in accordance with local, state, and federal regulations. Obtain all necessary permits and approvals for sludge application/injection or landfill disposal.
- E. Provide typed, notarized documentation listing materials disposed, method of disposal, and location of disposal.

3.06 REPAIR/RESTORATION

- A. Immediately repair or replace damages resulting from Work to acceptance of Engineer, at no additional cost to Owner.
- B. Clean alteration Work as specified for similar materials elsewhere in this Project Manual.
- C. "Hyper-vacuum" areas of lead-based paint.
- D. Leave Work in a neat, orderly condition suitable to receive additional construction or finishes or to remain exposed, as indicated on Drawings.

3.07 SCHEDULE

- A. Items to be Salvaged for Reuse:
 1. Main Lift Station
 - a. Omnisite auto-dialer within existing pump control panel.
 - b. Other items as noted in Drawings.
 - c. Additional items will be identified during pre-demolition meeting.
 2. Cleveland Lift Station
 - a. Pump control panel and any other associated equipment.
 - b. Two (2) lift station pumps.
 - c. Other items as noted in Drawings.
 - d. Additional items will be identified during pre-demolition meeting.
 3. Primary Pond Control Structure
 - a. Additional items will be identified during pre-demolition meeting.
 4. Well Removals and Installs
 - a. Additional items will be identified during pre-demolition meeting.

END OF SECTION

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SECTION 02 41 33

REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES (MnDOT 2104)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Removal and Disposal of:
 - a. Pavements.
 - b. Sewers and appurtenances.
 - c. Culverts.
 - d. Sidewalks.
 - e. Curbs.
 - f. Concrete Steps.
 - g. Retaining walls.
 - h. Wood fence.
 - i. Abandoned structures.
 - j. Tent Tiedowns.
 - k. Concrete Bollards.
 - l. Driveway Edging.
 - m. Signs.
 - n. Water Gate Valves.
 - o. Yard Hydrant.
 - 2. Salvaging of Designated Materials:
 - a. Mailboxes.
 - b. Other delivery boxes.
 - c. Signs.
 - d. Fencing.
 - e. Benchmarks and monuments.
 - f. Brick Pavers.
 - g. Driveway Edging.
 - h. Hydrant.
 - 3. Backfilling of Resulting Trenches, Holes, and Depressions.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
- C. Method of Measurement:
 - 1. General:
 - a. Only materials and items designated for removal will be measured.
 - b. Removal and salvage items will be measured separately as identified by the Item Name.
 - 2. Measurement by Area: Surface of uniform thickness will be measured by area in square units.
 - 3. Measurement by Length:
 - a. Length measurements will be made along the longitudinal centerline.
 - b. Pipe measurements will be made to the center of structures and to the end of aprons.
 - c. Pavement sawing will be measured along the staked cut line.
 - 4. Measurement by Volume: Volumes will be determined from field measurements of materials actually removed.
 - 5. Measurement by Number (Complete Unit): Items will be measured separately by the number of units including appurtenances.

D. Basis of Payment:

1. Sawing concrete driveway pavement shall be considered incidental to remove concrete driveway pavement. If required by the Engineer, additional saw cuts shall be at the Contract Unit Price as listed on the Bid Form.
2. Sawing bituminous driveway pavement shall be considered incidental to remove bituminous driveway pavement. If required by the Engineer, additional saw cuts shall be at the Contract Unit Price as listed on the Bid Form.
3. Removal of abandoned fences shall be considered incidental.
4. Only items removed in acceptable condition will be measured as salvage.
5. Items proposed for salvage which are damaged by Contractor's negligence shall be replaced at Contractor's expense.
6. Backfilling of depressions resulting from removals shall be considered as embankment under Section 31 23 10.
7. Removal of existing sanitary sewer services and water services shall be considered incidental.
8. Removal of existing clay sanitary or storm sewer pipes shall be considered incidental.
9. Payment for acceptable quantities of removal, salvage, or abandon items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT: 2104 - Removing Pavement and Miscellaneous Structures

1.03 PROJECT/SITE CONDITIONS

- A. Do not conduct on-site burning operations.
- B. Do not use explosives for structure removal operations.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Protection:
1. Protect all in-place structures and facilities not designated for removal.
 2. Protect and maintain all benchmarks and survey control points.
 3. Coordinate removals to minimize impact on vehicular and pedestrian traffic.
- B. Sawing Pavement:
1. Saw concrete pavement along removal lines through entire pavement thickness.
 2. Saw bituminous pavement along removal lines through entire pavement thickness.
 3. Produce a neat, square edge prior to restoration.
 4. Paint all ends of steel reinforcement in remaining concrete cross-section to prevent corrosion.
- C. Existing Piping or Utilities:
1. Determine requirements for disconnecting capping and protection.
 2. Before starting Site operations, disconnect or arrange for disconnection of utility services designated to be removed in accordance with requirements of utility company or agency.
 3. Repair damaged utilities or piping at no cost to Owner.
 4. Plug upgrade ends of drainage or sewer pipes leading from abandoned basements, manholes, or similar structures with concrete or masonry.
 5. Preserve in operating condition active utilities traversing site and designated to remain.

3.02 REMOVAL OPERATIONS

- A. Remove only structures and facilities that have been marked by Engineer.
- B. Complete all removal operations prior to adjacent new construction.
- C. Remove materials designated for salvage in a manner that will not result in damage. All damaged mailboxes will be replaced at Contractor's expense with no compensation by Owner.
- D. Prior to construction, relocate all mail and other delivery boxes to a location which will allow delivery during construction. Contractor shall coordinate temporary location with U.S. Postal Service and other affected delivery services.
- E. Completely remove structures which are designated for removal.
- F. Whenever possible, remove concrete to an existing joint.
- G. When removing guardrail and fences for salvage, neatly coil wire and cable, pull posts from the ground, and remove nails and staples from posts and boards.
- H. Remove timber structures and underground tanks in accordance with applicable laws and regulations.
- I. Seal wells and borings taken out of service meeting the requirements of MN Administrative Rules, Chapter 4725, "Wells and Borings."

3.03 DISPOSAL OF MATERIALS AND DEBRIS

- A. Stockpile all materials designated for salvage at locations approved by Engineer.
- B. Dispose of all materials not designated for salvage in accordance with all applicable laws and ordinances.
- C. Submit written request to Engineer for disposal within right-of-way embankments.
- D. Submit written request to Engineer for burning operations.

3.04 BACKFILLING DEPRESSIONS

- A. Backfill all depressions resulting from removals in accordance with Section 31 23 10.
- B. If the remains of partially removed structures prevent natural filtration of water, perforate structure bottoms prior to placing backfill to prevent entrapment of water.

3.05 INSTALLING SALVAGED MATERIALS

- A. Install all salvaged materials as shown in Drawing Details and in locations as directed by Engineer.

END OF SECTION

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SECTION 02 44 00

ABANDONMENT OF FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Removal of existing piping and manholes.
 - 2. Grouting of sanitary sewer main and force main lines.
 - 3. Partial removal of existing piping, manholes, and tanks for abandonment in place with sand fill.

- B. Related Sections:
 - 1. Section 02 41 33 - Removing Pavement and Miscellaneous Structures
 - 2. Section 02 41 19 - Selective Demolition
 - 3. Section 31 23 10 - Excavation and Embankment
 - 4. Section 31 23 20 - Trench Excavation and Backfill

- C. Method of Measurement:
 - 1. General:
 - a. Only materials and items designated for removal will be measured.
 - 2. Measurement by Length:
 - a. Length measurements will be made along the longitudinal centerline.
 - b. Pipe measurements will be made to the center of structures and to the end of aprons.
 - 3. Measurement by Volume: Volumes will be determined from field measurements of materials actually removed.
 - 4. Measurement by Number (Complete Unit): Items will be measured separately by the number of units including appurtenances.

- D. Basis of Payment:
 - 1. Payment for acceptable quantities of removal, salvage, or abandon items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 2. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station

1.02 REFERENCES

- A. ASTM D2487 - Standard Test Methods for Classification of Soils for Engineering Purposes

PART 2 PRODUCTS

2.01 MATERIALS

- A. Grout: Bentonite-sand grout with minimum 50 pounds bentonite clay and maximum 20 pounds sand to a maximum 100 gallons water for a minimum mud weight of 11 pounds per gallon.

- B. Sand: Free flowing No. 10 to No. 100 standard sieve size and free of lumps, rock and organic matter.

- C. Water shall be from a known safe, uncontaminated source.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify location of beginning and end of lines, manholes, tanks and other existing structures prior to abandonment.
- B. Contact project representative 24 hours prior to abandonment.
- C. Salvaged Items:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items; identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport to storage area designated by Owner.

3.02 INSTALLATION

- A. Tanks:
 - 1. Provide two 12 inch diameter holes at the bottom concrete slab. Provide holes that go through the entire thickness of the existing slab for proper water drainage.
 - 2. Remove tank walls down 3 feet below finished grade.
 - 3. Bulkhead any abandoned piped connected to tank.
 - 4. Fill tank with sand to top of opening. Backfill as referred to in Section 31 23 20.
- B. Removal: Removal of lines, manholes, manways and other structures in accordance with Section 02 41 33.
- C. Salvaged Items: Refer to Section 02 41 19 for a schedule of salvaged items.
- D. Lines:
 - 1. Pressure grout lines with a grout pump capable of pumping grout at 5 gpm and 20 feet of head.
 - 2. Cut open ends of line prior to grouting.
 - 3. Pump grout from high end of line to low end of line.
 - 4. If grout does not flow from low end of line, excavate line.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Metal bar gratings, supports, hinges and connections to primary structure.
- B. Related Sections:
 - 1. Section 33 31 00 - Sanitary Sewer Systems

1.02 REFERENCES

- A. Building Codes:
 - 1. International Building Code
 - 2. Minnesota State Building Code
- B. Aluminum Association:
 - 1. Aluminum Design Manual
- C. ASTM:
 - 1. A27 - Steel Carbon Castings, General Applications
 - 2. A36 - Carbon Structural Steel
 - 3. A47 - Ferritive Malleable Iron Castings
 - 4. A48 - Gray Iron Castings
 - 5. A53 - Pipe, Steel, Black, Hot Dipped, Zinc Coated, Welded, Seamless
 - 6. A123 - Zinc Coatings on Iron and Steel Products
 - 7. A153 - Zinc Coatings on Iron and Steel Hardware
 - 8. A167 - Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strips
 - 9. A500 - Cold-Formed, Welded and Seamless Carbon Steel Structural Tubing
 - 10. A501 - Hot-Formed, Welded and Seamless Carbon Steel Structural Tubing
 - 11. A536 - Ductile Iron Castings
 - 12. A653 - Steel Sheet, Galvanized or Galvannealed by Hot Dip Process
 - 13. A780 - Repair of Damaged Galvanized Coatings
 - 14. A786 - Hot Rolled Carbon, Low Alloy, High Strength Low Alloy, and Alloy Steel Floor
 - 15. A992 - Structural Steel Shapes
 - 16. A1008 - Steel Sheet, Cold Rolled, Carbon, Structural High Strength, Low Alloy
 - 17. B209 - Aluminum and Aluminum-Alloy Sheet and Plate
 - 18. B221 - Aluminum-alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - 19. B308 - Aluminum-Alloy 6061-T6 Standard Structural Shapes, Rolled or Extruded
 - 20. B429 - Aluminum-Alloy Extruded Structural Pipe and Tube
 - 21. B483 - Aluminum and Aluminum-Alloy Drawn Tubes
 - 22. B632 - Aluminum Alloy Rolled Tread Plates
 - 23. E119 - Test Method for Fire Tests of Building Construction and Methods
 - 24. G90 - Standard for Performing Outdoor Weathering of Nonmetallic Materials Using Sun
- D. AWS:
 - 1. D1.1 - Structural Welding Code - Steel
 - 2. D1.2 - Structural Welding Code - Aluminum
 - 3. D1.3 - Structural Welding Code - Sheet Metal
- E. NAAMM:
 - 1. Metal Finishes Manual
 - 2. MBG 531 - Metal Bar Grating Manual

- F. SSPC:
 - 1. PA1 - Paint Application Specification No. 1
 - 2. SP3 - Power Tool Cleaning
 - 3. SP6 - Commercial Blast Cleaning

1.03 DEFINITIONS

- A. Metal Fabrications: Items made from iron, steel, and aluminum shapes, plates, bars, strips, tubes, pipes, castings not part of structural steel or other metal systems specified elsewhere.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections.
 - 1. Aluminum grating, structural support members, and connections to concrete: Capable of withstanding a uniform load of 100 pounds per square foot or 300 pounds concentrated load, with less than 1/4 inch deflection.

1.05 SUBMITTALS

- A. Product Data: Data for products used, including paint products and grout.
- B. Shop Drawings:
 - 1. Detail fabrication, erection of each metal fabrication indicated. Include plans, elevations, sections, details of metal fabrications, their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors, bolts specified for installation under other sections.
- C. Samples:
 - 1. Two sets, representative of materials, finished products as requested by ENGINEER.
- D. Calculations:
 - 1. Where indicated to comply with certain design loadings, include structural computations, material properties, other information needed for structural analysis, signed and sealed by qualified professional engineer, registered in the state where project is located, responsible for their preparation.
 - 2. Submit calculations with the shop drawings they accompany, otherwise shop drawings will be rejected without review.
- E. Welder Certificates: Signed by Contractor certifying that welders comply with specified requirements.
- F. Qualification Data: For firms and persons specified, to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Fabricator: Firm experienced in successfully producing metal fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
 - 2. Installer: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.
 - 3. Welding Processes and Welding Operators:
 - a. Qualify in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel," and D1.2 "Structural Welding Code - Aluminum."
 - b. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

- B. Regulations:
 - 1. Gratings:
 - a. Comply with NAAMM MBG 531: "Metal Bar Grating Manual."

1.07 SITE CONDITIONS

- A. Field Measurements:
 - 1. Check actual locations of walls, other construction (including but not limited to gates) to which metal fabrications must fit, by accurate field measurements before fabrication.
 - 2. Show recorded measurements on final Shop Drawings.
 - 3. Coordinate fabrication schedule with construction progress to avoid delay of Work.
 - 4. Where field measurements cannot be made without delaying Work, guarantee dimensions, proceed with fabrication without field measurements.
 - 5. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.08 SEQUENCING AND SCHEDULING

- A. Coordinate installation of anchorages for gratings, grating frames, and supports.
- B. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
- C. Coordinate installation of embed plates for metal fabrications with concrete and precast supplier.

1.09 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1. Primary Pond Control Structure (Alternate 6)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Bar Gratings: Available Manufacturers, subject to compliance with requirements and prior approval by Engineer, include the following:
 - 1. Alabama Metal Industries Corporation www.amico-online.com
 - 2. Ohio Gratings, Inc. www.ohiogratings.com
 - 3. McNICHOLS www.mcnichols.com
 - 4. Approved equal.

2.02 MATERIALS

- A. Metal Fabrications Exposed to View:
 - 1. Provide materials selected for surface flatness, smoothness, and freedom from surface blemishes.
 - 2. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Wide flange shapes and structural tees cut from: ASTM A992.
- C. Brackets, Flanges, and Anchors: Cast or formed metal of same type material, finish as supported rails, unless otherwise indicated.

- D. Stainless Steel: ASTM A167 W/No. 2B Mill Finish.
- E. Aluminum Grating: Alloy 6061-T6 or 6063-T6 ASTM B221, design required for span indicated on Drawings.
- F. Aluminum Rolled and Extruded Members, Tubing, Connectors: Alloy and temper 6016-T6

2.03 METAL BAR GRATINGS

- A. Produce metal bar gratings of description indicated per NAAMM marking system that comply with the following:
 - 1. Metal Bar Grating Standard "Standard Specifications for Metal Bar Grating and Metal Bar Grating Treads" published in ANSI/NAAMM A202.1 "Metal Bar Grating Manual."
 - 2. Metal Bar Grating Standard: "Guide Specifications for Heavy Duty Metal Bar Grating" published in NAAMM "Metal Bar Grating Manual."
- B. Finish:
 - 1. Aluminum: Mill finish.
- C. Fabrication:
 - 1. Fabricate sections with banding bars attached by welding to entire perimeter of each section.
 - 2. Include anchors and fasteners as recommended by manufacturer, for attachment to supports.
 - 3. All grating shall be removable. Provide removable fasteners.
 - 4. Provide recessed lifting bars on each end of removable panels.
 - 5. Provide all grating as open grating.
 - 6. Provide aluminum channel and aluminum hinges as generally shown in drawings.
- D. Fasteners:
 - 1. Provide not less than 4 saddle clips for each grating section composed of rectangular bearing bars 3/16-inch or less in thickness and spaced not less than 15/16-inch on center, with each clip designed and fabricated to fit over 2 bearing bars. Furnish threaded bolts with nuts and washers for each clip required.
 - 2. Provide not less than 4 anchor blocks for each section of heavy duty grating composed of bearing bars over 3/16 inch in thickness, with each block shop-welded to 2 bearing bars.
- E. Cut Outs:
 - 1. Fabricate cutouts in grating sections for penetration of slide gate frame and operator.
 - 2. Arrange layout of cutouts to permit grating removal without disturbing items penetrating gratings.

2.04 POST INSTALLED ANCHOR RODS AND DOWELS FOR METAL FABRICATIONS

- A. Unless noted otherwise, anchors and reinforcing dowels installed in concrete or concrete masonry shall be as noted below. Post-installed anchors shall only be used where shown on the construction documents. Anchors not shown or noted on the drawings, those required by the contractor solely for his means and methods, or those required by mechanical/electrical and carrying less than 100 pounds of non-safety-related items, do not require special inspection.
- B. Approved manufacturers are HILTI, ITW/Redhead, Simpson, Dewalt/Powers, and Rawl.
 - 1. Post installed anchors shall have current ICC approval in accordance with ACI 355 and ICC ES corresponding to anchor base material.
 - 2. Submit product data and current ICC ES report or IAPMO report showing product is compliant with project code requirements for review.
 - 3. Contractor shall arrange for manufacturer's rep to train all installers on the complete installation process. A letter of procedure stating method of drilling, the product for use, the complete installation procedure, manufacturer training date and a list of the personnel trained on anchor installation shall be submitted to the engineer.
 - 4. Substitution requests of alternate products must be approved in writing by structural engineer of record prior to use by providing technical data that the substituted product is capable of meeting

performance requirements of specified products including but not limited to the following basis of design parameters ACI 355.2 or ACI 355.4 qualifications.

- C. All anchors shall be stainless steel type AISI 316.
- D. Where expansion anchors are called for, contractor may substitute screw type anchors with self-tapping threads or adhesive anchors of the same size and embedment, subject to review of capacity by the engineer for the product substituted. Where adhesive anchors are called for (and in submerged applications), other types shall not be substituted. Screw type anchors shall not be re-used on permanent work.
- E. Adhesive shall have a current ICC ES report. Use high viscosity adhesive and placement devices in consultation with the manufacturer for overhead work. Adhesive anchors in overhead or horizontal installation shall be subject to continuous special inspection during installation and shall only be performed by installers certified per ACI/CRSI Adhesive Anchor Certification Program Section 17.8.2 or Engineer approved equivalent. Use low temperature formulations for cold weather work. Do not apply load to anchors until their capacity has been assured.
- F. Holes shall be drilled dry, cleaned, and maintained until installation in accordance with manufacturer's recommendations and ICC-ES report using standard rotary-impact bits and oil-free compressed air. Diamond core bits shall not be used unless specifically approved by the manufacturer.
- G. The general contractor shall engage a testing company to locate existing reinforcing bars, PT tendons, and embedded items, by non-destructive means (GPR, X-ray, or other approved means) prior to drilling for installation of anchors. Notify EOR of any conflicts with existing embedded items. Do not cut or damage existing reinforcing or embedded items unless approved by the EOR.
- H. Maintain critical spacing and edge/corner distances as recommended by manufacturer.
- I. Expansion and screw anchors:
 - 1. Witness installation with torque wrench according to manufacturer's recommendations and requirements of ICC report;
 - 2. Test all anchors with torque wrench after installation (including load test of 5 percent of installed anchors); or
 - 3. Load test of 10 percent of installed anchors by supplier or third party inspector.
- J. Adhesive anchor rods and dowels:
 - 1. Witness installation according to manufacturer's recommendations and requirements of ICC report; or
 - 2. Load test of 10 percent of installed anchors by supplier or third party inspector

2.05 FINISHES

- A. Typically, all metal fabrications in process areas shall be aluminum with stainless steel type 316 fasteners and all exterior locations shall be galvanized steel with galvanized accessories.
- B. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
 - 1. Refer to Section 09 91 00.
- C. Finish metal fabrications after assembly.
- D. Steel and Iron Finishes:
 - 1. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:
 - a. ASTM A153 for galvanizing iron and steel hardware.
 - b. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299-inch thick and heavier.

- c. Use process for galvanizing that will prepare item for painting
- 2. Primer Application:
 - a. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated.
 - b. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
- E. Galvanizing Repair Paint: High zinc dust content; dry film containing at least 94 percent zinc dust by weight; comply with DOD-P-21035 or SSPC-Paint-20.
- F. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.
- G. Preparation for Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated.
- H. Where aluminum will contact dissimilar metals, protect against galvanic action as follows:
 - 1) Where aluminum members are in contact with steel, prime and paint both aluminum and steel members or provide protective barrier between members as necessary.
 - 2) Where aluminum members are in contact with concrete, apply to the contact surfaces of the aluminum members a heavy coat of alkali resistant bituminous paint.
 - 3) Where aluminum members are embedded in concrete containing admixtures which are corrosive to aluminum, or in concrete subjected to highly corrosive environments, prime and paint surfaces as necessary.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Verification of Conditions: Verify that Metal Fabrications may be installed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.
- B. Work of Other Trades: Prior to commencing work, carefully inspect and verify that work is complete to point where this installation may properly commence.
- C. Discrepancies: Immediately notify ENGINEER. Do not proceed with installation in areas of discrepancy until fully resolved. Commencement of installation signifies acceptance of surface conditions.

3.02 PREPARATION

- A. Coordination:
 - 1. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.
 - 2. Coordinate delivery of such items to Site.
- B. Utilize templates and other systems required to ensure accurate placement of items that will be embedded in concrete and masonry.

3.03 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for

concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Temporary Bracing: Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

3.04 INSTALLATION OF METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of NAAMM grating standard referenced under Part 2 that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Removable Units: Secure removable units to supporting members with type and size of clips and fasteners as recommended by grating manufacturer for type of installation conditions shown.

3.05 TOLERANCES

- A. Install in required position and within following tolerances:
 - 1. Maximum variation from plumb: 1/4-inch.
 - 2. Maximum offset from true alignment: 1/4-inch.
 - 3. Maximum vertical offset from transition of top of concrete to top of grating: 1/4-inch.

3.06 ADJUSTING AND CLEANING

- A. Galvanizing: For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.
- B. Repair damage to coatings per manufacturer's recommendations.
- C. Collect offcuts and scrap and place in designated areas for recycling.

END OF SECTION

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SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.

1.03 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.06 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.07 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Engineer from manufacturer's full range.

2.02 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik, Inc.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. May National Associates, Inc.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.
 - g. Schnee-Morehead, Inc.

2.03 URETHANE JOINT SEALANTS (EXTERIOR)

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems.
 - b. May National Associates, Inc.
 - c. Pacific Polymers International, Inc.
 - d. Pecora Corporation.
 - e. Polymeric Systems, Inc.
 - f. Schnee-Morehead, Inc.
 - g. Sika Corporation, Construction Products Division.
 - h. Tremco Incorporated.

2.04 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated], and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.05 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3.04 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 16 00

CORROSION RESISTANT DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Flush, corrosion-resistant, fiberglass reinforced plastic doors.
 - 2. Fiber reinforced plastic frames.
- B. Furnish the following for other sections to install including, but not limited to:
 - 1. Masonry anchors.
 - 2. Bolt anchors.
- C. Perform the following:
 - 1. Prepare the door for hardware in accordance with DHI industry standards.
- D. The following is not included in this section:
 - 1. Door Hardware (Section 08 71 00)
- E. Related Sections:
 - 1. Section 08 71 00 - Door Hardware

1.02 REFERENCES

- A. ANSI:
 - 1. A117.1 - Handicap Accessibility
 - 2. A250.4 - Door Swing Test
- B. ASTM:
 - 1. B209 - Aluminum and Aluminum-Alloy Sheet and Plate
 - 2. B221 - Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tube
 - 3. D256 - Pendulum Impact Resistance of Plastics
 - 4. D570 - Water Absorption of Plastics
 - 5. D635 - Burn Extent
 - 6. D638 - Tensile Properties of Plastics
 - 7. D790 - Flexural Properties of Plastics
 - 8. D1308 - Effect of Household Chemicals of Organic Finishes
 - 9. D1621 - Compressive Properties of Rigid Cellular Plastics
 - 10. D1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
 - 11. D2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging
 - 12. E2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
 - 13. D6670 - Volatile Organic Emissions from Indoor Materials/Products
 - 14. E84 - Flame Spread and Smoke Development
- C. NFPA:
 - 1. 80 - Standard for Fire Doors and Windows
 - 2. 252 - Fire Tests of Doors and Assemblies
- D. UL 10B - Fire Tests of Door Assemblies

1.03 DEFINITIONS

- A. FRP: Fiber Reinforced Plastic

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements:
 - 1. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles, with no failure of any design features of the door system.
 - 2. Impact Strength: ASTM D256, 15 foot-pounds per inch of notch.
 - 3. Tensile Strength: ASTM D638 14,000 psi.
 - 4. Flexural Strength: ASTM D790 21,000 psi.
 - 5. Water Absorption: ASTM D570 0.20 percent after 24 hours.
 - 6. Stain Resistance: Meet ASTM D1308.
 - 7. Chemical Resistance: Excellent rating per ASTM D543.
 - 8. Thermal and Humid Aging Foam Core: ASTM D2126 Nominal value, 158 degrees F and 100 percent humidity for 14 days, minus 5.14 percent volume change.
 - 9. Compressive Strength, Foam Core: ASTM D1621, nominal value 79.9 psi.
 - 10. Tensile Adhesion, Foam Core: ASTM D1623, nominal value 45.3 psi.
 - 11. Indentation Hardness: ASTM D2583, nominal value 0.20 percent after 24 hours.

1.05 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Product Data: Submit manufacturer's current Product Data including specifications, test reports, handling, storage and installation instructions, and maintenance and cleaning recommendations.
- C. Shop Drawings: Submit Shop Drawings showing system fabrication, installation drawings, including plans, elevations, sections, details of components, anchor types and spacing, location of cutouts for hardware, internal reinforcement, and configurations within system and between system and adjoining system.
- D. Samples:
 - 1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
 - 2. Color: Submit manufacturer's standard color samples for each type of finish.
 - 3. Submit samples of anchors, fasteners, hardware, frames, assembled corner sections and other materials and components if requested by Engineer.
- E. Maintenance Manual: Provide to Owner, maintenance and warranty data in "Maintenance Manual" at Maintenance Demonstration at Substantial Completion.

1.06 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide door and frame units made of components of standard construction furnished by 1 manufacturer as coordinated assemblies.
- B. Qualifications:
 - 1. Manufacturer: Experience in the manufacture of FRP doors and frames.
 - 2. Contractor: Experience in the installation of doors and frames.
- C. Regulatory Requirements:
 - 1. Flame Spread: All FRP component parts, including gelcoat finish, shall have a flame spread classification of 25 or less per ASTM E84 and shall be self extinguishing per ASTM D635 unless operating conditions dictate otherwise.
 - 2. Resins: Resins shall comply with USDA and FDA standards for incidental food contact, if applicable to this project.
- D. Certifications: Provide to Engineer, certification of installer from manufacturer of doors and frames.
- E. Field Samples: If requested, furnish sample of each type of door and frame to Engineer for review prior to manufacture/installation. Engineer will forward approved sample to the Site for installation.

- F. Preinstallation Meetings: Installer and manufacturer's technical representative shall meet with Engineer prior to the start of installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store doors in a vertical position on blocking, clear of the floor, and with blocking between the doors to permit air circulation between the doors.

1.08 WARRANTY

- A. 10-year non-prorated materials and labor warranty against degradation or failure due to corrosion, and a limited lifetime warranty covering core deterioration, delamination or bubbling of door skin, or failure of corner joinery, from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Standard of Quality: Design is based on products of Corrim Company, Oshkosh, WI www.corrim.com
- B. Other Acceptable Manufacturers: Subject to compliance with specified requirements, acceptable manufacturers and products are:
 1. Albany Door Systems, Lawrenceville, GA www.albanydoors.com
 2. Chem-Pruf Door Co, Brownsville, TX www.chem-pruf.com
 3. Corguard, Lawrenceville, GA www.cor-guard.com
 4. Rytec Corp, Jackson, WI www.rytecdors.com
 5. Special-Lite, Inc., Decatur, MI www.special-lite.com
 6. Manufacturer of comparable products submitted in compliance with Section 01 25 13.

2.02 MATERIALS

- A. FRP Face Sheets:
 1. 1 continuous seamless piece of FRP material of suitable structural integrity.
 2. Thickness: 0.070-inch to 0.125-inch.
 3. Manufactured using a corrosion resistant resin system.
 4. Exterior surfaces treated with ultraviolet inhibitors.
 5. Reinforce resin with fiberglass 25 percent by weight.
 6. Abuse resistant.
 7. Mortises: Provided by door manufacturer.
 8. Integral finish/color.
 9. Texture: Smooth.
- B. Core:
 1. Polyurethane:
 - a. Rigid block laminated to exterior panels.
 - 1) Thickness: 1-1/2 inch.
 - 2) K factor: 0.14 BTU per hour per square foot.
 - 3) Density: 2 to 4 pounds.
 - b. Poured in place polyurethane foam.
 - 1) Density: Minimum of 5 pounds per cubic foot.
 - 2) R-Value: Minimum of 9.
- C. Stile and Rails: FRP components or aluminum alloy 6063-T5, minimum of 2-5/16-inch depth.
- D. Fasteners:
 1. Material: Stainless steel or other noncorrosive metal.
 2. Compatibility: Compatible with items to be fastened.
 3. Exposed Fasteners: Screws with finish matching items to be fastened.

- E. Other Materials: Materials not specifically described but required for complete, proper installation of fiber reinforced door and frame, subject to acceptance of Engineer.

2.03 FABRICATION

A. General Requirements:

1. Fabricate doors and frames as shown on the Drawings and in accordance with best shop practices, free from defects and neat in appearance.
2. Field measure before fabrication and show recorded measurements on Shop Drawings.
3. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
4. Remove burrs from cut edges.
5. Form exposed surfaces free from warp, wave and buckle, with all corners square, unless otherwise shown.
6. Set each member in proper alignment and relationship to other members with all surfaces straight and in a true plane.
7. Frames shall be rigid.
8. Fit: Maintain continuity of line and accurate relation of planes and angles.
9. Secure attachments and support at mechanical joints with hairline fit at contacting members.

B. Doors:

1. Total Thickness: Nominal 1-3/4 inches.
2. Stiles and Rails:
 - a. Full stile and rail structure, providing an impenetrable barrier between the edge of the door and the core material.
 - b. Primary support for hardware accessories and attachments.
 - c. One continuous piece construction.
3. Corners: Mitered.
4. Support and seal window lite and louver cutouts in the door panel so that no moisture or contaminants shall penetrate the door cavity. 25 mil of resin-rich gelcoat to be integrally molded into window/louver and window/louver retainers.
5. Support louver structures and lites by systems that are corrosion resistant.
6. Hardware Preparation:
 - a. Mortise and reinforce doors to allow application of hinges and locks, in accordance with the hardware schedule.
 - b. Attach hinges by using stainless steel wood screws.
 - c. Pilot holes shall be in strict accordance to manufacturer's recommendations.

C. Reinforcements:

1. Reinforce members and joints with plates, tubes or angles for rigidity and strength.
2. Door panels shall be adequately reinforced and compression members fabricated from suitable corrosion resistant materials as to accommodate hinges (both mortised and surface), closers, locksets (both cylindrical and mortise type), kickplates, push-pull plates, exit devices, etc.
3. Doors shall contain sufficient internal reinforcing in the areas of through bolt hardware as specified. Reinforcement shall be a corrosion resistant compression member with the ability to resist through-bolt torquing and maintain the sealed integrity of the panel.

D. Door Accessories:

1. Hardware: See Section 08 71 00.

E. Fiberglass Frames:

1. Construct from fiberglass component parts and materials in accordance with the manufacturer's standard method of construction.
2. Reinforce with anchor blocks and prepare for the attachment of hinges, closers, exit devices and other hardware.
3. Mortises shall be prepared by the factory.

4. Hardware reinforcements shall be made from polymer materials unless alternates are approved:
 - a. Corner reinforcement: 4 inch by 4 inch by 5-3/8 inch by 1/4 inch pultruded fiberglass angle. Attach to head bar at factory using stainless steel countersunk screws or suitable polymer rivets.
 - b. Mortise hinge reinforcement: 1-1/2 inch by 7 inch by 1/2 inch thick polymer. Attach to frame by means of bonding and stainless steel countersunk screws.
 - c. Closer reinforcement: Same as mortise hinge reinforcement less screws.
 - d. Strike reinforcement: 1-1/2 inches by 9 inches by 3/4 inch thick polymer material. Attach to head bar at factory using stainless steel countersunk screws or suitable polymer rivets.

F. Frame Accessories:

1. Anchors:
 - a. Frame units shall be suitably prepared to meet the requirements of the job.
 - b. Existing wall: Concealed wall anchor.
 - c. Foam adhesive/sealant: Provide continuous around frame at perimeter of each opening.
2. Frames Fabricated From Component Parts: Provide cap to cover exposed screw heads.
3. Frames that require masonry anchors and tabs shall be suitably prepared to ensure sound and reliable installation.

2.04 SHOP FINISHES

A. FRP:

1. Polyurethane.
2. A two component, high solids, low VOC, UV inhibitor topcoat, in a matte finish.
3. Colors:
 - a. Exterior Doors and Frames - Single Color Finish.
4. Color: As selected by Engineer from manufacturer's standard color palette.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Work of Other Trades: Prior to commencing work, carefully inspect and verify that work is complete to point where this installation may properly commence.
- B. Verification of Conditions: Verify that doors and frames may be installed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.
- C. Discrepancies:
 1. Immediately notify Engineer in writing.
 2. Do not proceed with installation in areas of discrepancy until fully resolved.
 3. Commencement of installation signifies acceptance of surface conditions.

3.02 PREPARATION

- A. Protection:
 1. Protect installed work and materials of other trades.
 2. Protect frames from scratches and other blemishes caused by construction of surrounding walls.

3.03 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI-100, and as specified in NFPA 80.
- B. Doors:
 1. No modifications shall be made to the doors without the manufacturer's explicit approval.
- C. Frames:
 1. Coordinate with existing wall construction for anchor placement.

2. Coordinate installation of doors and frames with installation of finish door hardware.
3. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Engineer.

D. Knock down frames shall be sealed with silicone caulk or liquid plastic after installation is complete.

3.04 SITE TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 REPAIR/RESTORATION

A. Touch up marred finishes, but replace units that cannot be restored to factory-finished appearance.

B. Use materials and procedures recommended or furnished by manufacturer.

3.06 ADJUSTING

A. Adjust units to operate in proper manner and easily without binding.

B. Replace damaged materials with new materials complying with specified requirements.

3.07 CLEANING

A. Site: Do not allow accumulation of scraps, debris arising from work of this section. Maintain premises in neat, orderly condition.

B. System:

1. Remove temporary covering and other provisions made to minimize soiling of other work.
2. Clean exposed surfaces of doors and frames using materials and methods recommended by manufacturer.
3. When work is completed, remove unused materials, containers, equipment, and debris.

3.08 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to manufacturer to ensure work is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 08 31 00

ACCESS HATCHES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Aluminum access hatches for lift station and metering manhole.
 - a. Frame:
 - 1) Gasketed seal
 - b. Latch:
 - 1) Lockable hasp

1.02 SUBMITTALS

- A. Product Data: Manufacturer's technical data and installation of customized access doors and frames, including details of frame type, elevation of door design types, anchorage, and accessory items. Include type, general location, size, floor construction details, finishes, latching or locking provisions, and other data pertinent to installation.
- B. Shop Drawing: Submit for fabrication and installation of access door and frame, including details of frame type, door design type, anchorage, and accessory items.
- C. Operation and maintenance data in accordance with Section 01 78 23.
- D. Refer to Section 01 78 37 for warranty requirements.

1.03 QUALITY ASSURANCE

- A. Size Variations: Obtain Engineer's acceptance of manufacturer's standard size units that may vary slightly from sizes indicated.
- B. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.04 PROJECT CONDITIONS

- A. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.
- B. All access hatches shall be aluminum.
- C. Provide access hatches where illustrated on plans, even if not specifically called out.

1.05 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1. Cleveland Lift Station
 - 2. Metering Manhole (Alternate 5)

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer:
 - 1. Halliday Products,
 - 2. Nystrom,
 - 3. Or Equal.
- B. Refer to Section 01 25 13 for information pertaining to substitute products.
- C. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.
- D. Provide all access hatches as H20 load rated.

2.02 COMPONENTS

- A. Exterior Floor Access Hatches:
 - 1. Provide safety grating for all access hatches provided.
 - 2. Single leaf or double leaf as shown on Drawings.
 - 3. Doors: Provide aluminum diamond pattern plate designed for H20 load rating.
 - 4. Hinges: 316 Stainless steel with stainless steel pins.
 - 5. Hardware: 316 stainless steel, including all parts of latch and lifting mechanism assemblies, hold open arms and guides and all brackets and fasteners.
 - 6. Covers shall be counterbalanced.
 - 7. Equip each hatch with a recessed hinged hasp for padlocking. All hasps and padlocking parts shall be 1/4-inch type 316 stainless steel.
 - 8. Finish: Mill finish with bituminous coating applied to surface in contact with concrete.
 - 9. Seal: Shall have built in neoprene gasket.
 - 10. Maximum allowable deflection shall be 1/150 of the span.
 - 11. Coordinate hatch sizing with pump manufacturer and flow meter manufacturer.
- B. Exterior Floor Hatch Safety Grate:
 - 1. Secondary protective grating panel shall be 1-inch thick aluminum "I" bar grating.
 - 2. Grating panel color and finish shall be Safety Yellow powder- coating.
 - 3. Grating panel shall be hinged with tamper proof stainless steel bolts, and shall be supplied with positive latch to maintain unit in an upright position.
 - 4. A 6-inch viewing area shall be provided on each lateral unhinged side of grating panel, for visual observation and limited maintenance procedures.
 - 5. A padlock hasp for owner-supplied padlock shall be provided.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer's instructions for installation.
- B. Coordinate installation with work of other trades.
- C. Set frames accurately in position; securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- D. Orientation:
 - 1. Allow full access to all equipment for maintenance.
 - 2. Wet Well: Located over pumps to allow unrestricted pump removal when in the locked open position. Coordinate hatch sizing with pump manufacturer.
 - 3. Place in the orientation that matches the drawings.

3.02 OPERATION

- A. Operation shall not be affected by temperature.
- B. Panel door shall close flush with frame.
- C. Panel door shall open to 90 degrees and lock into position.
- D. Panel door shall be capable of being locked in the closed position using a standard keyed padlock.
- E. Padlock to be supplied by Owner.

END OF SECTION

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SECTION 08 71 00

DOOR HARDWARE

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Finish door hardware.
 - a. Hinges.
 - b. Locksets/latchsets.
 - c. Exit devices.
 - d. Closers.
 - e. Door trim:
 - 1) Kickplate.
 - 2) Stops and Holders.
 - 3) Thresholds and Gasketing.
 - 4) Weatherstripping.
 - 5) Latch Guards.
 - 2. Construction keying.
- B. Related Sections:
 - 1. Section 08 16 00 - Corrosion Resistant Doors and Frames

1.02 REFERENCES

- A. ADA/ANSI A117.1 - Accessibility and Usable Buildings and Facilities
- B. ANSI/BHMA A156 - Standards for Builders' Hardware
- C. Door and Hardware Institute (DHI) - Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames
- D. IBC Code: Currently in effect and adopted by state in which Project is located
- E. NFPA:
 - 1. 70 - National Electrical Code
 - 2. 80 - Fire Doors and Windows
 - 3. 101 - Life Safety Code
- F. UL - Building Materials Directory

1.03 DEFINITIONS

- A. Construction Keying: Method independent of final keying system for securing building during construction in accordance with Owner's security requirements.
- B. LDW: Less Door Width
- C. NRP: Non-Removable Pin

1.04 SUBMITTALS

- A. Refer to Section 01 33 00.

- B. Product Data: Submit manufacturer's current Product Data including individual catalog "cuts" and installation instructions.
- C. Manufacturer's Templates: Finish door hardware supplier shall provide manufacturer's templates to each fabricator of doors, frames, and other work to be factory-prepared for the installation of the hardware, and to the jobsite for site installation of hardware.
- D. Wiring Diagrams: For each opening requiring electrified hardware, submit the following with hardware schedules for approval, and at the time of hardware delivery to job site. Hardware schedules submitted without the following will be returned not reviewed.
 - 1. Riser Diagrams: Include all electrified components, wire gage, wire run.
 - 2. Point-to-point wiring diagrams: Indicate detailed interface between electrified door hardware, fire alarm, and security systems. Clarify between manufacturer-installed and field-installed wiring.
 - 3. Detailed operation narrative, describing how the opening is to function at all times.
 - 4. Verify voltage with electrical engineer.
- E. Supplier Hardware Schedule:
 - 1. Coordination:
 - a. Coordinate finish door hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
 - b. Group together doors of same size and function.
 - 2. Content: Submit final hardware schedule organized into "hardware groups" in vertical format, indicating complete designations of every item required for each door or opening. Horizontal schedules will be rejected and re-submitted. Include the following information:
 - a. Name and manufacturer of each item.
 - b. Type, grade, style, function, size, and finish of each hardware item.
 - c. Fastenings and pertinent information.
 - d. Location of hardware set cross-referenced to indications on the Drawings, both on the floor plans and in the Door/Frame Schedule.
 - e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - h. Openings with electrical hardware: Prepare and include a riser diagram showing each electrical item in its rough location in relation to the door, conductor requirements, and the type of back box needed to be supplied by electrical. Include a detailed written description of the operation of opening and wiring schematics.
 - 3. Sequence: Submit schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g. aluminum entrances) critical in the project construction schedule.
- F. Samples of Lever Design: If requested by Engineer, provide 3 samples of metal finishes.
- G. Keying Schedule: Submit detailed Keying Schedule, indicating Owner's instructions from pre-submittal lock and keying meeting with hardware supplier.
- H. Closeout Submittals: Provide to Owner, "Maintenance Manual" compliant with Section 01 78 23 at Substantial Completion, including:
 - 1. Maintenance and warranty data.
 - 2. Catalog pages for each product.
 - 3. Name, address, phone number of local representative for each manufacturer.
 - 4. Parts list for each product.
 - 5. Copy of final hardware schedule.
 - 6. Copy of final keying schedule.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide similar units furnished by 1 manufacturer as coordinated assemblies.

- B. Qualifications:
 - 1. Manufacturer: Experience in the manufacture of finish door hardware.
 - 2. Supplier: A recognized architectural finish door hardware supplier.
 - 3. Installer:
 - a. Experience in the installation of finish door hardware.
 - b. Automated/electrified products: Licensed Power Limited Technician as required by the State of Minnesota.
- C. Regulatory Requirements:
 - 1. Furnish hardware that conforms to all applicable state and local building codes, including applicable IBC positive pressure testing requirements for state in which Project is located.
 - 2. ADA: Comply with relevant ADA requirements.
 - a. Interior, non-rated doors shall have 5 pounds operating force (maximum).
 - b. Egress door locks shall not require use of key, tool, or special knowledge for operation.
 - 3. ANSI/BHMA: Test and comply with relevant A156 standards.
 - 4. Fire-rated Assemblies:
 - a. Provide UL or WH listed hardware as required for doors scheduled to be fire rated in door schedule.
 - b. Comply with NFPA 80, listed and labeled by testing and inspection agency acceptable to authorities having jurisdiction, for fire ratings indicated.
 - 5. Electrified Door Hardware: Listed and labeled per NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Pre-Submittal Lock and Keying Meeting: Prior to preparing final submittals, manufacturer's representative shall meet with Owner and Engineer for the following:
 - 1. Lock Function: Demonstrate the function/type of each lockset scheduled and verify function at each door.
 - 2. Keying schedule: Determine keying requirements.
- E. Preinstallation Meeting:
 - 1. Conduct conference at Site to comply with requirements of Section 01 31 19.
 - 2. Required Attendance: Manufacturer's representative, Contractor, hardware installer, electrician, access control provider, Engineer.
 - 3. Agenda: Instruction on proper installation of hardware for openings selected by Engineer, and coordination between trades.
 - 4. Provide a letter of compliance to Engineer and Owner after this meeting is held, showing date of meeting and who was in attendance.
- F. Post-installation Inspection: Upon completion of hardware installation, hardware supplier shall meet Contractor and Engineer at jobsite to ensure proper installation, adjustment and operation of hardware.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Pack each item complete with necessary pieces and fasteners, properly wrapped and cushioned to prevent scratches and damage during delivery and storage.
- B. Identification: Furnish each unit clearly marked or numbered in accordance with hardware schedule.
- C. Delivery: Hardware shall be delivered to the jobsite and door or frame manufacturers in manufacturer's original cartons.

1.07 COORDINATION

- A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete.
- B. Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware.

- C. Deliver templates and physical hardware in timely manner to ensure orderly progress of total Work.
- D. Coordinate door and frame preparations with door and frame suppliers.
- E. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, or building control system, if specified.
- F. Where new hardware components are scheduled for application to existing construction, or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.08 PROJECT CONDITIONS

- A. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.

1.09 WARRANTY

- A. Warranty materials against defective workmanship and manufacture.
- B. Repair or replace defective workmanship and material appearing within a period of 1 year after substantial completion.
- C. Provide 10-year factory warranty on door closers against defects in material and workmanship from date of substantial completion of project.
- D. Failures include, but are not limited to:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of doors or hardware.
 - 3. Deterioration of metals, metal finishes and other materials beyond normal weathering and use.

1.10 MAINTENANCE

- A. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of door hardware installer.
 - 1. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation.
 - 2. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Do not provide products with manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Engineer.
- B. Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness.
- C. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

- D. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.

2.02 FASTENERS

- A. Furnish necessary screws, bolts, other fasteners of suitable size and type to anchor hardware in position for long life under hard use.
- B. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, other anchors approved by Engineer, according to material to which hardware is to be applied and recommendations of hardware manufacturer.
- C. Use Phillips head for exposed screws.
- D. Aluminum fasteners are not permitted.
- E. Provide self-tapping fasteners (TEK for weatherstripping).
- F. Harmonize fasteners with hardware material and finish.

2.03 HINGES

- A. Test and comply with ANSI/BHMA standards for consistency, wear, and corrosion resistance.
- B. Butt Hinges:
 - 1. Acceptable manufacturers, subject to compliance with specified requirements, acceptable manufacturers and products are:

	Bommer	Hager	Ives	McKinney	PBB	Stanley
Type 1	5000	1279	5PB1	T2714	PB81	F179
Type 2	BB5000	BB1279	5BB1	TA2714	BB81	FBB179
Type 3	BB5004	BB1168	5BB1HW	T4A3786	4B81	FBB168
Type 4	BB5006	BB1199	5BB1HW	T4A3386	4B51	FBB199

- a. Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- 2. Furnish ball bearing butts for exterior doors, doors equipped with door closers, and doors over 3 feet wide.
- 3. Provide NRP for lockable doors opening outward. Other hinges shall have non-rising pins.
- 4. Provide flat button tips, unless otherwise noted.
- 5. Types:
 - a. Type 1: Grade 3
 - 1) Plain bearing, steel.
 - 2) Interior doors less than 36 inches wide without closers.
 - b. Type 2: Grade 2
 - 1) Standard weight, BB, steel.
 - 2) Interior doors 36 to 41 inches wide without closers.
 - 3) Interior doors up to 36 inches with closer.
 - c. Type 3: Grade 1
 - 1) Extra heavy, 4-BB, steel.
 - 2) Interior doors wider than 36 inches with closer.
 - 3) Doors higher than 96 inches.
 - 4) Vestibule doors.
 - 5) In-swing exterior doors.
 - d. Type 4: Grade 1
 - 1) Extra heavy, 4-BB, brass, bronze, or stainless steel.
 - 2) Out-swing exterior doors.
 - 3) Non-removable pin.

6. Quantities:
 - a. 2 butts for doors up to 5 feet high.
 - b. Provide 1 additional butt for every additional 30 inches in height or fraction thereof over 5 feet.
 - c. 4 butts for dutch doors.
 - d. 4 butts for aluminum entrance and vestibule doors.
 - e. 4 butts for high traffic doors as specified.
7. Sizes:
 - a. 1-3/8 inch doors: 3-1/2 inches by 3-1/2 inches.
 - b. 1-3/4 inch doors: 4-1/2 inches by 4-1/2 inches.
8. Butt Width: Provide proper butt width to clear trim and allow full 180-degree swing.

2.04 LOCKSETS AND LATCHES

- A. Mortise Locks (Heavy Duty):
 1. Acceptable manufacturers, subject to compliance with specified requirements, are:
 - a. Best (Stanley) 35H, Design 15H
 - b. Corbin Russwin, ML 2000, Design NSA
 - c. Dorma ML 9000
 - d. Sargent, 8200 Series, Design LNL
 - e. Schlage, L9000, Design 06A
 - f. Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- B. Lock Cylinder:
 1. Grade 2: Removable (interchangeable) small format core for exit devices and locksets.
- C. Components:
 1. Provide latchbolt throw of the lengths required to meet fire label requirements and a minimum of 1/2 inch.
 2. Backset for locks, deadbolts, and latches to be 2-3/4 inches.
 3. Lip Length: Provide wrought boxes and strikes with proper lip length to protect trim but not to project more than 1/8 inch beyond trim, frame or inactive leaf.
 4. Provide 4-7/8-inch by 1-1/4-inch ANSI strike for installation in wood or hollow metal doors and frames.
 5. Provide wrought box where special strikes are listed.
 6. Provide protected back strikes for pairs of wood doors having no astragals.

2.05 EXIT DEVICES

- A. Panic Bar.
- B. Heavy Duty.
- C. Same manufacturer as lockset and latch manufacturer. Lever handles supplied with exit devices shall match the design specified for locks and latches.
- D. Panic Exit Devices. Listed and labeled by testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, and tested per UL 305.

2.06 DOOR CLOSERS

- A. Heavy Duty: Acceptable manufacturers, subject to compliance with specified requirements, are:
 1. Corbin Russwin, DC6200.
 2. Dorma 8900 Series.
 3. LCN, 4040/4041 or 4010/4110 Series.
 4. Norton 7500.
 5. Sargent 281/281-P10 Series.
 6. Sargent, 351 Series.

7. Manufacturer of comparable products submitted in compliance with Section 01 25 13.

B. Components:

1. Non-sized, adjustable, to meet opening force requirements of ADA.
2. Heavy Duty: Cast iron or aluminum.
3. Arm: Regular.
4. Provide cast iron duty soffit bracket for heavy duty arms.
5. Provide complete with plates, adapters and accessories as required by door and frame conditions and as recommended by manufacturer.
6. Full rack and pinion mechanism with adjustable controls on Sweep, Latching, and Backcheck speeds, with tamper-proof tool and independent valve key adjusting features.

C. ADA: Closers shall meet ADA requirements for barrier free accessibility.

2.07 DOOR TRIM

A. Standard of Quality: Design is based on products of Hiawatha, subject to compliance with the specifications. Other acceptable manufacturers are:

1. Burns.
2. Ives.
3. Rockwood.
4. Trimco.
5. Manufacturer of comparable products submitted in compliance with Section 01 25 13.

B. Kickplates and Armor Plates:

1. Thickness: 16-gage (0.05 inch).
2. Width: 2 inches LDW on single doors and 1 inch LDW on pairs of doors and 16 inches high. Size of armor plates shall be as indicated.
3. Beveled: Four edges.
4. Countersinking.

2.08 THRESHOLDS, WEATHERSTRIPPING, GASKETING, AND RAIN DRIPS

A. Standard of Quality: Design is based on products of National Guard, subject to compliance with the specifications. Other acceptable manufacturers are:

1. Hager
2. Pemko
3. Reese
4. Manufacturer of comparable products submitted in compliance with Section 01 25 13.

B. Thresholds and Weatherstripping: ADA compliant, as listed below at each exterior door, unless noted otherwise:

1. Aluminum Thresholds: National Guard 8425.
2. Sweeps: National Guard B606.
3. Drip/Sweeps: National Guard C627A.
4. Weatherstripping: National Guard 700NA.
5. Surface Auto Door Bottom: National Guard 420NA.
6. Include metal threshold if application is on carpet.
7. Sound Seal: National Guard 5050 gasket.
8. Rain Drip: National Guard 16A full frame width.
9. Stainless Steel Weatherstrip: National Guard 130NSS.
10. Stainless Steel Threshold: National Guard 512SS.
11. Stainless Steel Sweeps: National Guard 200NSS.
12. Stainless Steel Astragal: National Guard 125NSS (2 pc).
13. Stainless Steel Cap: National Guard 16SS.

2.09 LATCH PROTECTORS

- A. Acceptable Manufacturers: Standard of Quality: Design is based on Ives LG1, subject to compliance with the specifications. Other acceptable manufacturers are:
 - 1. Don-Jo
 - 2. MAG
 - 3. Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- B. Provide stainless steel of the type required to work with the specified latch.

2.10 MISCELLANEOUS MATERIALS

- A. Other materials, not specifically described but required for complete, proper installation, to be new, first quality of their respective kinds, Grade 1, subject to approval of Engineer.

2.11 DOOR HARDWARE FINISHES

- A. Water Treatment Facilities:
 - 1. Butts: US32D.
 - 2. Continuous Hinges: US32D.
 - 3. Flushbolts: US26D.
 - 4. Coordinators: Powder coat.
 - 5. Locksets: US32D.
 - 6. Latch Guards: US32D.
 - 7. Exit Devices: US32D.
 - 8. Closers: Rust inhibitor under-coated and powder coat aluminum top-coat (SRI).
 - 9. Overhead Controls: US32D.
 - 10. Pushes, Pulls, Kick Plates: US32D.
 - 11. Stops, Holders: US26D.
 - 12. Miscellaneous Items: US32D.
 - 13. Weatherstripping: US32D.
- B. Straight chrome-irons (magnetic) are not acceptable except as hinge pins. Items showing magnetic properties will be rejected.

2.12 KEYING

- A. Final Keying:
 - 1. Systems: Locks and cylinders shall be keyed to a new master key system.
 - 2. Locks and cylinders shall be keyed to Owner's requirements.
 - 3. Keying shall include, but is not limited to, Grand Master keying, Master keying, and keying in groups.
 - 4. Provide 6 Grand Master keys marked "Do Not Copy."
 - 5. Provide 3 Master keys marked "Do Not Copy" for each Master key set.
 - 6. Provide 2 Change keys for each lock or cylinder.
 - 7. Ship keys to Owner, or as otherwise requested by Owner, via registered mail.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect the project prior to installation:
 - 1. Examine doors, frames, and related items, with hardware installer present, for conditions that would prevent the proper and timely application of finish hardware.
 - 2. Verify roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
 - 3. If conditions do not meet approval, notify Engineer.
 - 4. Do not proceed until defects and unsatisfactory conditions are corrected.

5. Proceeding without notification implies acceptance of conditions.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturers' printed instructions at mounting heights described in the Door and Hardware Institute's "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames," unless otherwise noted.
- B. Custom Doors and Frames: Use "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames" unless otherwise noted.
- C. Cut holes and mortises in wood doors for locks and other hardware with a jig approved or provided by the manufacturer of the item applied.
- D. Mount locks so key enters the cylinder with smooth side down.
- E. After hardware has been fitted, escutcheons and face-applied hardware shall be removed until final painting has been completed.
- F. Hardware shall be reinstalled after painting is complete, properly adjusted, tested and left in perfect working condition.
- G. Apply hinges and astragals that wrap the door with the "Adjusta-Screw" mounting method, to allow for proper adjustment of door in the opening.
- H. Exit Device Mounting:
 1. Verify need for through-bolting with door manufacturer.
 2. Fire-labeled wood doors: Provide through-bolt mounting if required.
- I. Thresholds:
 1. Set exterior thresholds in 2 beads of polyurethane joint sealant to prevent moisture from entering the work. Completely fill void space under threshold.
 2. At openings with one or more mullions, install continuously with cut-outs for mullions.
- J. Door Closers:
 1. Mount as follows unless details or other conditions dictate otherwise:
 - a. Room side of corridor doors.
 - b. Stair side of stair doors.
 - c. Interior side of exterior doors.
 - d. Built-in stop on exterior and vestibule doors.
 - e. If conflict arises, verify with Engineer.
 2. Verify need for through-bolting with door manufacturer.
- K. Key Envelopes:
 1. After each lock has been reinstalled, the installer shall seal its keys in one of the supplied envelopes.
 2. The keys shall be delivered to the Owner together with surplus envelopes.

3.03 ADJUSTING

- A. Ascertain that door closers are in adjustment so closer completes its full closing cycle without abrupt change of speed between sweep and latch speeds.
- B. Adjust backcheck according to manufacturer's instructions.
- C. Verify that levers are free from binding.
- D. Ensure that latchbolts and deadbolts are engaged into strike and hardware is functioning.

- E. Replace units that cannot be adjusted or lubricated to operate properly.
- F. Schedule post-installation inspection with Engineer, Contractor, hardware supplier, and a representative of the manufacturer.
- G. Occupancy Adjustment: Approximately 6 months after date of Substantial Completion, installer's hardware consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean and restore hardware to the original finish.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper function and finish.
- D. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DEMONSTRATION

- A. Instruct the Owner's personnel in the proper adjustments of the hardware as needed.
- B. Turn over wrenches and adjusting tools, provided with hardware, to Owner.

3.06 HARDWARE SCHEDULE

- A. The following schedule of hardware groups shall be considered a guide only, and the supplier is cautioned to refer to the whole of this Section and other pertinent portions of the Project Manual.
- B. Furnish items in amounts indicated on Drawings or required for complete and operable facility.
- C. Verify quantities and suitability of fasteners.
- D. Coordinate Schedule with Drawings and notify Engineer of any door not scheduled for hardware.

END OF SECTION

SECTION 09 91 50

SHOP PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Provide shop painting of steel work, miscellaneous metals, and equipment as specified and shown on Drawings.

1.02 REFERENCES

- A. American Society of Testing Materials (ASTM)
- B. National Association of Pipe Fabricators (NAPF)
- C. Society for Protective Coatings (SSPC):
 - 1. Volume 1 - Good Painting Practice
 - 2. Volume 2 - Systems and Specifications

1.03 SUBMITTALS

- A. Shop Drawings in accordance with Section 01 33 00.
- B. Name, address, toll-free phone number and email address of manufacturers.
- C. Product Data:
 - 1. Submit data sheet for each coating system.
 - 2. Provide Certificate of Compliance stating the surface preparation and coating application is in accordance with this Section.

1.04 RELATED SECTIONS

- A. Refer to the following specification sections for additional requirements:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 12 00 - Work Sequence
 - 3. Section 01 31 13 - Coordination
 - 4. Section 01 33 00 - Submittal Procedures
 - 5. Section 01 60 00 - Product Requirements
 - 6. Section 01 78 37 - Product Warranties
 - 7. Section 09 97 20 - Coating Systems for Wastewater Facilities
 - 8. Individual Specification Sections.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver all materials in original, factory-sealed containers bearing manufacturer's intact and legible label with the following information:
 - a. Material identification by name or number.
 - b. Manufacturer's stock number, batch number, and date of manufacture.
 - c. Color name and number.
- B. Storage:
 - 1. Store materials in an environmentally controlled location as recommended by paint manufacturer's product information guidelines.
 - 2. Store materials not in actual use in tightly covered containers.

3. Comply with health and fire regulations of governing authorities having jurisdiction.
- C. Handling:
1. Handle materials in a manner that precludes the possibility of contamination or incorrect product catalyzation.
 2. Do not open containers or mix components until surface preparation has been completed and approved by the coating inspector.
 3. Maintain containers used for storage, mixing, and application in a clean condition, free of foreign materials and residue.
- D. Allow painted items to fully cure before shipping or handling.

1.06 WARRANTY

- A. Manufacturer agrees to repair or replace components that fail(s) in material or workmanship within specified warranty period.
1. Standard Warranty Period: Two (2) years from date of Substantial Completion, regardless of date of shipment or duration of storage on site. Standard warranty shall be Non-Pro-Rated with unlimited hours of operation.
- B. Cost for any evaluation or inspections, removal, shipment, repair and installation by Contractor shall be included in warranty, as well as correction of defective work.
- C. Any part found to be defective is, upon request, to be returned to the manufacturer's factory, freight prepaid.
- D. Refer to Section 01 78 37 for requirements.

1.07 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
1. Cleveland Lift Station
 2. Metering Manhole (Alternate 5)
 3. Primary Pond Control Structure (Alternate 6)
 4. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Standard of Quality: Unless indicated otherwise, design is based on:
1. Sherwin Williams Company www.sherwin-williams.com
 2. Tnemec Company www.tnemec.com
 3. Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- B. Approved Substitutions:
1. Submit request for substitution in accordance with Section 01 25 13.
 2. Substitutions: Substitutions that decrease film thickness, or that are of other generic types, will not be approved for this Project.

2.02 MATERIALS

- A. Regulatory Requirements:
1. Products shall comply with the United States Clean Air Act for maximum VOC content.
 2. Products shall comply with state environmental and health standards.
 3. All products shall be lead, chromate, mercury, and heavy metals free.

- B. Thinners: Use thinners approved by coating manufacturer and within their recommended limits.
- C. Abrasives:
 - 1. Abrasive materials must be in compliance with state environmental and health standards.
 - 2. Properly sized abrasives to provide the specified surface profile.

PART 3 EXECUTION

3.01 PREPARATION

- A. Visually evaluate surface preparation by comparison with pictorial standards of SSPC-VIS-1.
- B. Remove all surface contaminants in accordance with SSPC-SP1 Solvent Cleaning.
- C. Clean and remove all rust, slag, weld splatter, weld scabs, mill scale, and loose paint.
- D. Mask-off 4-inch strip from edges of heat affected areas to provide for field welding.
- E. Surface profile shall be in accordance with manufacturer's product recommendation.
- F. Re-blast all surfaces:
 - 1. Where rusting has recurred.
 - 2. That does not meet the requirements of these specifications.
- G. Interior and Exterior Steel:
 - 1. Moderate Service: Use the following surface preparation for steel that is subject to normal exposure and moderate humidity.
 - a. Includes:
 - 1) Interior structural steel.
 - 2) Miscellaneous metals.
 - 3) Doors.
 - 4) Frames.
 - b. Enclosed or protected: SSPC-SP3 - Power Tool Cleaning.
 - c. Exposed to view: SSPC-SP6 - Commercial Blast Cleaning.
 - 2. Severe Service: Use the following surface preparation for steel that is subject to frequent splashing, spilling, and exposure to high humidity and condensation.
 - a. Includes:
 - 1) Interior and exterior structural steel.
 - 2) Miscellaneous metals.
 - 3) All piping, valves, and equipment.
 - b. SSPC-SP6 "Commercial Blast Cleaning".
 - c. Ductile Iron: NAPF 500-03-03 Abrasive Blast Cleaning.
 - 3. Immersion Service: Use the following surface preparation for steel that is subject to immersion, or constant exposure to high humidity and condensation.
 - a. Includes:
 - 1) Structural steel.
 - 2) Miscellaneous metals.
 - 3) Piping, valves, equipment, and supports.
 - b. SSPC-SP10 "Near White Blast Cleaning".
 - c. Ductile iron: NAPF 500-03-04 Abrasive Blast Cleaning.

3.02 SHOP PAINTING

- A. Materials: Mix, thin, and apply according to the manufacturer's written instructions.
- B. Stripe coat all edges, corners, crevices, bolts, and welds.

C. Coating Schedule:

Service	Sherwin Williams	Tnemec
Moderate	Kem Kromik Universal Primer Color: Gray DFT: 2.5 to 3.5	37H Chem Prime HS Color: Gray DFT: 2.5 to 3.5
Severe	Corothane Galvapak DFT: 2.5 to 3.5 or Copoly Primer DFT: 3.0 to 5.0	94H20 HydroZinc DFT: 2.5 to 3.5 or N140 Pota-Pox DFT: 3.0 to 5.0
Immersion	Copoly Primer Color: Gold DFT: 3.0 to 5.0	N140 Pota-Pox DFT: 3.0 to 5.0

3.03 SOURCE QUALITY CONTROL

- A. Measure dry film thickness with a magnetic film thickness gage in accordance with SSPC-PA2.
- B. Visually inspect dried film for runs, sags, dry spray, overspray, embedded particles and missed areas.
- C. Repair defective or damaged areas.
- D. Provide Certificate of Compliance stating the surface preparation and coating application is in accordance with this Section.

END OF SECTION

SECTION 09 97 20

COATING SYSTEMS FOR WASTEWATER FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide surface preparation and application of high performance industrial coatings.
- B. Surfaces required to be painted
 - 1. It is the intent that all new exposed surfaces of metal, precast concrete planks, precast concrete wall panels, concrete, concrete masonry units without integral coloring, gypsum drywall, sheet metal, process equipment, HVAC equipment, electrical equipment, process piping, plumbing, sanitary piping, wood, and other miscellaneous items be painted, whether specifically mentioned or not. Incidental items attached to walls, such as handrails, etc., shall be painted if the hosting wall is scheduled to be painted.
 - 2. Refer to the Finish Schedule at the end of this section for a general description of items to be painted.
- C. Surfaces not required to be painted:
 - 1. Non-ferrous and corrosion-resistant ferrous alloys, such as copper, bronze, monel, aluminum, chromium plate, stainless steel, factory finished metal roofing, metal facing panels, metal soffits, plus fiberglass, **except** as noted below. Therefore, **paint** the following:
 - a. Where required for electrical insulation between dissimilar metals.
 - b. Aluminum in contact with concrete or masonry.
 - c. All electrical conduit as noted.
 - d. Vents, grills, and louvers that are not prefinished.
 - e. Aluminum ductwork as noted.
 - f. Copper water and drainage piping systems, including valves and accessories.
 - 2. The following surfaces shall not be painted:
 - a. Refer to the Finish Schedule at the end of this section for general areas to receive paint.
 - b. Exposed surfaces of exterior precast concrete and cast-in-place concrete unless otherwise noted.
 - c. All HVAC machinery, vents, grills, and louvers that are anodized or factory finished with baked enamel.
 - d. Non-metallic materials, such as glass and porcelain, except as required for architectural painting or color-coding.
 - e. Electrical motor control and supervisory panels furnished with baked enamel finish or specified not to be painted.
 - f. Non-exposed galvanized steel surfaces, such as conduit above suspended ceilings.
 - g. Anodized aluminum doors, doorframes, and windows.
 - h. Sprinkler heads.
 - i. Interior concrete or concrete block walls and ceilings above suspended ceilings.
 - j. Finish materials with inherent color.
 - k. Caulking: Pre-colored caulking shall be provided.
- D. Related Sections:
 - 1. Section 01 12 16 - Work Sequence
 - 2. Section 01 33 00 - Submittal Procedures
 - 3. Section 33 31 00 - Sanitary Sewer Systems
 - 4. Section 40 23 00 - Process Piping General Provisions
 - 5. Section 40 23 10 - Process Water and Waste Piping
 - 6. Section 40 23 20 - Process Piping Valves and Operators
 - 7. Section 40 23 30 - Process Piping Specialties
 - 8. Section 40 23 40 - Piping Hangers and Supports
 - 9. Section 43 24 10.10 - Submersible Pump Accessories

1.02 REFERENCES

- A. ASTM - American Society for Testing Materials
- B. International Concrete Repair Institute (ICRI)
- C. NACE International (NACE)
- D. Society for Protective Coatings (SSPC):
 - 1. Volume 1: Good Painting Practice
 - 2. Volume 2: Systems and Specifications

1.03 DEFINITIONS

- A. Applicator: Person applying the product in the field at Site.
- B. Containment: Equipment, supports, screens, tarps, or shrouds that prevent airborne debris generated during surface preparation and coating application from entering the environment, and also facilitates controlled collection of debris for disposal in compliance with current regional and federal regulations.
- C. Dry Film Thickness (DFT): Minimum dry coating thickness.
- D. Immersion Service: Surfaces subject to immersion, or constant exposure to high humidity and condensation.
- E. LEL: Lower Explosion Limit.
- F. Moderate Service: Surfaces subject to normal exposure and moderate humidity. Includes concrete, concrete masonry, structural steel, miscellaneous metals, doors, and frames.
- G. Regional: The state in which the Project is located and surrounding states.
- H. Severe Service: Surfaces subject to frequent splashing, spilling, and exposure to high humidity and condensation. Includes concrete, structural steel, miscellaneous metals, piping, valves, and equipment.
- I. SFPG: Square feet per gallon.
- J. VOC: Volatile Organic Compounds.

1.04 SUBMITTALS

- A. Manufacturer current Product Data sheets.
 - 1. Coatings
 - 2. Abrasive(s)
 - 3. Additives (as applicable)
- B. Safety Data Sheets (SDS) for each product specified.
- C. Samples:
 - 1. Color chips of available colors.
 - 2. Recommended colors for color code marking.
- D. Post-construction Contract Closeout: Daily application records using Engineer's provided format, or Contractor's form pre-approved by Engineer.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide coating products from a single manufacturer.

- B. Applicator Qualifications:
1. Contractor shall provide a written statement from the coating manufacturer's authorized representative attesting that the on-site Contractor's Superintendent has been instructed on proper preparation, mixing, and application procedures for all the coatings specified for this project.
 2. Contractor shall provide all necessary equipment to monitor and record the information required on the Daily Application Record.
 - a. Equipment shall be in good condition.
 - b. Operational within its design range.
 - c. Calibrated as required by the specified standard for use of each device.
 3. Applicator to establish quality control procedures and practices to monitor phases of surface preparation, storage, mixing, application, and inspection throughout the duration of the project. Contractor to provide a fulltime, on-site person whose dedicated responsibilities will include quality control of the corrosion protection linings.
 4. Applicator's quality control procedures and practices must include the following items:
 - a. Training of personnel in the proper surface preparation requirements.
 - b. Training of personnel in the proper storing, mixing, and application and quality control testing of the linings.
- C. Pre-Installation Conference:
1. Before applying any materials the Contractor, Installer and qualified technical representative of the corrosion protection lining manufacturer shall meet on-site with Engineer to discuss approved products and workmanship to ensure proper application of the corrosion protection lining components and substrate preparation requirements.
 2. Review foreseeable methods and procedures related to the corrosion protection lining of coating Work including but not necessarily limited to the following:
 - a. Review Project requirements and the Contract Documents.
 - b. Review required submittals, both completed and yet to be completed.
 - c. Review status of substrate Work, including approval of surface preparations and similar considerations.
 - d. Review requirements of on-Site quality control testing and requirements for preparing Site Quality Control Report as specified herein.
 - e. Review availability of materials, tradesmen, equipment and facilities needed to make progress and avoid delays.
 - f. Review required inspection and testing.
 - g. Review environmental conditions, other Project conditions, and procedures for coping with unfavorable conditions.
 - h. Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.
 - i. Review procedures required for the protection of the corrosion protection lining during the remainder of the construction period.
 3. Record the discussions of the Pre-Installation Conference and the decisions and agreements or disagreements reached, and furnish a copy of the minutes to each party attending. Record any revision or changes agreed upon, reasons therefore, and parties agreeing or disagreeing with them.
 4. Reconvene the conference at the earliest opportunity if additional information must be developed in order to conclude the subjects under consideration.
- D. Performance Criteria: The surfaces to receive the protective lining shall be capable of withstanding under constant exposure to raw wastewater, permeation from hydrogen sulfide and other sewer gases, and attack from organic acids generated by microbial sources. Products must have sufficient field history to substantiate product viability for these exposures.
- E. Source Quality Control: Provide each component of protective lining produced by a single manufacturer; including recommended repair mortar, repair overlay (resurfacer), base coat and topcoat materials.

- F. Reference Standards: Comply with applicable provisions and recommendations of all standards listed in Section 1.2 except as otherwise shown or specified.
- G. Qualifications:
 - 1. Applicator shall have minimum of 5 years application experience on projects of similar size and scope.
 - 2. Provide written statement from coating manufacturer's authorized representative attesting that all Applicators on this project have been instructed on proper preparation, mixing, and application procedures for coating specified.
 - 3. Provide regional references for coating contractor for a minimum of 5 different projects of similar size and scope completed in the last 5 years, including:
 - a. Contact person and phone number.
 - b. Project location.
 - c. Cost of coating work.
 - d. Start/finish dates.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in original, factory-sealed containers bearing manufacturer's intact name and legible label with the following information.
 - 1. Material identification by name or number.
 - 2. Manufacturer's stock number, batch number, and date of manufacture.
 - 3. Color name and number.
- B. Storage:
 - 1. Store materials in an environmentally controlled location as recommended by coating manufacturer's product information guidelines.
 - 2. Store materials not in actual use in tightly covered containers.
 - 3. Comply with health and fire regulations of governing authorities having jurisdiction.
- C. Handling:
 - 1. Handle materials in a manner that precludes the possibility of contamination or incorrect product catalyzation.
 - 2. Do not open containers or mix components until surface preparation has been completed and approved by Engineer.
 - 3. Maintain containers used for storage, mixing, and application in a clean condition, free of foreign materials and residue.

1.07 PROJECT CONDITIONS

- A. Site Facilities:
 - 1. As necessary to maintain required ambient conditions and contract scheduling, the contractor shall provide all required equipment for supplemental heating, dehumidification and power.
 - 2. Maintain environmental conditions, including temperature, dew point and humidity within range recommended by coating manufacturer.
 - 3. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas being coated.
 - 4. Properly locate and vent all such heat sources to the exterior such that coating systems are unaffected by exhaust products.
 - 5. Provide lighting to the satisfaction of Engineer to illuminate the complete workspace during blasting, coating, and inspection operations.
- B. Environmental Conditions:
 - 1. Coating shall not be applied in rain, snow, fog, or mist.
 - 2. Conduct surface preparation and coating operations only when the following conditions are met.
 - a. Ambient air temperature is within limits recommended by coating manufacturer.
 - b. Steel surface temperature is more than 5 degrees above the dew point of the ambient air.
 - c. Surfaces to be painted are clean and completely dry.

3. Immersion Service: Continuous forced ventilation in accordance with manufacturer recommendation.
 - a. At a minimum provide 3 to 5 air exchanges per hour for 12 hours after application of the prime coat and for the first 24 hours following final finish coat application.
 - b. Maintain exhaust in compliance with state standards.
 - c. Provide containment during abrasive blasting operations to prevent emission of abrasives, existing coatings, and contaminants onto adjacent property, street, structures, or equipment
- C. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.

1.08 SEQUENCING AND SCHEDULING

- A. Schedule blasting, cleaning, and painting so that contaminants from cleaning process will not come in contact with wet, newly painted surfaces.
- B. Do not apply coatings until surface preparation has been approved by Engineer.
- C. Do not apply finish coats until:
 1. All prime coat application is completed.
 2. All surfaces have been cleaned.
 3. All surfaces have been approved for coating by Engineer.

1.09 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 1. Cleveland Lift Station
 2. Metering Manhole (Alternate 5)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Coatings/Fillers:
 1. Acceptable Manufacture: Subject to compliance with specified requirements, acceptable manufacturers and products are:
 - a. BASF www.basfbuildingsystems.com
 - b. General Polymers Corporation (GPC) www.generalpolymers.com
 - c. AW Cook (Cemtec Concrete Repair) www.awcook.com
 - d. Sherwin-Williams (SWC) www.sherwin.com
 - e. Tnemec (TCI) www.tnemec.com
 - f. Zebron (ZEBR) www.zebron.com
 - g. Or approved equivalent.
- B. Sealant Caulking:
 1. Sika-Flex 1A by Sika Corporation www.sikausa.com
 2. BASF Caulks & Sealants
 3. Thiokol Polysulfide Caulk
 4. Or approved equivalent
- C. Corrosion Inhibitor:
 1. Holdtight 102 by HoldTight, Houston, TX www.holdtight.com
 2. Or approved equivalent.
- D. Lead Abatement Additive:
 1. Blastox by TDJ Group, Cary, IL www.blastox.com
 2. Or approved equivalent

- E. Substitutions: Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- F. Substitution of fast-cure products or acceleration additives must receive prior approval by Engineer.

2.02 MATERIALS

- A. Regulatory Requirements:
 - 1. Products shall comply with the United States Clean Air Act for maximum VOC content.
 - 2. Products shall comply with state environmental and health standards.
 - 3. All products shall be lead, chromate, mercury and heavy metals free.
- B. Thinners: Use thinners approved by coating manufacturer and within their recommended limits.
- C. Abrasives:
 - 1. Abrasive materials must be in compliance with state environmental and health standards.
 - 2. Properly size abrasives to provide the specified surface profile.
 - 3. The use of abrasives exceeding 1 percent free silica is prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for application and notify Engineer in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected.
- B. Notify Engineer in writing of anticipated problems using specified systems with substrates primed by others.
- C. Prepare existing materials or substrates to be coated to meet the requirements of specified coating system.
- D. Starting of painting Work will be construed as Contractor's acceptance of surfaces and conditions within any particular area.

3.02 PREPARATION

- A. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items not to be painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting, reinstall removed items.
- B. Clean and remove all rust, slag, weld splatter, weld scabs, mill scale, loose paint, and surface contaminants
- C. Chip or grind off flux, spatter, slag or other laminations left from welding. Grind welds and other sharp projects smooth.
- D. Re-blast all Surfaces:
 - 1. Where rusting has recurred.
 - 2. That do not meet the requirements of this Section.
- E. Feather edges of existing coating to form a smooth transition prior to spot priming.
- F. Scarify previously applied coatings in accordance with coating manufacturer's recommendations.
- G. All substrates: Prepare surface profiles in accordance with manufacturer's recommendations.

- H. Prime all bare metal and touch-up damaged shop-applied prime coat with specified primer. Prepare and coat in accordance with this Section.
- I. Concrete:
 - 1. Allow new concrete to cure 28 days.
 - 2. Verify dryness by testing in accordance with ASTM D4263.
 - a. Floors: If moisture is detected, perform Moisture Vapor Emission Testing in accordance with ASTM F1869.
 - b. Moisture content not to exceed 3 pounds per 1,000 square feet in a 24-hour period.
- J. Fill cracks and voids according to coating manufacturer's recommendations.
- K. Surface Preparation Classifications:
 - 1. P1: SSPC-SP1 - Solvent Cleaning.
 - a. Scarify surface by sanding.
 - b. Brush blast if recommended by coating manufacturer.
 - 2. P2: SSPC-SP2 - Hand Tool Cleaning.
 - 3. P3: SSPC-SP3 - Power Tool Cleaning
 - 4. P4: SSPC-SP13 - Surface Preparation of Concrete
 - a. Prepare concrete, concrete block, cement plaster, and drywall by removing all efflorescence, chalk, dust, dirt, grease, and other oils, and by roughening as required to remove glaze.
 - b. Scrap and grind fins and protrusions flush with surface.
 - c. Rake mortar joints clean.
 - d. Brush blast if recommended by coating manufacturer.
 - 5. P5: SSPC-SP5 - White Metal Blast Cleaning.
 - 6. P6: SSPC-SP6 - Commercial Blast Cleaning.
 - 7. P7: SSPC-SP7 - Brush-Off Blast Cleaning.
 - 8. P9:
 - a. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required.
 - b. Sandpaper smooth those finished surfaces exposed to view.
 - 9. P10: SSPC-SP10 - Near White Blast Cleaning.
 - 10. P11: SSPC-SP11 - Power Tool Cleaning to Bare Metal.
 - 11. P12: SSPC-SP WJ4 Waterjet cleaning of Metals - light cleaning
 - 12. P13: SSPC-SP13 - Surface Preparation of Concrete:
 - a. 4.3.1.: Abrasive Blast.
 - b. 4.3.2.: High Pressure Water Cleaning.
 - 13. P14: SSPC-SP16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals
 - 14. P15: NAF 500-03-04 Abrasive Blast Cleaning.
- L. Re-blast all Surfaces:
 - 1. Where rusting has recurred.
 - 2. That do not meet the above requirements.

3.03 MATERIALS PREPARATION

- A. Mix and prepare materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application in a clean condition, free of foreign materials and residue.
- C. The following is prohibited:
 - 1. Field mixing of partial containers.
 - 2. Field mixing of lead abatement additive.
 - 3. Field tinting.

3.04 APPLICATION

- A. Surface preparation and coating system are as indicated in the "Coating Schedule" at the end of this Section, or noted on Drawings.
- B. Use equipment and techniques best suited for substrate and type of material being applied.
- C. Apply in accordance with manufacturer's directions.
 - 1. Do not apply in snow, rain, fog, mist, or damp surfaces.
 - 2. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the painting operation.
 - 3. Work may continue during inclement weather only if areas and surfaces are enclosed and temperatures within the area can be maintained within limits specified during application and drying periods.
- D. Avoid degradation and contamination of surfaces and avoid intercoat contamination.
 - 1. Surfaces shall be free from grease, oil, abrasives, and other contaminants that may have an adverse effect on coating application, bonding, curing, or performance.
 - 2. Clean contaminated surfaces before applying next coat.
 - 3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable system.
- E. Brush-apply primer or intermediate on all welds and edges prior to general application of finish coat.
- F. Apply caulking to flange interfaces, gaps, and intermittent weld seams.
- G. Provide finish coats that are compatible with primers used. Prime and intermediate coats shall be lighter than subsequent coat.
- H. Provide application thickness to specific mil requirements. Mil thicknesses referenced are in dry mil thickness.
- I. All paint systems are "full coverage." Where discrepancies between manufacturer's square foot coverage and mil thickness occur, use mil thickness requirements.
- J. Where voids are present exposing the substrate or undercoats, apply additional coats until a uniform color and finish is obtained. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- K. Do not apply additional coats until Engineer has had the opportunity to inspect and approve previous coat.
- L. Unless otherwise indicated, match color of adjacent walls or equipment when painting conduit, miscellaneous brackets, hangers, and supports.
- M. Smooth out runs or sags immediately, or remove and recoat entire surface.
- N. Allow preceding coats to dry before recoating. Recoat within time limits specified by coating manufacturer.
- O. Do not apply coatings to the following surfaces (unless directed by Engineer):
 - 1. Factory or installer-finished items.
 - 2. Anodized aluminum, stainless steel, or other pre-finished metal.
 - a. Exception: Galvanized steel.
 - 3. Moving parts of operating devices.
 - 4. Sprinkler heads or other fire detection/suppression elements.
 - 5. Code required labels or equipment nameplates.

3.05 COLOR CODING

- A. Pipes Exposed or Concealed in Accessible Pipe Spaces:
 - 1. Provide with color band and arrow indicating direction of flow, and legend adjacent to valves, at not more than 20-foot spacing on straight pipe runs, adjacent to change in direction, and on both sides where pipes pass through walls or floors.
 - 2. Color-coding shall be based on pipe contents in accordance with the "Pipe Color Schedule" at the end of this Section, or noted on Drawings.
- B. Bands: Color and of width indicated.
- C. Arrows: Install adjacent to each band and legend to indicate direction of flow in pipe.
- D. Legends:
 - 1. Print in uppercase letters and letter sizes as listed in this Section to match "arrow".

3.06 QUALITY CONTROL

- A. Contractor shall provide all necessary equipment to monitor and record the information required on the Daily Application Record.
 - 1. Equipment shall be in good condition.
 - 2. Operational within its design range.
 - 3. Calibrated as required by the specified standard for use of each device.
- B. Maintain a copy of the following information at the site:
 - 1. Product Data Sheets.
 - 2. Safety Data Sheets (SDS).
 - 3. Contract Document and submittals.
 - 4. Daily Application Record.
 - a. Record information (in English) on form located at the end of this Section.
- C. Owner's representative will be on site to observe the application of each coating, and the preparation of each substrate.
- D. Provide safe and complete access to all surfaces for observation by Owner and/or Engineer.
- E. Prepare rigging so that all surfaces are within arm's reach of observer.
- F. Measure wet paint with wet film thickness gages.
- G. Provide DFT measurements for all coatings in accordance with SSPC-PA2.
- H. Perform Holiday testing in accordance with NACE SPO 188-2006 as directed by Engineer.
- I. Correct any deficiencies observed or detected by field testing as directed by Engineer.

3.07 CLEANING AND PROTECTION

- A. During progress of Work, remove discarded materials, rubbish, cans, and rags at end of each workday from the Site.
- B. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- C. Upon completion of Work:
 - 1. Clean window glass and spattered surfaces.
 - 2. Remove spattered paint by washing and scraping, using care not to scratch or otherwise damage finished surfaces.

- D. Protect Work of other trades against damage. Correct any damage by cleaning, repairing or replacing, and repainting.
- E. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided for protection of Work, after completion of painting operations.
- F. At completion of Work of other trades, touch-up and restore damaged or defaced surfaces.

3.08 SCHEDULES

- A. See the following pages.

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE / SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
C2	Chemical Resistant	Concrete Immersion (Industrial Wastewater)	P13 4.3.1	SWC	Macropoxy 5000	1.0-1.5	Polycote 115	40.0-80.0			Fill all bugholes and voids with Steel Seam FT910.or Duraplate 2300
				TCI	Series 218	1/16-inch	Series G435	40.0-80.0			Full parge coat of Series 218 MortarClad Contact Coating Resources to review industrial waste stream.
D1	Epoxy/ Acrylic Urethane	Ductile Iron Exterior Exposure Outside Diameter Non-Immersion	P15	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0	Acrolon Ultra	2.0-3.0	
				TCI	Series N69	3.0-5.0	Series N69	4.0-6.0	Series 1095	2.0-3.0	Note: Substitute N69 with Series 49 for low-VOC, high solids
D3	100% Solids High-Build Epoxy	Ductile Iron Outside Diameter (Municipal wastewater & H ₂ S vapor exposure)	P15	SWC	Duraplate 235	3.0-6.0	Duraplate 6000	40.0-60.0			
				TCI	Series N140	3.0-5.0	Series G435	15.0-40.0			
PCV1	Epoxy	PVC Piping	P1a	SWC	Sherglass FF	8.0-12.0	Sherglass FF	8.0-12.0			
				TCI	Series N140	3.0-6.0	Series 142	13.0-18.0			

NOTES:

Any Secondary Chemical Containment and Immersion Grade Chemical Resistant commodities will be specified on case by case basis by the Protective Coatings Management Group in conjunction with Manufacturer's Chemical Resistant Guides.

Prepared concrete surfaces must be filled if the surface is too rough. Fairing the surface to fill bugholes and voids to near smooth is mandatory prior to coating application. Some surface texture after filling may be approved and recommended for adhesion of subsequent coats.

Optically Activated Pigment (OAP) which may be used for supplementary visual holiday detection. OAP is not a replacement for NACE standard SPO-188-2006.

Galvanized metal is not recommended for wastewater immersion due to adverse chemical reaction(s).

ROOM FINISH SCHEDULE

LOCATION	COATING SYSTEM No.	COATING TYPE
Metering Manhole (Alternate 5)		
Interior Piping, valve and accessories	D3	Epoxy
Cleveland Lift Station Wet Well		
Wet well interior pre-cast concrete walls, bottom slab, grout, underside of top slab and invert	C2	Epoxy or Polyurethane
Wet well interior piping, valves and accessories	D3	Epoxy
Wet well exterior piping	D1	Epoxy / Urethane
Wet well PVC Drain Piping	PCV1	Epoxy
Cleveland Lift Station Valve Vault		
Valve vault interior piping, valves and accessories	D3	Epoxy

WASTEWATER TREATMENT PLANTS
Piping Color Code

IDENTIFIER	PIPE CONTENT	PIPE LABEL	COLOR STANDARD	SHERWIN WILLIAMS COLOR No.	TNEMEC COLOR No.
SAN	SANITARY SEWER	FM	GREY	PIPE: 4025	PIPE: 55BL
VNT	VENT	VENT	GREY	PIPE: 4025	PIPE: 55BL

END OF SECTION

DAILY APPLICATION RECORD

DATE			-----RECORD EVERY 3 HOURS-----						
			Surface Temperature (Deg. F.)	Air Temperature (Deg. F.)	Material Temperature (Deg. F.)	Relative Humidity (%)	Dew Point (Deg. F.)	Weather Conditions	
TIME START		AM	PM						
		AM	PM						
		AM	PM						
		AM	PM						
		AM	PM						
TIME STOP		AM	PM						

Area Prepared	
Area Coated	
Type of Material & Quantity Applied:	

SIGNED

PROJECT NAME:	SEH FILE No.:
OWNER:	CONTRACTOR:

SECTION 09 97 21

COATING SYSTEMS FOR WATER TREATMENT FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide surface preparation and application of high performance industrial coatings.
- B. Related Sections:
 - 1. Division 40 Sections.
 - 2. Drawings.

1.02 REFERENCES

- A. ASTM - American Society for Testing Materials
- B. International Association of Corrosion Engineers (NACE)
- C. International Concrete Repair Institute (ICRI)
- D. NACE International (NACE)
- E. NSF - ANSI/NSF Standard 61 - Drinking Water System Components
- F. Society for Protective Coatings (SSPC):
 - 1. Volume 1: Good Painting Practice
 - 2. Volume 2: Systems and Specifications
 - 3. Supplement to Volume 2: Lead Paint Removal Guides 6I and 7I

1.03 DEFINITIONS

- A. Applicator: Person applying the product in the field at Site.
- B. Containment: Equipment, supports, screens, tarps, or shrouds that prevent airborne debris generated during surface preparation and coating application from entering the environment, and also facilitates controlled collection of debris for disposal in compliance with current regional and federal regulations.
- C. Dry Film Thickness (DFT): Minimum dry coating thickness.
- D. Immersion Service: Surfaces subject to immersion, or constant exposure to high humidity and condensation.
- E. LEL: Lower Explosion Limit.
- F. Moderate Service: Surfaces subject to normal exposure and moderate humidity. Includes concrete, concrete masonry, structural steel, miscellaneous metals, doors, and frames.
- G. Regional: The state in which the Project is located and surrounding states.
- H. Severe Service: Surfaces subject to frequent splashing, spilling, and exposure to high humidity and condensation. Includes structural steel, miscellaneous metals, piping, valves, and equipment.
- I. SFPG: Square feet per gallon.
- J. VOC: Volatile Organic Compounds.

1.04 SUBMITTALS

- A. Manufacturers' current Product Data sheets.
 - 1. Coatings
 - 2. Abrasive(s)
 - 3. Additives (as applicable)
 - 4. Containment system
- B. Provide list of equipment to be used on this Project for review by Engineer.
- C. Material Safety Data Sheets (MSDS) for each product specified.
- D. Samples:
 - 1. Color chips of available colors.
 - 2. Recommended colors for color code marking.
- E. Written plan for containment of fugitive airborne particles compliant with current state and/or federal regulations.
- F. Post-construction Contract Closeout: Daily application records using Engineer's provided format, or Contractor's form pre-approved by Engineer.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide coating products from a single manufacturer.
- B. Qualifications:
 - 1. Applicator shall have minimum of 5 years application experience on projects of similar size and scope.
 - 2. Provide written statement from coating manufacturer's authorized representative attesting that Applicator has been instructed on proper preparation, mixing, and application procedures for coating specified.
 - 3. Provide regional references for coating contractor for a minimum of 5 different projects of similar size and scope completed in the last 5 years, including:
 - a. Contact person and phone number.
 - b. Project location.
 - c. Cost of coating work.
 - d. Start/finish dates.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in original, factory-sealed containers bearing manufacturer's intact name and legible label with the following information.
 - 1. Material identification by name or number.
 - 2. Manufacturer's stock number, batch number, and date of manufacture.
 - 3. Color name and number.
- B. Storage:
 - 1. Store materials in an environmentally controlled location as recommended by coating manufacturer's product information guidelines.
 - 2. Store materials not in actual use in tightly covered containers.
 - 3. Comply with health and fire regulations of governing authorities having jurisdiction.
- C. Handling:
 - 1. Handle materials in a manner that precludes the possibility of contamination or incorrect product catalyzation.
 - 2. Do not open containers or mix components until surface preparation has been completed and approved by Engineer.

3. Maintain containers used for storage, mixing, and application in a clean condition, free of foreign materials and residue.

1.07 PROJECT CONDITIONS

A. Site Facilities:

1. As necessary to maintain required ambient conditions and contract scheduling, the contractor shall provide all required equipment for supplemental heating, dehumidification and power.
2. Maintain environmental conditions, including temperature, dew point and humidity within range recommended by coating manufacturer.
3. Do not use heat sources that emit carbon dioxide or carbon monoxide into areas being coated.
4. Properly locate and vent all such heat sources to the exterior such that coating systems are unaffected by exhaust products.
5. Provide lighting to the satisfaction of Engineer to illuminate the complete workspace during blasting, coating, and inspection operations.

B. Environmental Conditions:

1. Coating shall not be applied in rain, snow, fog, or mist.
2. Conduct surface preparation and coating operations only when the following conditions are met.
 - a. Ambient air temperature is within limits recommended by coating manufacturer.
 - b. Steel surface temperature is more than 5 degrees above the dew point of the ambient air.
 - c. Surfaces to be painted are clean and completely dry.
3. Immersion Service: Continuous forced ventilation in accordance with manufacturer's recommendation.
 - a. At a minimum provide 3 to 5 air exchanges per hour for 12 hours after application of the prime coat and for the first 24 hours following final finish coat application.
 - b. Maintain exhaust in compliance with state standards.
 - c. Provide containment during abrasive blasting operations to prevent emission of abrasives, existing coatings, and contaminants onto adjacent property, street, structures, or equipment.
4. Provide the following through the use of dehumidification equipment:
 - a. Dew point of the ambient air at a minimum 15 degrees below the surface and air temperature.
 - b. Dehumidification shall be maintained at all times during surface preparation, coating application, and cure.

- ### **C. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.**

1.08 SEQUENCING AND SCHEDULING

- A. Schedule blasting, cleaning, and painting so that contaminants from cleaning process will not come in contact with wet, newly painted surfaces.
- B. Do not apply coatings until surface preparation has been approved by Engineer.
- C. Do not apply finish coats until:
 1. All prime coat application is completed.
 2. All surfaces have been cleaned.
 3. All surfaces have been approved for coating by Engineer.

1.09 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 1. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Coatings:
 - 1. Acceptable Manufacture: Subject to compliance with specified requirements, acceptable manufacturers and products are:
 - a. BASF www.basfbuildingsystems.com
 - b. CIM Industries (CIM) www.cimind.com
 - c. General Polymers Corporation (GPC) www.generalpolymers.com
 - d. L&M Construction (LMC) www.lmcc.com
 - e. Sherwin Williams (SWC) www.sherwin.com
 - f. Tnemec (TCI) www.tnemec.com
 - 1) Represented by Coating Resources, Inc 877-TNEMEC1.
- B. Sealant Caulking:
 - 1. Sika-Flex 1A by Sika Corporation www.sikausa.com
- C. Corrosion Inhibitor: HoldTight 102 by HoldTight, Houston, TX www.holdtight.com
- D. Substitutions: Manufacturer of comparable products submitted in compliance with Section 01 25 13.
- E. Substitution of fast-cure products or acceleration additives must receive prior approval by Engineer.

2.02 MATERIALS

- A. Regulatory Requirements:
 - 1. Products shall comply with the United States Clean Air Act for maximum VOC content.
 - 2. Products shall comply with state environmental and health standards.
 - 3. All products shall be lead, chromate, mercury and heavy metals free.
- B. Thinners: Use thinners approved by coating manufacturer and within their recommended limits.
- C. Abrasives:
 - 1. Abrasive materials must be in compliance with state environmental and health standards.
 - 2. Properly size abrasives to provide the specified surface profile.
 - 3. Abrasive to include lead abatement additive.
 - 4. The use of abrasives exceeding 1 percent free silica is prohibited.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for application and notify Engineer in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with Work until unsatisfactory conditions have been corrected.
- B. Notify Engineer in writing of anticipated problems using specified systems with substrates primed by others.
- C. Prepare existing materials or substrates to be coated to meet the requirements of specified coating system.
- D. Starting of painting Work will be construed as Contractor's acceptance of surfaces and conditions within any particular area.

3.02 PREPARATION

- A. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items not to be painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting, reinstall removed items.
- B. Clean and remove all rust, slag, weld splatter, weld scabs, mill scale, loose paint, and surface contaminants
- C. Chip or grind off flux, spatter, slag or other laminations left from welding. Grind welds and other sharp projects smooth.
- D. Re-blast all Surfaces:
 - 1. Where rusting has recurred.
 - 2. That do not meet the requirements of this Section.
- E. Feather edges of existing coating to form a smooth transition prior to spot priming.
- F. Scarify previously applied coatings in accordance with coating manufacturer's recommendations.
- G. All substrates: Prepare surface profiles in accordance with manufacturer's recommendations.
- H. Prime all bare metal and touch-up damaged shop-applied prime coat with specified primer. Prepare and coat in accordance with this Section.
- I. Abrasive to include lead abatement additive.
- J. Mix corrosion inhibitor and apply in accordance with manufacturer's recommendations.
- K. Valves: All shop primed valves shall be solvent cleaned in accordance with SSPC-SP1 prior to field painting.
- L. Concrete:
 - 1. Allow new concrete to cure 28 days.
 - 2. Verify dryness by testing in accordance with ASTM D4263.
 - a. Floors: If moisture is detected, perform Moisture Vapor Emission Testing in accordance with ASTM F1869.
 - b. Moisture content not to exceed 3 pounds per 1,000 square feet in a 24-hour period.
- M. Fill cracks and voids according to coating manufacturer's recommendations.
- N. Surface Preparation Classifications:
 - 1. P1: SSPC-SP1 - Solvent Cleaning.
 - a. Scarify surface by sanding.
 - b. Brush blast if recommended by coating manufacturer.
 - 2. P2: SSPC-SP2 - Hand Tool Cleaning.
 - 3. P3: SSPC-SP3 - Power Tool Cleaning
 - 4. P4:
 - a. Prepare concrete, concrete block, cement plaster, and drywall by removing all efflorescence, chalk, dust, dirt, grease, and other oils, and by roughening as required to remove glaze.
 - b. Scrap and grind fins and protrusions flush with surface.
 - c. Rake mortar joints clean.
 - d. Brush blast if recommended by coating manufacturer.
 - 5. P5: SSPC-SP5 - White Metal Blast Cleaning.
 - 6. P6: SSPC-SP6 - Commercial Blast Cleaning.
 - 7. P7: SSPC-SP7 - Brush Off Blast Cleaning.
 - 8. P9:
 - a. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required.

- b. Sandpaper smooth those finished surfaces exposed to view.
 - 9. P10: SSPC-SP10 - Near White Blast Cleaning.
 - 10. P11: SSPC-SP11 - Power Tool Cleaning to Bare Metal.
 - 11. P12: SSPC-SP12 - LP-WC/WJ-4: Pressure Wash
 - 12. P13: SSPC-SP13 - Surface Preparation of Concrete:
 - a. 4.3.1.: Abrasive Blast.
 - b. 4.3.2.: High Pressure Water Cleaning.
 - 13. P14: SSPC-SP16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
 - 14. P15: NAPF 500-03-04 Abrasive Blast Cleaning.
- O. Re-blast all Surfaces:
- 1. Where rusting has recurred.
 - 2. That do not meet the above requirements.

3.03 MATERIALS PREPARATION

- A. Mix and prepare materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application in a clean condition, free of foreign materials and residue.
- C. The following is prohibited:
 - 1. Field mixing of partial containers.
 - 2. Field mixing of lead abatement additive.
 - 3. Field tinting.

3.04 APPLICATION

- A. Surface preparation and coating system are as indicated in the "Coating Schedule" at the end of this Section, or noted on Drawings.
- B. Use equipment and techniques best suited for substrate and type of material being applied.
- C. Apply in accordance with manufacturer's directions.
 - 1. Do not apply in snow, rain, fog, mist, or damp surfaces.
 - 2. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the painting operation.
 - 3. Work may continue during inclement weather only if areas and surfaces are enclosed and temperatures within the area can be maintained within limits specified during application and drying periods.
- D. Avoid degradation and contamination of surfaces and avoid intercoat contamination.
 - 1. Surfaces shall be free from grease, oil, abrasives, and other contaminants that may have an adverse effect on coating application, bonding, curing, or performance.
 - 2. Clean contaminated surfaces before applying next coat.
 - 3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable system.
- E. Brush-apply primer or intermediate on all welds and edges prior to general application of finish coat.
- F. Apply caulking to flange interfaces, gaps, and intermittent weld seams.
- G. Provide finish coats that are compatible with primers used. Prime and intermediate coats shall be lighter than subsequent coat.
- H. Provide application thickness to specific mil requirements. Mil thicknesses referenced are in dry mil thickness.

- I. All paint systems are “full coverage.” Where discrepancies between manufacturer’s square foot coverage and mil thickness occur, use mil thickness requirements.
- J. Where voids are present exposing the substrate or undercoats, apply additional coats until a uniform color and finish is obtained. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- K. Do not apply additional coats until Engineer has had the opportunity to inspect and approve previous coat.
- L. Unless otherwise indicated, match color of adjacent walls or equipment when painting conduit, miscellaneous brackets, hangers, and supports.
- M. Smooth out runs or sags immediately, or remove and recoat entire surface.
- N. Allow preceding coats to dry before recoating. Recoat within time limits specified by coating manufacturer.
- O. Do not apply coatings to the following surfaces:
 - 1. Factory or installer-finished items.
 - 2. Anodized aluminum, stainless steel, or other pre-finished metal.
 - 3. Moving parts of operating devices.
 - 4. Sprinkler heads or other fire detection/suppression elements.
 - 5. Code required labels or equipment nameplates.

3.05 COLOR CODING

- A. Pipes Exposed or Concealed in Accessible Pipe Spaces:
 - 1. Provide with color band and arrow indicating direction of flow, and legend adjacent to valves, at not more than 20-foot spacing on straight pipe runs, adjacent to change in direction, and on both sides where pipes pass through walls or floors.
 - 2. Color-coding shall be based on pipe contents in accordance with the “Pipe Color Schedule” at the end of this Section, or noted on Drawings.
- B. Bands: Color and of width indicated.
- C. Arrows: Install adjacent to each band and legend to indicate direction of flow in pipe.
- D. Legends:
 - 1. Print in uppercase letters and letter sizes as listed in this Section to match “arrow”.

3.06 QUALITY CONTROL

- A. Contractor shall provide all necessary equipment to monitor and record the information required on the Daily Application Record.
 - 1. Equipment shall be in good condition.
 - 2. Operational within its design range.
 - 3. Calibrated as required by the specified standard for use of each device.
- B. Maintain a copy of the following information at the site:
 - 1. Product Data Sheets.
 - 2. Material Safety Data Sheets (MSDS).
 - 3. Contract Document and submittals.
 - 4. Daily Application Record.
 - a. Record information (in English) on form located at the end of this Section.
- C. Owner’s representative may be on site to observe the application of each coating, and the preparation of each substrate.

- D. Provide safe and complete access to all surfaces for observation by Owner and/or Engineer.
- E. Prepare rigging so that all surfaces are within arm's reach of observer.
- F. Measure wet paint with wet film thickness gages.
- G. Provide DFT measurements for all coatings in accordance with SSPC-PA2.
- H. Perform Holiday testing in accordance with NACE RPO 188 as directed by Engineer.
- I. Correct any deficiencies observed or detected by field testing as directed by Engineer.

3.07 CLEANING AND PROTECTION

- A. During progress of Work, remove discarded materials, rubbish, cans, and rags at end of each workday from the Site.
- B. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- C. Upon completion of Work:
 - 1. Clean window glass and spattered surfaces.
 - 2. Remove spattered paint by washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- D. Protect Work of other trades against damage. Correct any damage by cleaning, repairing or replacing, and repainting.
- E. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided for protection of Work, after completion of painting operations.
- F. At completion of Work of other trades, touch-up and restore damaged or defaced surfaces.

3.08 DAMAGED COATINGS

- A. Damaged coatings and pinholes shall have the edges feathered and repaired in accordance with paint manufacturer's directions.
- B. All finish coats, including touch-up and damage-repair coats, shall be applied in a manner that will present an appearance of uniform color and texture.

3.09 UNSATISFACTORY APPLICATION

- A. If the item has an improper finish color or insufficient film thickness, the surface shall be cleaned and top-coated with the specified paint material to obtain the specified color and coverage. Specific surface preparation information shall be obtained from the paint manufacturer and the Engineer.
- B. All visible areas of chipped, peeled, or abraded paint shall be hand or power sanded feathering the edges. The areas shall be primed and finish coated in accordance with the Specifications. Depending on the extent of repair and its appearance, a finish sanding and topcoat may be required by the Engineer.
- C. Work shall be free of runs, bridges, shiners, laps, or other imperfections. Evidence of the conditions is grounds for rejection.
- D. Any defects in the coating system shall be repaired by the Contractor per written recommendations of the coating manufacturer.

3.10 WARRANTY

- A. At the owner's option, an inspection of the coating systems may be held within 24 months of the date of Substantial Completion.

- B. Owner's Responsibilities:
 - 1. Establish date and time for inspection.
 - 2. Provide minimum 14 days' notice to Contractor.
 - 3. Determine inspection method.
 - 4. Provide suitable access.
 - 5. Advise Contractor of any coating failures, and the required corrective measures.
 - a. Coating failures shall be interpreted to include:
 - 1) Peeling.
 - 2) Blistering or bubbling.
 - 3) Cracking.
 - 4) Rusting or rust staining.

- C. Contractor's Responsibilities:
 - 1. Repair all coating failures as follows:
 - a. Coordinate Work schedule with Owner.
 - b. Perform corrective measures in accordance with this Section.
 - c. Complete work within 30 days of receipt of Owner's notice.
 - d. Complete work at no additional cost to Owner.

3.11 SCHEDULES

- A. See the following pages.

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
C1	Epoxy	Concrete Immersion (potable)	P13 4.3.1	SWC	Macropoxy 5500 LT	5.0-10.0	Macropoxy 5500 LT	5.0-10.0			Fill bugholes and voids with Steel Seam FT910 or Duraplate 2300
				TCI	Series 21	4.0-6.0	Series 21	10.0-12.0			*Use Series 215 or Series 218 for filling voids/surfacing
C2	Epoxy (Low Temp)	Concrete Immersion (potable)	P13 4.3.1	SWC	Macropoxy 5500 LT	5.0-7.0	Macropoxy 5500 LT	5.0-7.0			Fill bugholes and voids with Steel Seam FT910.Or Duraplate 2300
				TCI	Series 21	4.0-6.0	Series 21	10.0-12.0			*Use Series 215 or Series 218 for filling voids/surfacing
C3	100% Solids Amine Cured Epoxy	Concrete Immersion (potable)	P13 4.3.1	SWC	Duraplate UHS Primer	6.0-8.0	Duraplate UHS	20.0-28.0			Fill bugholes and voids with Steel Seam FT 910 or Duraplate 2300
				TCI	Series 218	1/16-inch	Series 22	20.0-40.0			
C4	Urethane (Semi - Flexible)	Concrete Immersion (potable)	P13 4.3.1	SWC	Macropoxy 5500 LT	6.0-8.0	Polycote 115	80.0-100.0			Fill bugholes and voids with Steel Seam FT 910.or Duraplate 300
				TCI	Series N140	4.0-6.0	Series 406	25.0-75.0			Fill bugholes and voids with Series 215 or Series 218
				SWC	Macropoxy 5500 LT	5.0-7.0	Sherplate PW	20.0-50.0			Fill bugholes and voids with Steel Seam FT 910 or Duraplate 2300
				TCI	Mat-Reinforced, Chemical Resistant Lining	Concrete/ Immersion (Membrane Filtration Tanks, Potable)	P13 4.3.1		Series N140F	2.0-4.0	
	Mat-Reinforced, Chemical Resistant Lining	Concrete/ Immersion (Membrane Filtration Tanks, Potable)	P13 4.3.1	TCI	Series N140F	2.0-4.0	Series 215 Series 211-215 Series 22	60.0-80.0 8.0-12.0	Series 22	20.0-30.0	Lining system protects concrete from aggressive cleaning methods, impact, and thermal shock from elevated backwash/backflush temperatures.
C6	100% Solids Moisture Tolerant Epoxy	Concrete Immersion and Severe service	P13 4.3.1	SWC	Corobond 100	4.0-6.0	Duraplate 5900 mortar	125.0- 250.0			Fill bugholes and voids with Steel Seam FT 910 or Duraplate 2300
C7	Acrylic Blockfiller/ Cementitious Acrylic	Concrete & Masonry Exterior	P4	SWC	Porous Substrates- Loxon Block Surfacer	60-80 SFPG	Ultra-Crete	4.0-8.0	Ultra-Crete	4.0-8.0	No Block Filler on Smooth Concrete
				TCI	Porous substrates- Series 130	60-115 SFPG	Series 181	4.0-10.0	Series 181	4.0-10.0	No Block Filler on Smooth Concrete

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
C8	Cementitious Acrylic/WB Epoxy	Concrete & Masonry Interior	P4	SWC	Pro Industrial HD Block Filler	80-100 SFPG	Pro Industrial WB Catalyzed Epoxy	2.0-4.0	Pro Industrial WB Catalyzed Epoxy	2.0-4.0	No Block Filler on Smooth Concrete
				TCI	Porous substrates- Series 130	60-115 SFPG	Series 113/114	4.0-6.0	Series 113/114	4.0-6.0	No Block Filler on Smooth Concrete
C9	Epoxy	Concrete & Masonry Interior	P4	SWC	Porous Substrates-Kem Cati-coat	60-80 SFPG	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0	No Block Filler on Smooth Concrete
				TCI	Porous substrates - Series 130	60-115 SFPG	Series N69	4.0-6.0	Series N69	4.0-6.0	No Block Filler on Smooth Concrete
C10	Elastomeric Acrylic	Concrete & Masonry Exterior	P4	SWC	Loxon XP	90-115 SFPG	Loxon XP	90-115 sq/ft gal.			
				TCI	Series 156	4.0-8.0	Series 156	4.0-8.0			Fill porous block with Series130
C11	Coal Tar	Concrete Exterior Below Grade Soil Side	P13 4.3.1	SWC	Hi-Mil Shertar	14.0-20.0					
				TCI	Series 46H-413	14.0-20.0					
C12	Silane/Siloxane Blend	Concrete & Masonry Exterior Water Repellent	P4	SWC	Loxon 40% Silane	75-125 SFPG					
				TCI	Series 662	75-150 SFPG					
D1	Epoxy/Acrylic Urethane	Ductile Iron Outside Diameter Exterior Exposed	P15	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0	Acrolon Ultra	2.0-3.0	
				TCI	Series N140	3.0-5.0	Series N140	4.0-6.0	Series 1095	2.0-3.0	Note: Can substitute N140 with Series 49 for low-VOC, high solids
D2	Epoxy	Ductile Iron Outside Diameter Interior Exposed	P15	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0			
				TCI	Series N69	3.0-5.0	Series N69	4.0-6.0			Note: Can substitute N69 with Series 49 for low-VOC, high solids
D3	Coal Tar Epoxy	Ductile Iron Outside Diameter Exterior Buried	P15	SWC	Hi-Mil Shertar	14.0-20.0					
				TCI	Series 46H-413	16.0-20.0					
D4	Amine Cured Epoxy	Ductile Iron Inside & Outside Diameter Immersion (Potable)	P15	SWC	Duraplate UHS	10.0-12.0	Duraplate UHS	10.0-12.0			OAP Recommended
				TCI	Series N140	2.0-4.0	Series 22	20.0-40.0			

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
D5	Personal Protective Coating	Ductile Iron Outside Diameter Interior Exposed	P15	SWC	Heat Flex 1200	5.0-6.0	Heat Flex 3500	40-100*	Shercryl 1300	4.0-7.0	*Temperature Dependent Consult Sherwin Williams Rep for Specific Recommendation
				TCI	Series 1224	6.0-8.0	Series 975	30.0-50.0	Series 1028T	2.0-3.0	*For personnel protection with operating temperatures up to 325 degrees F
				TCI	Series 1224	6.0-8.0	Series 971	40.0-50.0 *	Series 1028	2.0-3.0	*Number of coats dependent on environmental conditions. Consult with Coating Resources, Inc. - For Condensation Control Coating
S1	Epoxy	Steel Immersion (potable)	P10	SWC	Macropoxy 5500 LT	5.0-10.0	Macropoxy 5500 LT	5.0-10.0			
				TCI	Series 91-H ₂ O	2.5-3.5	Series 21	14.0-16.0			
S2	Epoxy (Low Temp)	Steel Immersion (potable)	P10	SWC	Macropoxy 5500 LT	5.0-7.0	Macropoxy 5500 LT	5.0-7.0			
				TCI	Series 91-H ₂ O	2.5-3.5	Series 21	14.0-16.0			
S3	Amine Cured Epoxy	Steel Immersion (potable)	P10	SWC	Duraplate UHS Primer*	6.0-8.0	Duraplate UHS	18.0-22.0			*OAP Recommended
				TCI	Series 91-H ₂ O	2.5-3.5	Series 22	20.0-40.0			Stripe coat seams with Series N140 at 2.0-4.0 mils DFT
S4	High Build Amine Cured Edge Retentive Epoxy	Steel Immersion (potable)	P10	SWC	Duraplate UHS primer	6.0-8.0	Sherplate PW	20.0- 22.0			*OAP Recommended Primer is optional
				TCI	Series 91-H ₂ O	2.5-3.5	Series 22	20.0-40.0			Stripe coat seams with Series N140 at 2.0-4.0 mils DFT
S5	Elastomeric Urethane	Steel Immersion (potable)	P10	SWC	Macropoxy 5500 LT	3.0-6.0	Polycote 115	30.0-40.0			Primer is optional
				TCI	Series 91-H ₂ O	2.5-3.5	Series 406	25.0-75.0			Stripe coat seams with Series N140 at 2.0-4.0 mils DFT
S6	Epoxy	Steel Interior Exposed	P6	SWC	Macropoxy 646	3.0-6.0			Macropoxy 646	3.0-6.0	
				TCI	Series N69	3.0-5.0			Series N69	3.0-5.0	Note: Can substitute N69 with Series 49 for low-VOC, high solids
S7	Epoxy/ Acrylic Urethane	Steel Exterior Exposed	P6	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0	Acrolon Ultra	2.0-3.0	
				TCI	Series N140	3.0-5.0	Series N140	3.0-5.0	Series 1095	2.0-3.0	Note: Can substitute N140 with Series 49 for low-VOC, high solids

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
S8	Polyurethane	Doors and Frames	P1	SWC	See Note		See Note		Acrolon Ultra	2.0-3.0	First Coat: Compatible tie coat as recommended by coating manufacturer
				TCI			*Series 48	2.0-3.0	Series 1095	2.0-3.0	Confirm compatibility with factory-primed surfaces prior to coating
S9	Acrylic	Steel Interior and Exterior Moderate	P6	SWC	Sher-Cryl HPA	2.5-4.0	Sher-Cryl HPA	2.5-4.0			Factory primed metal deck and joists: Prepare surfaces according to manufacturer recommendation
				TCI	Series 1028	2.0-3.0	Series 1028	2.0-3.0			Factory primed metal deck and joists: Prepare surfaces according to manufacturer recommendation
S10	Epoxy/ Polyester Polyurethane	Steel Exterior	P6	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0	Polyton HP	2.0-3.0	
				TCI	Series N140	3.0-5.0	Series N140	2.0-3.0	Series 290	2.0-3.0	Can substitute Series N140 with 49 for low-VOC. High-solids
S11	Personal Protective Coating	Steel Interior and Exterior Safe Touch	P10	SWC	Heat Flex 1200	5.0-6.0	Heat Flex 3500	40-100*	Shercryl 1300	4.0-7.0	*Temperature Dependent Consult Sherwin Williams Rep for Specific Recommendation
				TCI	Series 1224	6.0-8.0	Series 971	30.0-50.0	Series 1028T	2.0-3.0	*For personnel protection with operating temperatures up to 325 degrees F
	Condensation Control Coating	Steel/ Interior and Exterior (Sweating)	P6		Series 1224	6.0-8.0	Series 971	40.0-50.0*	Series 1028	2.0-3.0	*Number of coats dependent on environmental conditions. Consult with Coating Resources, Inc.
NF1	Epoxy	Galvanized and Non Ferrous Metals Interior Exposed	P14	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0			
				TCI	Series N69	2.0-3.0	Series N69	2.0-3.0			
NF2	Epoxy/ Acrylic Urethane	Galvanized and Non Ferrous Metals Exterior Exposed	P14	SWC	Macropoxy 646	3.0-6.0	Acrolon Ultra	2.0-3.0			
				TCI	Series N140	2.0-3.0	Series 1095	2.0-3.0			
PVC1	Epoxy/Acrylic Urethane	PVC Exterior Exposed	P1a	SWC	Macropoxy 646	3.0-6.0	Acrolon Ultra	2.0-3.0			
				TCI	Series N140	2.0-3.0	Series 1095	2.0-3.0			
PVC1	Epoxy	PVC Interior Exposed	P1a	SWC	Macropoxy 646	3.0-6.0	Macropoxy 646	3.0-6.0			
				TCI	Series N69	2.0-3.0	Series N69	2.0-3.0			

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
PVC2	Acrylic	PVC	P1a	SWC	Shercryl HPA	2.0-4.0	Shercryl HPA	2.0-4.0			
				TCI	Series 1029	2.0-3.0	Series 1029	2.0-3.0			
IP1	Acrylic	Insulated Pipe	P1	SWC	Shercryl HPA	2.0-4.0	Shercryl HPA	2.0-4.0			
				TCI	Series 1029	2.0-3.0	Series 1029	2.0-3.0			
WPG1	Acrylic	Wood Plaster Gypsum	P9	SWC	Pro Ind Acrylic	2.5-4.0	Pro Ind Acrylic	2.5-4.0			
				TCI	Series 151	1.0-2.0	Series 1029	2.0-3.0			
WPG2	Latex/Vinyl Acrylic	Architectural Gypsum Board	P1	SWC	Promar 200 primer	1.0-1.5	Promar 200	1.5-2.0	Promar 200	1.5-2.0	
				TCI	Series 51	1.0-2.0	Series 1029	2.0-3.0	Series 1029	2.0-3.0	
F1	Silicate Blend	Concrete Floor Mild Exposure	P4	SWC	H&C Endurapolish Hardener & Densfier	400-500 SFPG	H&C Endurapolish Hardner	400-500 Sq/ft gal			
				TCI		Discontin- ued					
F2	1/8-inch Thick Aggregate- Filled Pigmented Epoxy	Concrete Floor Pigmented Heavy Traffic Chemical Resistant	P13 4.3.1	SWC	Resuprime 3579	4.0-6.0	Resufloor 3746	Double Broadcast 1/8-inch	Resufloor 3746	6.0-8.0	
				TCI	Series 201	4.0-6.0	Series 237	Double Broadcast 1/8-inch	Series 280	6.0-12.0	
F3	1/8-inch Thick Decorative Quartz-Filled Epoxy	Concrete Floor Decorative Quartz Heavy Traffic	P13 4.3.1	SWC	Resuprime 3579	4.0-6.0	Resufloor 3746	Double Broadcast 1/8-inch	Resufloor 3746 Elladur 4850	6.0-8.0 2.0-3.0	4 coat system
				TCI	Series 201	4.0-6.0	Series 222	Double Broadcast 1/8-inch	Series 284 Series 248	14.0-16.0 2.0-3.0	
F4	High Build Decorative Flake-Filled Epoxy	Concrete Floors Decorative Flake Heavy Traffic	P13 4.3.1	SWC	Resupime 3579	4.0-6.0	Resufloor 3746	8.0-10.0 Broadcast Flake	Resufloor 3746 Elladur 4850	8.0-10.0 8.0-10.0	4 coat system
				TCI	Series 281	6.0-8.0	Series 224	8.0-10.0 Broadcast with Flake	Series 284 Series 248	8.0-12.0 2.0-3.0	

Coating Systems

SYSTEM NUMBER	TYPE	SUBSTRATE/ SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	FINISH COAT	DFT (Mils)	NOTES
F5	Epoxy	Concrete Floors Pigmented Epoxy Light Traffic Low Impact	P13 4.3.1	SWC	Macropoxy 646	5.0-10.0	Macropoxy 646	5.0-10.0	Resutile 4638 Urethane	2.0-3.0	Urethane is Optional
				TCI	Series N69	5.0-10.0	Series N69	5.0-10.0	Series 290	2.0-3.0	Substitute Series N69 with Series 49 for low-VOC, high- solids

NOTES:

Any Secondary Chemical Containment and Immersion Grade Chemical Resistant commodities will be specified on case by case basis by the Protective Coatings Management Group in conjunction with Manufacturer's Chemical Resistant Guides.

Prepared concrete surfaces must be filled if the surface is too rough. Fairing the surface to fill bugholes and voids to near smooth is mandatory prior to coating application. Some surface texture after filling may be approved and recommended for adhesion of subsequent coats.

Optically Activated Pigment (OAP) which may be used for supplementary visual holiday detection. OAP is not a replacement for NACE standard SPO-188-2006.

Galvanized metal is not recommended for wastewater immersion due to adverse chemical reaction(s).

**Water Treatment Plants and Pumping Stations
Piping Color Code**

USAGE	COMMODITY	COLOR STANDARD	SHERWIN WILLIAMS COLOR #	TNEMEC COLOR #
Water Lines	Raw	Olive Green	4024	112GN
	Settled or Clarified	Aqua	4061	10GN
	Finished or Potable	Dark Blue	4064	27BL
Chemical Lines	Alum or Primary Coagulant	Orange	4083	04SF
	Ammonia	White	Ultra White	11WH
	Carbon Slurry	Black	Black	35GR
	Caustic	Yellow with Green Band	4084/4071	02SF/08SF
	Chlorine	Yellow	4084	02SF
	Chlorine Dioxide	Yellow with Violet Band	4084/4080	02SF/14SF
	Fluoride	Light Blue with Red Band	4061/4081	37BL/06SF
	Lime Slurry	Light Green	4069	52GN
	Ozone	Yellow with Orange Band	4084/4083	02SF/04SF
	Phosphate Compounds	Light Green with Red Band	4069/4081	52GN/06SF
	Polymers or Coagulant Aids	Orange with Green Band	4083/4071	04SF/08SF
	Potassium Permanganate	Violet	4080	14SF
	Soda Ash	Light Green with Orange Band	4069/4083	52GN/04SF
	Sulfuric Acid	Yellow with Red Band	4084/4081	02SF/06SF
	Sulfur Dioxide	Light Green with Yellow Band	4069/4084	52GN/02SF
Waste Lines	Backwash Waste	Light Brown	4001	40BR
	Sludge	Dark Brown	4009	84BR
	Sewer	Dark Gray	4025	55BL
Other	Compressed Air	Dark Green	4071	08SF
	Gas	Red	4081	06SF
	Other Lines	Light Gray	4026	32GR

**WASTEWATER TREATMENT PLANTS
Piping Color Code**

PIPE CONTENT	COLOR STANDARD	SHERWIN WILLIAMS COLOR #	TNEMEC COLOR #
Raw Sludge Line	Brown with Black Band	4009/Black	85BR/35GR
Sludge Recirculation Suction Line	Brown with Yellow Band	4009/4084	85BR/02SF
Sludge Draw-Off Line	Brown with Orange Band	4009/4083	85BR/04SF
Sludge Recirculation Discharge Line	Brown	4009	85BR
Sludge Gas Line	Orange (Or Red)	4083	04SF
Natural Gas Line	Orange (Or Red) with Black Band	4083/Black	04SF/35GR
Non Potable Water Line	Blue with Black Band	4064/Black	27BL/35GR
Potable Water Line	Blue	4064	27BL
Chlorine Line	Yellow	4084	02SF
Sulfur Dioxide	Yellow with Red Band	4084/4081	02SF/06SF
Sewage (Wastewater) Line	Gray	4025	55BL
Compressed Air	Green	4071	08SF
Water Lines For Heating Digesters Or Buildings	Blue with Red Band (6nin. wide By 30-Inch Spacing)	4064/4081	27BL/06SF

END OF SECTION

DAILY APPLICATION RECORD

DATE			-----RECORD EVERY 3 HOURS-----					Weather Conditions
			Surface Temperature (Deg. F.)	Air Temperature (Deg. F.)	Material Temperature (Deg. F.)	Relative Humidity (%)	Dew Point (Deg. F.)	
TIME START	AM	PM						
	AM	PM						
	AM	PM						
	AM	PM						
	AM	PM						
TIME STOP	AM	PM						

Area Prepared	
Area Coated	
Type of Material & Quantity Applied:	

SIGNED

PROJECT NAME:	SEH FILE #:
OWNER:	CONTRACTOR:

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SECTION 10 14 23

SECURITY SIGNS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Galvanized steel security signs.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 32 31 26 - Woven Wire Fences and Gates

1.02 SUBMITTALS

- A. Provide shop drawings in accordance with Section 01 33 00.

1.03 METHOD OF MEASUREMENT AND PAYMENT

- A. Security Signs: Measured for each sign installed as a unit.
- B. Payment for acceptable quantities of signs shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

PART 2 PRODUCTS

2.01 SECURITY SIGNS

- A. Eight security signs shall be provided.
- B. Signs shall be 18 gauge hot dipped galvanized steel with a baked white enamel surface (1.25 oz. zinc/sq. ft.) and a 1/4 inch inside diameter eyelet in each corner.
- C. The signs shall be 16 inch by 16 inch in size. Lettering should be black in color. "CAUTION" lettering shall be minimum 4 inches in height. The remaining lettering shall be minimum 2 inches in height.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the signs securely to the woven wire fence to prevent movement of the sign.
- B. Locations as directed by the Engineer and shown in the Drawings.

END OF SECTION

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SECTION 26 00 00

GENERAL PROVISIONS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 GENERAL

- A. Scope of Work:
 - 1. The work included under Division 26 shall consist of furnishing labor and materials necessary for the complete installation of the electrical systems shown on the Contract Drawings and described in the Specifications. This shall include minor items which are necessary to complete the installation and usually included in similar work even though not specifically mentioned in the Contract Documents.
 - 2. Contractor shall walk through the installation at site with Owner's representative prior to mounting equipment and routing conduit.
 - 3. Include minor items which are obviously and reasonably necessary to complete the installation and usually included in similar work even though not specifically mentioned in the Contract Document.
 - 4. Deviations due to a particular manufacturer's requirements shall be provided at no additional cost.
 - 5. Contractor is responsible for the coordination of the installation of electrical equipment with other trades. Where conflicts between disciplines arise, contact the Engineer prior to equipment installation.
 - 6. Factory-trained manufacturer's representative to provide operator training as specified in Sections 01 75 00 and 01 77 00.
 - 7. Provide as-built drawings and documents as required by Section 01 77 00.
- B. Related Requirements:
 - 1. The Contractor is responsible for information contained in the Division 26 Specifications in addition to electrical requirements and information contained in other divisions.
 - 2. Where a Specification Section refers to other sections under the Article of Related Requirements, this is done for Contractor's Convenience only. It shall not relieve the Contractor of responsibilities stated in other Sections of the Specifications. The Contractor is responsible for information contained in this division's Specifications as well as for electrical requirements and information contained in other divisions.

1.03 PERMITS, LICENSES, AND FEES

- A. Provide temporary and permanent permits and licenses required for the completion of the work included under this contract. Fees and expenses required to obtain such permits shall be paid for by the Contractor.
- B. Fees and costs charged by utility companies for utility services, or modifications to, shall be paid for out of the Utility Allowance. See Section 01 21 00. This allowance shall be for fees charged by the Utility to extend service to the site and shall be for charges related to the primary service and utility transformer only. All costs related to the secondary service from the utility transformer and electrical equipment related to the service, such as meter cabinet and conduit stub outs, shall be part of the contractors lump sum bid and shall not be included in the allowance amount.
- C. Contractor to coordinate with Owner and Utility for modifications to the electrical service.
 - 1. Electric Utility is Xcel Energy

2. Contact Jacen Hogard (Jacen.T.Hogard@xcelenergy.com)
- D. Contractor to coordinate application for gas service with Utility and the Owner.
 1. Contractor shall obtain application and submit the application to the Utility.
 2. Contractor to coordinate with Engineer for completion of the load sheet.
 3. Contractor to meet with Utility representative on-site after submittal of the application to coordinate the installation.
 4. Gas utility is CenterPoint Energy, www.centerpointenergy.com.
 - a. Business Center Line: 612.321.4939
 - b. Contact is Daniel Gibson (daniel.gibson@centerpointenergy.com)
- E. Provide inspections as required by regulating agencies or where required by code. Include and pay charges for inspection agencies and provide Owner with a certificate of final inspection and approval by the authority having jurisdiction.
- F. Refer to General Conditions for state and local sales tax requirements.

1.04 REFERENCES

- A. Material and workmanship to comply with applicable codes. As a minimum include State and Federal laws, local ordinances, Utility Company regulations and requirements and interpretations of the following by the local authority having jurisdiction:
 1. State and Local Building Codes.
 2. State and Local Fire Codes.
 3. National Electrical Code.
 4. State and Local Electrical Codes.
 5. OSHA Regulations.
- B. If drawings and specifications are against these codes, notify the Engineer prior to rough-in.
- C. The following is list of organizations and their abbreviations where referred to in the specifications as standards of construction:
 1. ANSI – American National Standard Institute.
 2. ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers.
 3. ADA – Americans with Disabilities Act.
 4. ASTM – American Society for Testing and Materials.
 5. FM – Factory Mutual.
 6. IRI – Industrial Risk Institute.
 7. IEEE – Institute of Electrical and Electronic Engineers.
 8. NBFU – National Board of Fire underwriters.
 9. NBS – National Bureau of Standards.
 10. NEC – National Electrical Code.
 11. NEMA – National Electrical Manufacturers Association.
 12. NFPA – National Fire Protection Agency.
 13. OSHA – Occupational Safety and Health Administration.
 14. UL – Underwriters' Laboratories, Inc.

1.05 DEFINITIONS

- A. The terms listed below are defined as followed:
 1. Furnish: Obtain, coordinate, deliver to the job site and guarantee.
 2. Install: Furnished by others, receive on site, unload, store, set in place, connect, place in operation and guarantee workmanship of installation.
 3. Provide: Furnish and install.
 4. Connect: Bring service to the equipment and make final attachments, including necessary disconnect switches, control switches, outlets, etc.
 5. Conduit: Electrical conduit and associated fittings, hangers, pull boxes, supports, etc. as required for a complete and proper installation.
 6. Concealed: Hidden from sight in walls, ceilings, or floors.

7. Exposed: Surface mounted, not hidden from site.
8. Building Structure: Columns and beams.
9. Relocate: Existing equipment to be relocated to new location and existing conduit and branch circuiting (conductors) to be extended to new location and reconnected.
10. Circuitry: Conduit, conductors, and connections for a complete operational system.

1.06 SUBMITTALS

- A. Substitutions shall be submitted through a bidding contractor and submitted to Engineer (10) working days prior to bid opening. Include detailed information concerning substitution. Acceptable substitutions will be issued in an addendum to the Contract Documents prior to bid date. Extra costs incurred because of substitution, including those of other contractors are the responsibility of the submitting contractor, including engineering redesign cost.
- B. Shop drawing submittals shall be done in accordance with the General Conditions and as listed under Division 1. Submit copies for each item as required per individual section of the specifications.
- C. Submit Record Drawings in accordance with the General Conditions and as listed under Division 1. Record Drawings shall consist of one complete set marked up with changes completed during construction. Multiple set of markups is will not be accepted and must be transferred to one site prior to submittal.
- D. Submit Operating, Maintenances and Warranty Data Manuals in accordance with the General Conditions and as listed in Division 1.

1.07 PROJECT/SITE CONDITIONS

- A. Inspection of Site: Before submitting a proposal on the Work, the Contractor and Subcontractors shall examine the site of the proposed work and thoroughly familiarize themselves with existing conditions and limitations affecting the performance of their Work. No extra compensation will be allowed because of a misunderstanding as to the amount of Work involved or lack of knowledge of existing conditions which could have been discovered or reasonable anticipated prior to bidding.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Engineer before proceeding.

1.08 STORAGE AND HANDLING

- A. Protect electrical equipment and components stored or installed on-site with polyethylene or equivalent covering to protect from moisture, plaster, cement, paint, or work of other trades.
- B. Additional protective coverings may be constructed of plywood sheeting for additional strength.
- C. Replace or touch up and refinish surfaces of original finishes that becomes chipped or scratched during shipment or installation.

1.09 TEMPORARY ELECTRICAL SERVICE

- A. Provide and maintain electrical power service for the use of all trades during construction.
 1. Contractor is responsible for all costs and charges associated with the temporary power connection and service for the duration of the construction period.
 2. Provide and maintain a complete temporary lighting services for use by all trades during construction.
 - a. Provide adequate lighting suitable for conditions for high quality workmanship and for safety throughout the area of construction.
 - b. Provide and maintain an exit and safety lighting system where required by code or OSHA.
 3. Refer to General Conditions for additional temporary power service requirement details.
 4. Refer to General Conditions for any phasing or additional requirements.

- B. Provide and maintain a complete temporary power system for facilities being removed but are to remaining functional until new facilities are operations. See sequence of construction.
- C. Provide and maintain services to existing facilities until new facilities are operational. See sequence of operation to sequence electrical services.

1.10 HAZARDOUS AREAS

- A. Equipment, materials, and installation in areas designated as hazardous shall comply with National Electrical Code Articles 500, 501 (for Class I), 502 (for Class II), and 504.
- B. Equipment and materials installed in hazardous areas shall be UL-Listed and Labeled for the appropriate hazardous area classification.

1.11 EQUIPMENT SIZE COORDINATION

- A. Equipment placement on design drawings is based on one manufacturer's dimensions. Coordinate the actual size of manufacturer used with the spaces available and alert Engineer if there is issue with fitting the proposed equipment into the space.
- B. Investigate each space in structure through which equipment must pass to reach its final location. Coordinate shipping splits with manufacturer to permit safe handling and passage through restricted areas in structure.
- C. Equipment shall always be kept upright during storage and handling. When equipment must be tilted for passage through restricted areas, brace equipment to ensure that tilting does not impair the functional integrity of equipment.

1.12 TEMPORARY SHUTDOWNS AND ABANDONED SERVICES

- A. Where the work makes temporary shutdowns unavoidable, contractor shall consult with owner as to times and procedures for such shutdowns. Where existing services are abandoned, wiring shall be removed, and conduit shall be properly capped in conformance with the requirements of the utility.
- B. Existing systems are to remain functional until new facilities are complete and operational.

1.13 SEQUENCING AND SCHEDULING

- A. Install work to accommodate Owner's occupancy requirements during construction period and coordinate electrical schedule and operations with owner.
- B. Construct work in a sequence under provisions of division 01 – General requirements and other sections as applicable.
- C. Electrical work shall be coordinated with other trades and contractors to expedite completion of project.
- D. It will be the contractor's responsibility to examine the drawings and specifications, to take measurements where required to verify dimensions for correct placement of equipment and to progress the contract as expeditiously as possible, so that the progress of the work is orderly and does not cause unnecessary cutting and patching of structures. The contractor shall be responsible for cutting and patching of structures made necessary by the failure to install sleeves, grilles or other items required by the electrical work at the proper time for the normal installation of such items.
- E. The determination of quantities of material and equipment required shall be made by the contractor based on the contract documents. Schedules on the drawings and in the specifications are completed as an aid to the contractor but where discrepancies arise, the actual number required shall govern.

1.14 RECORD UTILITES DRAWINGS

- A. Contractor shall prepare and submit to Engineer, drawings showing the exact location of all installed underground electrical and conduit runs, and any existing underground utilities encountered during installation. The drawings shall give accurate locations (referenced to visible above-grade objects) and dimensions of all such equipment for future use by the owner. These drawings shall be submitted to Engineer as soon as possible after such runs have been installed.

1.15 WARRANTY

- A. Provide a guarantee of workmanship and material and keep same in good operating condition for a period of two (2) years after final completion of the work as evidenced by issuance of final completion certificate by the Engineer.
- B. Correct defects immediately and at contractors' expense those defects due to faulty workmanship or materials that arise during the above-mentioned period and make corrections to the satisfaction of the Engineer. Such reconstruction and repairs shall include damages to the finish of the building resulting from the original defect.
- C. The guarantee shall not apply where other guarantees for different lengths of time are specifically called for.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 ROUGH-IN

- A. Verify location for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Consult the Contract Documents (Drawing and Specifications) of other Divisions and other trades for correlating information and layout work so that it will not interfere with other trades. Verify dimensions and conditions, i.e., finished ceiling heights, wall elevations, sections, footing and foundation elevations, beam depths, ductwork and piping etc. with architectural, mechanical, civil, and structural drawings. If conflicts occur such that resolution is not possible by the affected trades on the job, notify the Engineer so a resolution can be worked out. Where work must be replaced due to failure to verify conditions existing on the job, such replacement shall be accomplished at no extra cost to the owner. This shall apply to shop fabricated Work as well as work fabricated in place.

3.02 INSTALLATION

- A. Arrange for chases, slots, and openings in other building components during the progress of construction to allow for electrical installation.
- B. Install material and equipment in accordance with manufacturers' recommendations, instructions and current NECA, NFPA 70 and UL standards.
- C. Install equipment and materials to provide required access for servicing and maintenance. Coordinate equipment location with required access panels and doors. Allow ample space for removal of parts that require replacement or servicing.
- D. Coordinate the installation of required supporting devices and sleeves with structural systems.

- E. Coordinate with other trades before installing equipment so that conflicts will be resolved before installation. In general, large mechanical equipment shall be given priority. Maintain, wherever practical, a minimum separation of 3 inches from water and waste piping and 12 inches from hot water and steam piping.
- F. Electrical Equipment, outlet boxes, etc. shall not be attached or otherwise fastened to ductwork or other mechanical equipment unless noted otherwise.
- G. Cutting and patching shall be performed in accordance with the provisions of the general conditions.
- H. Install systems, materials, and equipment level and plumb, parallel, and perpendicular to other building systems and components, where installed exposed unless noted otherwise.
- I. Drilling:
 - 1. Drill holes in masonry with rotary drills.
 - 2. Properly seal penetrations with an approval fire-rated sealant.
 - 3. Verify fire rating of walls prior to work and restore to required fire rating.

3.03 PROTECTION

- A. Contractor shall be responsible for damage to electrical equipment or materials. Equipment installed by the Contractor shall be kept in a clean and functional condition until final acceptance by the Owner.
- B. When a portion of the building is to be occupied by the Owner prior to Substantial Completion of the entire Project, arrangements will be made to transfer responsibility for protection and housekeeping tasks from the Contractor to Owner.
- C. There shall be no interruptions of building systems during occupied times without prior arrangement.

3.04 CLEANING

- A. Keep the premises free from the accumulations of waste materials or rubbish caused by execution of the Work. At the completion of the Work, remove rubbish, tools, scaffolding and surplus material from and about the premises. The premises shall be "broom-cleaned" or its equivalent unless more thorough cleaning is specified elsewhere.

3.05 PAINTING

- A. Refinish electrical equipment damaged during shipping or installation to its original condition. Remove rust, prime and paint per manufacturer's recommendations for finished equal to original. Do not paint nameplates, labels, tags, stainless steel, or items such as shafts, levels, handles, trim or terminal strips.
- B. Conduit and raceway systems shall be unpainted unless specifically noted. If painting of conduit and raceway systems is required, coat with paint type and color to match background mounting surface.
- C. Touch-up paint shall be applied to equipment with chips or scratch marks.

3.06 OPENINGS, CUTTING AND PATCHING

- A. The contractor shall coordinate the placing of openings in structures as required for the installation of electrical work.
- B. The contractor shall coordinate the accurate location and size for required openings and shall assure that the proper size openings are provided. Openings shall be patched and/or sealed.
- C. Contractor shall provide cutting and patching as required for the installation of the work and shall furnish lintels and supports as required for openings. Cutting of the structural members will not be permitted without prior approval of the Engineer. Extent of the cutting shall be minimized by use of

core drills, power saws or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsman skilled in the respective discipline.

3.07 TEST AND DEMONSTRATIONS

- A. Systems shall be tested and placed in proper working order prior to demonstrating to Owner.
- B. Prior to acceptance of the electrical installation, the contractor shall demonstrate to the Owner or Owner's designated representative all essential features and functions of the systems installed and shall instruct the owner in the proper operation and maintenance of such systems.
- C. Contractor shall furnish the necessary trained personnel to perform to demonstrations and training and shall arrange to have the manufacturers' representatives for the system present to assist with the demonstration, the owner and contractor shall each sign a certification stating that the training has been performed and the owner accepts the same.

3.08 CONCRETE WORK

- A. The contractor shall coordinate size and location of concrete bases and pads for electrical equipment with the required trades and with the utility.
- B. The contractor shall furnish equipment anchor bolts and shall be responsible for their proper installation and accurate location.

3.09 EXCAVATING, TRENCHING AND BACKFILLING

- A. The contractor shall do excavating necessary for underground electrical ducts, wiring manholes, conduit, etc. and shall backfill such trenches and excavations after equipment has been installed and tested. Care shall be taken in excavating, so that walls and footings and adjacent load bearing soils are not disturbed, except where lines must cross under a wall footing. Where a line must pass under a footing, the crossing shall be made by the smallest possible trench to accommodate the pipe.
- B. Excavations shall be kept free from water by pumping if necessary. No greater length of trench shall be left open, in advance of pipe and utility laying, than necessary.
- C. Immediately after testing and/or inspection, the trench shall be carefully backfilled. Place backfill into trench, so the impact on installed pipe is minimized. Backfill and compact to specifications described in division 02 for utility trenching.

END OF SECTION

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SECTION 26 05 01

ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SCOPE

- A. This Section covers basic electrical requirements for providing labor, materials, equipment, and services necessary to complete all the demolition required for the Project as specified herein and shown on the Drawings.

1.02 INTENT

- A. It is the intent of this specification and accompanying Drawings to describe the overall scope of demolition work to be performed. It is not intended that the specifications and Drawings show every piece of equipment required to be removed.
- B. The Contractor shall disconnect and remove electrical items as indicated on the Drawings, or as required by the Project.
- C. The Contractor shall seal floor, wall and ceiling openings with thermo-setting fire resistive compound after removal of conduits.
- D. Notify the Owner and Engineer prior to any equipment being out of service.

1.03 JOB OVERVIEW

- A. See Drawings for scope of demolition work.

PART 2 PRODUCT

Not Used

PART 3 EXECUTION

3.01 DEMOLITION/ALTERATION

- A. Prior to start of demolition, disconnect power and control at the source. Contractor shall verify using an electrical meter or other device to ensure that power has been disconnected at the source of supply.
- B. Demolition shall be performed in such a manner as to avoid hazards to persons and property. Work shall be performed in strict accordance with all Municipal, State and Federal Rules, Regulations, Codes, and Laws which may govern and apply to this work.
- C. Maintain continuous service of feeders, circuits or partial circuits, and outlets affected by this work, except where written permission for an outage for a specified time has been granted. All work requiring shut down of existing systems shall be coordinated and approved by Owner prior to work starting.
- D. Provide reconnection and temporary installation as required; remove at job completion.
- E. Cut back to floor, wall, or ceiling and plug ends of concealed conduits made obsolete. Remove exposed conduits, wireways, outlet boxes, hangers, and devices made obsolete by this work unless designated specially to remain.

- F. Provide blank plates on all unused outlet boxes.
- G. Wherever extensions of wires or cables are shown on drawings, check and verify wire and cables size and capacities. Secure Engineer acceptance of this data before new cables are ordered or installation starts.
- H. The Owner reserves the right to claim any materials removed during demolition that will not be reused.
- I. Repair existing surfaces back to original condition.
- J. Where equipment is shown to be removed, the contractor shall also remove the associated electrical conduits back to their sources, or back to the nearest junction if the circuit need to remain to service equipment not being removed.

3.02 WASTE MANAGEMENT

- A. Contractor is responsible to remove from the site all material not salvaged or retained by the Owner.
- B. The Contractor shall be responsible for all damage to existing materials not affected by the demolition work. The Contractor shall repair or replace damage material or equipment as directed at no additional cost to the Owner.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

PART 2 PRODUCTS

2.01 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpha Wire Company.
 - 2. American Insulated Wire Corporation.
 - 3. Belden Inc.
 - 4. Cerro Wire LLC.
 - 5. Encore Wire Corporation.
 - 6. General Cable Corporation.
 - 7. Southwire Company.
 - 8. WESCO
 - 9. Approved Substitution.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. RoHS compliant.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.

2.02 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

- B. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. 3M Electrical Products.
 - 2. AFC Cable Systems.
 - 3. Gardner Bender.
 - 4. Hubbell Power Systems, Inc.
 - 5. Ideal Industries, Inc.
 - 6. ILSCO.
 - 7. NSi Industries LLC.
 - 8. O-Z/Gedney.
 - 9. Service Wire Co.
 - 10. Approved Substitution.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: One or two hole with standard barrels.
 - 3. Termination: Compression.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid or stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- B. Feeders: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- C. Branch Circuits: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

- F. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.04 MINIMUM SIZES

- A. Minimum control circuit conductor sizes:
 - 1. Class 1 remote-control and signal circuits; No 16 AWG.
 - 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
 - 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 14 AWG.
- B. Minimum building wire and power conductor size shall be No. 12 AWG for power and lighting circuits, and No. 14 AWG for control circuits. In order to minimize voltage drop for longer runs, the following minimum conductor sizes apply:
 - 1. 20A, 120V circuits longer than 75 feet: No. 10 AWG minimum.
 - 2. 20A, 120V circuits longer than 150 feet: No. 8 AWG minimum.
 - 3. 20A, 120V circuits longer than 300 feet: No. 6 AWG minimum
 - 4. 20A, 277V circuits longer than 150 feet: No. 10 WG minimum.
 - 5. 20A, 277V circuits longer than 300 feet: No. 8 AWG minimum.

3.05 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.06 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.07 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.08 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.09 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements:
 - 1. Generator
 - 2. Transfer switch
 - 3. Service entrance equipment
 - 4. Motors larger than 25HP

5. Equipment rated 100A or greater:
 - a. Perform each of the following visual and electrical tests:
 - 1) Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - a) Test bolted connections for high resistance using one of the following:
 - (1) Low-resistance ohmmeter.
 - (2) Calibrated torque wrench.
 - (3) Thermographic survey.
 - 2) Inspect compression-applied connectors for correct cable match and indentation.
 - 3) Inspect for correct identification.
 - 4) Inspect cable jacket and condition.
 - 5) Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
 - 6) Continuity test on each conductor and cable.
 - 7) Uniform resistance of parallel conductors.
- C. Perform each of the following visual and electrical tests on all other equipment:
 1. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 2. Test bolted connections for high resistance using one of the following:
 - a. A low-resistance ohmmeter.
 - b. Calibrated torque wrench.
 - c. Thermographic survey.
 3. Inspect compression-applied connectors for correct cable match and indentation.
 4. Inspect for correct identification.
 5. Inspect cable jacket and condition.
 6. Test receptacles for polarity and continuity.
- D. Test and Inspection Reports: Prepare a written report to record the following:
 1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 26 05 23

CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 1. Low-voltage control cabling. (Shielded)
 2. Control-circuit conductors.
 3. Identification products.

1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. Plenum: A space forming part of the air distribution system to which one or more air ducts are connected. An air duct is a passageway, other than a plenum, for transporting air to or from heating, ventilating, or air-conditioning equipment.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 PRODUCTS

2.01 LOW VOLTAGE CONTROL CABLE (SHIELDED)

- A. Standard Cable: NFPA 70, Type CM.
 1. Paired, one pairs, No. 16 AWG, stranded (9x29) tinned-copper conductors.
 2. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 3. PVC jacket.
 4. Flame Resistance: Comply with UL 1685.
 5. 600volt rated

2.02 CONTROL-CIRCUIT CONDUCTORS

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 1. 3M Company.
 2. AMP NETCONNECT.
 3. Belden Inc.
 4. Berk-Tek Leviton.
 5. CommScope, Inc.
 6. General Cable Corporation.
 7. Hitachi Cable America, Inc.

8. Mohawk.
 9. Approved Substitution.
- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway.
 - C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway.
 - D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway, Type XHHW-2, complying with UL 44 in raceway.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
- B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1 and NFPA 70.
- B. General Requirements for Cabling:
 1. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 2. Cables may not be spliced and shall be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 3. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 4. Secure and support cables at intervals not exceeding 30 inches, (760 mm), and not more than 6 inches, (150 mm), from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
 6. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
 7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 8. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
 9. Support: Do not allow cables to lie on removable ceiling tiles.
 10. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
 11. Provide strain relief.
 12. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.

13. Ground wire shall be copper, and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.
- C. Installation of Control-Circuit Conductors:
1. Install wiring in raceways.
 2. Use insulated spade lugs for wire and cable connection to screw terminals.
 3. Comply with requirements specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches, (127 mm).
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches, (305 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches, (600 mm).
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches, (64 mm).
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches, (150 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches, (305 mm).
 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches, (75 mm).
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches, (150 mm).
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches, (1200 mm).
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches, (127 mm).

3.04 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.05 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
1. Class 1 remote-control and signal circuits; No 16 AWG.
 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 14 AWG.

3.06 GROUNDING

- A. For low-voltage control wiring and cabling, comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

3.07 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

- B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.
- C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire shall have a unique tag.

3.08 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
- B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- C. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

SECTION 26 05 26

GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Equipment grounding.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.02 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.03 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

3.02 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Three-phase motor and appliance branch circuits.
 - 3. Flexible raceway runs.

3.03 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- C. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Steel slotted support systems.
 - 2. Aluminum slotted support systems.
 - 3. Nonmetallic slotted support systems.
 - 4. Conduit and cable support devices.
 - 5. Support for conductors in vertical conduit.
 - 6. Structural steel for fabricated supports and restraints.
 - 7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 - 8. Fabricated metal equipment support assemblies.

1.03 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.04 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.

1.05 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.06 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.
- C. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

- D. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section 077200 "Roof Accessories."

PART 2 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-, (10-mm-), diameter holes at a maximum of 8 inches, (200 mm), o.c. in at least one surface.
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. B-line.
 - c. CADDY.
 - d. Flex-Strut, Inc.
 - e. G-Strut.
 - f. GThomas & Betts Corporation.
 - g. Approved Substitution.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel or Stainless steel, type 316.
 4. Channel Width: Selected for applicable load criteria.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch-, (10-mm-), diameter holes at a maximum of 8 inches, (200 mm), o.c. in at least one surface.
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. Cooper Industries, Inc.
 - b. Flex-Strut, Inc.
 - c. Haydon Corporation.
 - d. MKT Metal Manufacturing.
 - e. Approved Substitution.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Channel Material: 6063-T5 aluminum alloy.
 4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
 5. Channel Width: Selected for applicable load criteria.
 6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch-, (10-mm-), diameter holes at a maximum of 8 inches, (200 mm), o.c., in at least one surface.
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. B-line.
 - c. Fabco Plastics Wholesale Limited.
 - d. G-Strut.
 - e. Approved Substitution.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Channel Width: Selected for applicable load criteria.
 4. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.

5. Fitting and Accessory Materials: Same as those for channels and angles except metal items may be stainless steel.
 6. Rated Strength: Selected to suit applicable load criteria.
 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Conduit and Cable Support Devices: Steel and malleable-iron, or stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325, (Grade A325M).
 6. Toggle Bolts: Stainless-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 EXECUTION

3.01 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
 2. NECA 101
 3. NECA 102.
 4. NECA 105.
 5. NECA 111.
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch, (6 mm), in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps or single-bolt conduit clamps using spring friction action for retention in support channel.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Classified spaces shall use aluminum or stainless steel support channel and hardware.
- C. Damp and wet locations use aluminum or stainless steel support channel and hardware.
- D. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb, (90 kg).
- E. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 or Spring-tension clamps.
 - 6. To Light Steel: Sheet metal screws.
 - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- F. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils, (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

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SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Boxes, enclosures, and cabinets.
 - 4. Handholes and boxes for exterior underground cabling.

1.03 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. IMC: Intermediate Metal Conduit.
- C. RMC: Rigid Metal Conduit.
- D. GRC: Galvanized Rigid Steel Conduit.
- E. PVC-GRC: PVC Coated Galvanized Rigid Steel Conduit.
- F. FMC: Flexible Metal Conduit.
- G. LFMC: Liquid Tight Flexible Metal Conduit.
- H. RNC: Rigid non-metallic conduit.

1.04 SUBMITTALS

- A. Product Data: For surface raceways, hinged-cover enclosures, and cabinets.

PART 2 PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems.
 - b. Allied Tube & Conduit.
 - c. Anamet Electrical, Inc.
 - d. Calconduit.
 - e. Electri-Flex Company.
 - f. FSR, Inc.
 - g. Killark.
 - h. Korkap.
 - i. NEC, Inc.

- j. Opti-Com Manufacturing Network, Inc. (OMNI)
 - k. O-Z/Gedney.
 - l. Patriot Aluminum Products, LLC.
 - m. Perma-Cote.
 - n. Picoma Industries, Inc.
 - o. Plasti-Bond.
 - p. Approved Substitution.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. GRC: Comply with ANSI C80.1 and UL 6.
 - a. Metallic zinc applied by hot-dipped galvanizing or electro-galvanizing.
 - b. Threads galvanized after cutting.
 - c. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
 4. IMC: Comply with ANSI C80.6 and UL 1242.
 5. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
 - a. Flexible steel conduit with PVC jacket and complying with UL 360.
 - b. Core formed of continuous, spiral wound, hot-dipped galvanized steel with successive convolutions securely interlocked.
 - c. Extruded PVC outer jacket positively locked to the steel core.
 - d. Liquid and vaportight.
- B. Metal Fittings:
1. Comply with NEMA FB 1 and UL 514B.
 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Fittings, General: Listed and labeled for type of conduit, location, and use.
 4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 5. Fittings for GRC, RAC, IMC:
 - a. Type FS or FD
 6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, (1 mm), with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or RAC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. CANTEX Inc.
 - e. CertainTeed Corporation.
 - f. Champion Fiberglass, Inc.
 - g. Condux International, Inc.
 - h. Electri-Flex Company
 - i. FRE Composites.
 - j. Kraloy.
 - k. Lamson & Sessions.
 - l. Niedax Inc.
 - m. RACO; Hubbell.
 - n. Thomas & Betts Corporation.
 - o. Approved Substitution.
 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. RNC: Type EPC-40-PVC, Type EPC-80-PVC.
 - a. Complying with NEMA TC 2 and UL 651 unless otherwise indicated.
 - b. Polyvinyl-chloride (PVC) plastic compound.
 - c. Rated for direct sunlight exposure where installed exposed.
 - d. Fire retardant and low smoke emission.
 - e. Suitable for use with 90 Degree C wire.
4. LFNC: Comply with UL 1660.

B. Nonmetallic Fittings:

1. Fittings, General: Listed and labeled for type of conduit, location, and use.
2. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
3. Fittings for LFNC: Comply with UL 514B.
4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 CONDUIT SEALS

- A. Conduit seals shall be provided wherever conduits penetrate exterior concrete walls below grade, or cross hazardous location boundaries:
1. For conduits less than 60 inches below grade; OZ/Gedney Type FSK, or equal.
 2. For conduits more than 60 inches below grade; OZ/Gedney Type WSK, or equal.

2.04 BOXES, ENCLOSURES, AND CABINETS

A. Boxes, Enclosures, and Cabinets

1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - a. Adalet.
 - b. Crouse-Hinds.
 - c. EGS/Appleton Electric.
 - d. Erickson Electrical Equipment Company.
 - e. FSR, Inc.
 - f. Hoffman.
 - g. Hubbell.
 - h. Kraloy.
 - i. Milbank Manufacturing Company.
 - j. MonoSystems, Inc.
 - k. Oldcastle Enclosure Solutions.
 - l. O-Z/Gedney.
 - m. Plasti-Bond.
 - n. Approved Substitution.

- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

- D. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

- E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

- F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

- G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 4, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
- H. Cabinets:
1. NEMA 250, Type 1, Type 4, Type 3R to match environment galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Metal barriers to separate wiring of different systems and voltage.
 4. Accessory feet where required for freestanding equipment.
- I. Boxes, enclosures, and cabinets installed in Class 1, Division I and Division II shall be rated for the area installed.

2.05 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Manufacture: Subject to compliance by one of the following:
 - a. Armorcast Projects Company.
 - b. Carson Industries LLC.
 - c. NewBasis
 - d. Oldcastle precast, Inc.
 - e. Quazite: Hubbell Power Systems, Inc.
 - f. Synertech Moulded Products
 2. Standard: Comply with SCTE 77.
 3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 6. Cover Legend: As called for in the drawings.
 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 8. Handholes 12 Inches Wide by 24 Inches Long, (300 mm Wide by 600 mm Long), and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC, IMC or PVC-Coated GRC.
 2. Concealed Conduit, Aboveground: GRC, IMC or PVC-Coated GRC.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried. Schedule 80 PVC under roadways.
 - a. PVC coated rigid, or post-coated GRC for elbow and riser out of ground.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, Type 4X, Type 7.

- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed: GRC, PVC-Coated GRC or IMC.
 - 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC
 - 3. Boxes and Enclosures:
 - a. Indoors, dry locations: NEMA 250, Type 1 or Type 12.
 - b. Damp or wet locations: NEMA 250, Type 3R or Type 4 stainless steel.
 - c. Corrosive Areas: Type 4X stainless steel.
 - d. Hazardous, (Class I), areas: NEMA 250, Type 7.
 - e. Hazardous, (Class II), areas: NEMA 250, Type 9.
- C. Minimum Raceway Size: 3/4-inch, (21-mm), trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

3.02 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Do not fasten conduits onto the bottom side of a metal deck roof.
- C. Keep raceways at least 6 inches, (150 mm), away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Complete raceway installation before starting conductor installation.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches, (300 mm), of changes in direction.
- F. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- G. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches, (300 mm), of enclosures to which attached.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

- L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch, (35mm), trade size and insulated throat metal bushings on 1-1/2-inch, (41-mm), trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits 2-inch, (53-mm), trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb, (90-kg), tensile strength. Leave at least 12 inches, (300 mm), of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.
 - 4. Where otherwise required by NFPA 70.
- S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- T. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 degrees F, (17 degrees C), and that has straight-run length that exceeds 25 feet, (7.6 m). Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 degrees F, (55 degrees C), and that has straight-run length that exceeds 100 feet, (30 m).
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 degrees F, (70 degrees C), temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 degrees F, (86 degrees C) temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 degrees F, (70 degrees C), temperature change.
 - d. Attics: 135 degrees F, (75 degrees C), temperature change.
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degrees F, (0.06 mm per meter of length of straight run per degrees C), of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.00078 inch per foot of length of straight run per degrees F, (0.0115 mm per meter of length of straight run per degrees C), of temperature change for metal conduits.
 - 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 - 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

- U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches, (915 mm), of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
- V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- W. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- X. Set metal floor boxes level and flush with finished floor surface.
- Y. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 1. Excavate trench bottom to provide firm and uniform support for conduit.
 2. Install backfill:
 - a. Backfill shall be free of rocks and other unsuitable debris.
 - b. Deposit material uniformly on both sides of pipe throughout entire trench width.
 - c. Place material in 6-inch lifts and mechanically compact.
 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches, (300 mm), of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
 4. Install manufactured rigid steel conduit elbows below grade for stub-ups at poles and equipment and at building entrances through floor. Transition to rigid steel conduit at elbow for riser above ground. **Rigid steel shall be used for all exposed piping above ground, non-metallic conduit is not acceptable.**
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches, (75 mm), of concrete for a minimum of 12 inches, (300 mm), on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches, (1500 mm), from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch, (12.5-mm), sieve to No. 4, (4.75-mm), sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch, (25 mm), above finished grade.
- D. Install handholes with bottom below frost line.

3.05 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.06 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.07 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 44

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Sleeve-seal fittings.
 - 4. Grout.
 - 5. Silicone sealants.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product

PART 2 PRODUCTS

2.01 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
- B. PVC-Pipe Sleeves: ASTM D1785, Schedule 40.
- C. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- D. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- E. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches, and with no side larger than 16 inches, (400 mm), thickness shall be 0.052 inch,
 - b. For sleeve cross-section rectangle perimeter 50 inches, or more and one or more sides larger than 16 inches, (400 mm), thickness shall be 0.138 inch.

2.02 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.03 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.04 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 4. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches, (50 mm), above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using **[steel]** **[cast-iron]** pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch, (25-mm), annular clear space between pipe and sleeve for installing mechanical sleeve seals.

- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch, (25-mm), annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION

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SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 2. Labels.
 3. Bands and tubes.
 4. Tapes and stencils.
 5. Tags.
 6. Signs.
 7. Cable ties.
 8. Paint for identification.
 9. Fasteners for labels and signs.

1.03 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For arc-flash hazard study.
- B. Product Data: For each electrical identification product indicated.
- C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- D. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 70.
- B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- C. Comply with ANSI Z535.4 for safety signs and labels.
- D. Comply with NFPA 70E requirements for arc-flash warning labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.02 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded conductors.
 - 1. Color shall be factory applied, or field applied for sizes larger than No. 6 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 240-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 4. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - 5. Color for Neutral: White for 240V and below, Gray for greater than 240V.
 - 6. Color for Equipment Grounds: Green.
 - 7. Colors for Isolated Grounds: Green with two or more yellow stripes.
- C. Raceways and Cables Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."
- D. Warning Label Colors:
 - 1. Identify system voltage with black letters on an orange background.
- E. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES, (915 MM)."
3. Arc Flash Label: "WARNING" for equipment with less than 40 cal/cm² incident energy and "DANGER" for equipment with greater than 40cal/cm² incident energy levels. Include the following information: Incident energy level at working distance, working distance, arc flash boundary, voltage level with covers removed, limited and restricted approach boundaries, date of survey and location.

F. Equipment Identification Labels:

1. Black letters on a white field.
2. For service equipment, include the following information:
 - a. Nominal system voltage.
 - b. Available fault current at the service overprotection devices based on the available fault current at the service equipment.
 - c. The clearing time of service overcurrent protective devices based on the fault current at the service equipment.
 - d. The date the label was applied.

2.03 LABELS

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Champion America.
3. emedco.
4. Grafoplast Wire Markers.
5. Helermann Tyton.
6. LEM Products, Inc.
7. Marking Services, Inc.
8. Industrial Safety Solutions.
9. Approved Substitution.

B. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

C. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

D. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-, (0.08-mm-), thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag or printer manufacturer.

E. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-, (0.08-mm-), thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches, (37 by 150 mm), for raceway and conductors.
 - b. 3-1/2 by 5 inches, (76 by 127 mm), for equipment.
 - c. As required by authorities having jurisdiction.

2.04 BANDS AND TUBES

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Helermann Tyton.
3. Approved Substitution.

- B. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches, (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.
- C. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F, (93 deg C). Comply with UL 224.

2.05 TAPES AND STENCILS

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils, (0.08 mm), thick by 1 to 2 inches, (25 to 50 mm), wide; compounded for outdoor use.
- C. Tape and Stencil: 4-inch-, (100-mm-), wide black stripes on 10-inch, (250-mm), centers placed diagonally over orange background and are 12 inches, (300 mm), wide. Stop stripes at legends.
- D. Floor Marking Tape: 2-inch-, (50-mm-), wide, 5-mil, (0.125-mm), pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
- E. Underground-Line Warning Tape:
 - 1. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 - 2. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
 - 3. Tag: Conductive:
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Overall Thickness: 5 mils.
 - c. Foil Core Thickness: 0.35 mil.
 - d. Weight: 28 lb/1000 sq. ft.
 - e. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.06 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch, thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.
- C. Write-on Tags:
 - 1. Polyester Tags: 0.015 inch, thick, with corrosion-resistant grommet and cable tie for attachment.
 - 2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag or printer manufacturer.

2.07 SIGNS

- A. Baked-Enamel Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch, grommets in corners for mounting.
 - 3. Nominal Size: 7 by 10 inches.
- B. Metal-Backed Butyrate Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch, galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
 - 2. 1/4-inch, grommets in corners for mounting.
 - 3. Nominal Size: 10 by 14 inches.
- C. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Engraved legend.
 - 2. Thickness:
 - a. For signs larger than 20 sq. in., 1/8 inch, thick.
 - b. Engraved legend with black letters on white face.
 - c. Punched or drilled for mechanical fasteners with 1/4-inch, grommets in corners for mounting or framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.08 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch .
 - 2. Tensile Strength at 73 degrees F, According to ASTM D 638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 degrees F.
 - 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 degrees F, According to ASTM D 638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 degrees F, According to ASTM D 638: 7000 psi.
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 degrees F.
 - 5. Color: Black.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot, maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall. Tape shall be conductive unless otherwise identified on drawings.
- J. Cable Ties: General purpose, for attaching tags, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
 - 3. UPS.
- B. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- C. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

- D. Concealed Raceways, Duct Banks, more than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch high, black letters on 20-inch centers.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10-foot maximum intervals.
- E. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Vinyl wraparound labels.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color coding conductor tape to identify the phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.
- H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- I. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes or self-adhesive labels with the conductor designation.
- J. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source.
- K. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- L. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- M. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- N. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- O. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.

- P. Arc Flash Warning Labeling: Self-adhesive labels.
- Q. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- R. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer.
- S. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Indoor Equipment: Self-adhesive engraved laminated acrylic or melamine label.
 - 2. Outdoor Equipment: Engraved laminated acrylic or melamine label.
 - 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchgear.
 - e. Switchboards.
 - f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - g. Substations.
 - h. Emergency system boxes and enclosures.
 - i. Motor-control centers.
 - j. Enclosed switches.
 - k. Enclosed circuit breakers.
 - l. Enclosed controllers.
 - m. Variable-speed controllers.
 - n. Push-button stations.
 - o. Power-transfer equipment.
 - p. Contactors.
 - q. Remote-controlled switches, dimmer modules, and control devices.
 - r. Battery-inverter units.
 - s. Battery racks.
 - t. Power-generating units.
 - u. Monitoring and control equipment.
 - v. UPS equipment.

END OF SECTION

SECTION 26 29 23

VARIABLE-FREQUENCY DRIVES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes separately enclosed, preassembled, combination VFDs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.03 DEFINITIONS

- A. CPT: Control power transformer.
- B. NC: Normally closed.
- C. NO: Normally open.
- D. OCPD: Overcurrent protective device.
- E. RFI: Radio-frequency interference.
- F. VFD: Variable-frequency motor controller.

1.04 SUBMITTALS

- A. Product Data: For each type and rating of VFD indicated.
 - 1. Include dimensions and finishes for VFDs.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each VFD indicated.
 - 1. Include mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
 - b. Manufacturer's written instructions for setting field-adjustable overload relays.
 - c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 - 2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 - 3. Indicating Lights: Two of each type and color installed.
 - 4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
 - 5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store VFDs in a space that is permanently enclosed and climate controlled.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFDs, including clearances between VFDs, and adjacent surfaces and other items.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Contractor shall obtain the VFD's from one manufacturer who shall also manufacture the enclosure and major equipment components. The manufacture shall have a minimum of five years' experience in the manufacture of similar units and shall have a general distribution to the electrical trade. Subcontracting of wiring will not be acceptable. Drive shall be from one of the following manufactures:
 - 1. Eaton.
 - 2. Rockwell Automation, Inc.
 - 3. Schneider Electric/Square D.
 - 4. ABB.
 - 5. Yaskawa.
 - 6. Substitutions by Engineer approval only.

2.02 SYSTEM DESCRIPTION

- A. General Requirements for VFDs:
 - 1. VFDs and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508A.
- B. Application: Constant torque and variable torque as required for equipment installed.
- C. VFD Description: Variable-frequency motor controller, consisting of power converter that employs pulse-width-modulated inverter, factory built and tested in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 - 1. Units suitable for operation of NEMA MG 1, Design A and Design B motors, as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
 - 2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
 - 3. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.

- D. Disconnects:
1. MCP:
 - a. UL 489, with interrupting capacity complying with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - b. Lockable Handle: For three padlocks and interlocks with cover in closed position.
 - c. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - d. NC alarm contact that operates only when MCP has tripped.
 - e. Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 2. MCCB:
 - a. UL 489, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - b. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - c. Lockable Handle: For three padlocks and interlocks with cover in closed position.
 - d. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - e. NC alarm contact that operates only when MCCB has tripped.
 3. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFD input current rating, whichever is larger.
- E. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
1. VFDs shall be Heavy Duty Rated. (50 percent Overload for 1 minute, based on motor full load amperage rating).
- F. Output Rating: Three-phase; 10 to 60 Hz for variable torque load or 10 to 66 Hz, with torque contact as speed change for constant torque loads, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- G. Unit Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
 2. Input AC Voltage Unbalance: Not exceeding 3 percent.
 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 4. Minimum Efficiency: 96 percent at 60 Hz, full load.
 5. Minimum Displacement Primary-Side Power Factor: 96percent under any load or speed condition.
 6. Overload Capability:
 - a. For variable-torque controllers, 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 - b. For constant-torque controllers, 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 7. Starting Torque: Minimum of 100 percent of rated torque from 3 to 60 Hz.
 8. Speed Regulation: Plus or minus 5 percent.
 9. Output Carrier Frequency: Field selectable.
 10. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- H. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 3. Acceleration: 0.1 to 999.9 seconds.
 4. Deceleration: 0.1 to 999.9 seconds.
 5. Current Limit: 30 to a minimum of 150 percent of maximum rating.
- I. Self-Protection and Reliability Features:
1. Input transient protection by means of SPDs for three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.

2. Loss of Input Signal Protection: Selectable response strategy including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 3. Under- and overvoltage trips.
 4. Inverter overcurrent trips.
 5. VFD and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFD overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved and listed and labeled by an NRTL.
 6. Critical frequency rejection, with three selectable, adjustable deadbands.
 7. Instantaneous line-to-line and line-to-ground overcurrent trips.
 8. Loss-of-phase protection.
 9. Reverse-phase protection.
 10. Short-circuit protection.
 11. Motor overtemperature fault.
- J. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- K. Bidirectional Autospeed Search: Capable of starting VFD into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- L. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.

2.03 CONTROLS AND INDICATION

- A. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - a. Control Authority: Supports at least four conditions: Off, local manual control at VFD, local automatic control at VFD, and automatic control through a remote source.
- B. Historical Logging Information and Displays:
1. Running log of total power versus time.
 2. Total run time.
 3. Fault log, maintaining last four faults with time and date stamp for each.
 4. Indicating Devices: Digital display mounted flush in VFD door and connected to display VFD parameters including the following:
 - a. Output frequency (Hz).
 - b. Motor speed (rpm).
 - c. Motor status (running, stop, fault).
 - d. Motor current (amperes).
 - e. Motor torque (percentage).
 - f. Fault or alarming status (code).
 - g. PID feedback signal (percentage).
 - h. DC-link voltage (V dc).
 - i. Set-point frequency (Hz).
 - j. Motor output voltage (V ac).

- C. Control Signal Interfaces:
 1. Ethernet/IP connection to the existing Allen Bradley Ethernet network. No protocol converters allowed.
 - a. Ethernet outputs shall allow all data to be transmitted to PLC, including but not limited to:
 - 1) Motor running.
 - 2) Fault.
 - 3) Speed input.
 - 4) Speed output.
 - 5) Motor current (amperes).
 - 6) Motor Speed (rpm).
 - 7) Voltage.
 - 8) Frequency.
 - 9) VFD shall be capable of receiving motor control, (start/stop) and motor speed setting input commands from the PLC via Ethernet.
 2. Input Signal Interfaces:
 - a. A minimum of two programmable analog inputs: 4- to 20-mA dc.
 - b. A minimum of six multifunction programmable digital inputs.
 3. Output Signal Interface: A minimum of two programmable analog output signal(s) 4- to 20-mA dc, which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. DC-link voltage (V dc).
 - d. Motor torque (percent).
 - e. Motor speed (rpm).
 - f. Set point frequency (Hz).
 4. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).
 - d. PID high- or low-speed limits reached.

2.04 LINE CONDITIONING AND FILTERING

- A. Each VFD shall be provided with input line conditioning, 3 percent line reactors minimum.
- B. EMI/RFI Filtering: CE marked; certify compliance with IEC 61800-3 for Category C2.
- C. Harmonic Distortion:
 1. Drives shall be designed to limit the harmonic currents which are generated on the AC service and which would produce electromagnetic interference (EMI) or radio frequency interference (RFI). Individual current harmonic distortion and the total demand distortion expressed as percent of maximum demand load current shall not exceed the values specified in IEEE 519 – Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, Table 10.3.
 2. Total Harmonic Distortion (THD) shall not exceed 5 percent, and individual voltage harmonic distortion shall not exceed 3 percent per IEEE 519.
 3. If the drives generate objectionable interference, EMI or RFI drive manufacturer shall provide the specifications for the equipment required to reduce it to acceptable levels. The VFD supplier shall have in possession filters to alleviate interference if encountered.
 4. The Owner will provide the equipment specified to correct the problem through a direct purchase or a Change Order to the Contract.
- D. Output Filtering: Provide output filtering on VFDs that operate motor with conductors longer than 100 feet (as indicated on the one line diagram or schematic diagram):
 1. Filters shall be installed on the inside of the VFD enclosure at the inverter output.
 2. Output filters shall consist of a minimum 1.5 percent impedance reactor, in conjunction with a resistor and capacitor network, to form a damped low-pass filter.
 3. TCI or equal.

2.05 ENCLOSURES

- A. VFD Enclosures: NEMA 250, Type 12.

2.06 ACCESSORIES

- A. Cooling Fan and Exhaust System: UL 508 component recognized: Supply fan, with composite or stainless-steel intake and exhaust grills and filters; 120 V ac; obtained from integral CPT.

2.07 SOURCE QUALITY CONTROL

- A. VFD Testing: Test and inspect VFDs according to requirements in NEMA ICS 61800-2.
 - 1. Test each VFD while connected to a motor that is comparable to that for which the VFC is rated.
 - 2. Verification of Performance: Rate VFDs according to operation of functions and features specified.
- B. VFDs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFDs, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine VFD before installation. Reject VFDs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFD installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches (2000 mm) above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."

3.03 CONTROL WIRING INSTALLATION

- A. Install wiring between VFDs and remote devices and facility's central-control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
 - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.04 IDENTIFICATION

- A. Identify VFDs, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFD with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.05 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each VFD element, bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Inspect VFD, wiring, components, connections, and equipment installation.
 - 2. Test insulation resistance for each VFD element, component, connecting motor supply, feeder, and control circuits.
 - 3. Test continuity of each circuit.
 - 4. Verify that voltages at VFD locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Engineer before starting the motor(s).
 - 5. Test each motor for proper phase rotation.
 - 6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. VFDs will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies the VFD and describes test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.06 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
- B. After startup, VFDs shall be thoroughly cleaned.
 - 1. Cleaning shall include wiping down of the enclosure and removal of all debris and dirt from the interior of the enclosure.
 - 2. Cleaning procedure shall include vacuuming the drive interior and wipe down of all exterior surfaces, utilization of compressed air for cleaning is not acceptable.

3.07 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

3.08 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers.

END OF SECTION

SECTION 26 32 13

ENGINE GENERATORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes packaged engine-generator sets for standby power supply with the following features:
 - 1. Natural gas.
 - 2. Unit-mounted cooling system.
 - 3. Unit-mounted control and monitoring.
 - 4. Fuel system.
 - 5. Sound Attenuated outdoor enclosure.
- B. Related Requirements:
 - 1. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.03 DEFINITIONS

- A. FVNR: Full Voltage, Non-Reversing Starter.
- B. SSRV: Solid-State Reduced Voltage Starter.
- C. VFD: Variable Frequency Drive.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 2. Include thermal damage curve for generator.
 - 3. Include time-current characteristic curves for generator protective device.
 - 4. Include fuel consumption data at 0.5, 0.75 and 1.0 times generator capacity.
 - 5. Include generator efficiency at 0.8 power factor at 0.5, 0.75 and 1.0 times generator capacity.
 - 6. Include air flow requirements for cooling and combustion air in cfm at 0.8 power factor, with air supply temperature of 95, 80, 70, and 50 degrees F. Provide drawings showing requirements and limitations for location of air intake and exhausts.
 - 7. Include generator characteristics, including, but not limited to kw rating, efficiency, reactances, and short-circuit current capability.
- B. Shop Drawings:
 - 1. Include plans and elevations for engine-generator set and other components specified.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Identify fluid drain ports and clearance requirements for proper fluid drain.
 - 4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
 6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.
 7. Provide available enclosure colors.
- C. Provide a sizing report included with the shop drawing submittal for review that the proposed generator set will meet the starting and running requirements for this project. The summary table represents the loads and steps to be used in the sizing report.

1.05 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports, including, but not limited to the following:
1. Certified summary of prototype-unit test report.
 2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
 3. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
 4. Report of sound generation.
 5. Report of exhaust emissions showing compliance with applicable regulations.
 6. Certified Torsional Vibration Compatibility: Comply with NFPA 110.
- B. Warranty

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 260000, "Operation and Maintenance Data," include the following:
 - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
 - b. Operating instructions laminated and mounted adjacent to generator location.
 - c. Training plan.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses: One for every 10 of each type and rating but no fewer than one of each.
 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 4. Tools: Each tool listed by part number in operations and maintenance manual.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.09 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 2 years from date of Substantial Completion.

1.10 OPERATING PARAMETERS

- A. Provide a sizing report included with the shop drawing submittal for review that the proposed generator set will meet the starting and running requirements for this project. The summary table represents the loads and steps to be used in the sizing report.
- B. Load range: 30-100 percent of rated capacity.
- C. Maximum Allowable Voltage dip: 35 percent.
- D. Maximum Allowable Frequency dip: 10 percent.
- E. Altitude: Less than 1200 feet.
- F. Ambient Temperature: 15 to plus 40 degrees C.
- G. Emissions: EPA, Stationary, standby application.
- H. Fuel: Natural Gas.
- I. Duty: Standby.
- J. Voltage/Frequency: 120/240V, 3 phase, 4 wire, 60 Hz.
- K. Power Factor: 8, lagging.
- L. Minimum size: 36 kW/43.75kVA. Provide larger generator if required due to starting characteristics of the motors.
- M. Load step and summary list:

Stage	Equipment	Voltage	Load (kVA)	Load (HP)	Starter/VFD
1	Pump 1	240V		10	FVNR
1	Controls	120V	1		NA
2	Pump 2	240V		10	FVNR

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Caterpillar
 - 2. Cummins
 - 3. Approved Equal.
- B. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. ASME Compliance: Comply with ASME B15.1.
- B. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.

- 3. Comply with NFPA 110 requirements for standby power supply system.
- C. UL Compliance: Comply with UL 2200.
- D. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

2.03 ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- C. Induction Method: Naturally aspirated.
- D. Governor: Adjustable isochronous, with speed sensing.
- E. Emissions: Current EPA requirements for emergency stationary applications.
- F. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.
- G. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 - 2. Voltage characteristics as listed above.
 - 3. Unit shall be capable to operate loads as indicted on drawings with minimal capacity as shown. Upsize unit to meet load capabilities and specification requirements.
 - 4. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of components.
- H. Generator-Set Performance for Sensitive Loads:
 - 1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - a. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
 - 2. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
 - 3. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
 - 4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
 - 5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - 6. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
 - 7. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.

8. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
9. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
 - a. Provide permanent magnet excitation for power source to voltage regulator.
10. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.04 ENGINE

- A. Fuel: See Operating Parameters.
- B. Rated Engine Speed: 1800 rpm.
- C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm (11.4 m/s).
- D. Lubrication System: The following items are mounted on engine or skid:
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
 4. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity. 208-volt three-phase, or single-phase and with cord and plug connection to dedicated receptacle.
 - a. Provide 1/4 turn isolation ball valves located on the inlet and outlet to isolate heater for replacement of element without draining the cooling system.
 - b. Hose clamps to include screw and tension spring.
 - c. Thermostatically controlled.
- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 degrees F (82 degrees C), and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 1. Minimum sound attenuation of 25 dB at 500 Hz.
 2. Sound level measured at a distance of 25 feet (8 m) from exhaust discharge after installation is complete shall be 78 dBA or less.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

- H. Starting System: 12 or 24-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: As required by NFPA 110 for system level specified.
 4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
 5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 degrees C regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
 7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
 8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35 A minimum continuous rating.
 9. Battery Charger: Current-limiting, automatic-equalizing and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 degrees F (minus 40 degrees C) to 140 degrees F (plus 60 degrees C) to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.
 - g. Provide dedicated 20A receptacle and plug for 120V, 1-phase connection.

2.05 GASEOUS FUEL SYSTEM

- A. Gas Piping: Comply with current codes and per detail.
- B. Gas Train: Comply with NFPA 37.
- C. Engine Fuel System:
1. Vapor-Withdrawal System:
 - a. Carburetor.
 - b. Secondary Gas Regulators: One for each fuel type.
 - c. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
 - d. Fuel Filters: One for each fuel type.
 - e. Manual Fuel Shutoff Valves: One for each fuel type.
 - f. Flexible Fuel Connectors: Minimum one for each fuel connection.

- D. Coordination
 - 1. Gas Service Connections: Coordinate with utility companies and components they furnish as follows:
 - a. Comply with requirements of gas supplier for providing gas services.
 - b. Coordinate installation and connection of utilities and services, including provision for gas-metering components.
 - c. Local utility shall provide underground service from main to metering equipment at Owners control panel. Contractor shall coordinate with local utility to sequence work.
 - d. Coordinate with gas utility and orient generator so that gas connection to generator is on same side as the utility gas supply.

2.06 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.
- B. Provide minimum run time control set for 15 minutes with override only by operation of a remote emergency-stop switch.
- C. Comply with UL 508A.
- D. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine-generator set battery.
- E. Indicating Devices : As required by NFPA 110, including the following:
 - 1. AC voltmeter.
 - 2. AC ammeter.
 - 3. AC frequency meter.
 - 4. EPS supplying load indicator.
 - 5. Ammeter and voltmeter phase-selector switches.
 - 6. DC voltmeter (alternator battery charging).
 - 7. Engine-coolant temperature gage.
 - 8. Engine lubricating-oil pressure gage.
 - 9. Running-time meter.
 - 10. Current and Potential Transformers: Instrument accuracy class.
- F. Protective Devices and Controls in Local Control Panel: Shutdown devices and common visual alarm indication as required by NFPA 110 system, including the following:
 - 1. Start-stop switch.
 - 2. Overcrank shutdown device.
 - 3. Overspeed shutdown device.
 - 4. Coolant high-temperature shutdown device.
 - 5. Coolant low-level shutdown device.
 - 6. Low lube oil pressure shutdown device.
 - 7. Air shutdown damper shutdown device when used.
 - 8. Overcrank alarm.
 - 9. Overspeed alarm.
 - 10. Coolant high-temperature alarm.
 - 11. Coolant low-temperature alarm.
 - 12. Coolant low-level alarm.
 - 13. Low lube oil pressure alarm.
 - 14. Air shutdown damper alarm when used.
 - 15. Lamp test.

- 16. Contacts for local and remote common alarm.
 - 17. Run-Off-Auto switch.
 - 18. Control switch not in automatic position alarm.
 - 19. Low cranking voltage alarm.
 - 20. Battery-charger malfunction alarm.
 - 21. Battery low-voltage alarm.
 - 22. Battery high-voltage alarm.
 - 23. Generator overcurrent protective device not closed alarm.
- G. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
 - H. Connection to Datalink: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication.
 - I. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
 - J. Remote Emergency-Stop Switch: Mount on enclosure exterior unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.07 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.
 - 1. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.
- B. Generator Circuit Breaker: Molded-case, electronic-trip type; complying with UL 489.
 - 1. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous, long-time trip setting shall be capable of setting down to a minimum of 50 percent breaker rating.
 - 2. Trip Settings: Selected to coordinate with generator thermal damage curve.
 - 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.

2.08 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide six lead alternator.
- E. Range: Provide broad range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Dripproof.
- H. Instrument Transformers: Mounted within generator enclosure.

- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within 15 percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within 5 percent and stabilize at rated frequency within 2 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- L. Subtransient Reactance: 12 percent, maximum.

2.09 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, sound-attenuating, weatherproof steel housing, wind resistant up to 100 mph (160 km/h). Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be hinged. Instruments and control shall be mounted within enclosure.
 - 1. Sound Attenuation: 76dB at 25 feet.
- B. Description: Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed enclosure erected on concrete foundation.
- C. Hinged Doors: With padlocking provisions.
- D. Lighting: Interior light with switch and LED weather-resistant lighting.
- E. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- F. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
 - 1. Automatic Dampers: At engine cooling-air inlet and discharge. Damper shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
 - 2. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.
- G. One Convenience Outlet: Factory wired, GFCI. Power from factory provided power distribution center.
- H. Provide generator prime mover shutdown kit on exterior of enclosure to meet requirements of NEC Article 445.

2.10 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material: Natural rubber separated by steel shims.
 - 2. Shore "A" Scale Durometer Rating: 60.
 - 3. Number of Layers: as required by manufacture.
 - 4. Minimum Deflection: 1 inch (25 mm).

- B. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Minimum Deflection: 1 inch (25 mm).
- C. Comply with requirements in Section "Hydronic Piping Specialties" for vibration isolation and flexible connectors materials for steel piping.
- D. Comply with requirements in Section "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.
- E. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.11 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish, white or forest green, over corrosion-resistant pretreatment and compatible primer.

2.12 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Equipment Mounting:
 1. See drawings for concrete pad. Coordinate conduit routing with floor and pad installation.
 2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- C. Install packaged engine-generator to provide access, without removing connections or accessories, for periodic maintenance.

- D. Install packaged engine-generator with elastomeric isolator pads having a minimum deflection of 1 inch (25 mm) on room floor. Secure sets to anchor bolts installed in concrete bases. Concrete base/floor is detailed on structural drawings.
- E. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints.
- F. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.03 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine-generator to allow service and maintenance.
- C. Connect engine exhaust pipe to engine with flexible connector.
- D. Connect fuel piping to engines with a gate valve and union and flexible connector.
 - 1. Natural-gas piping, valves, and specialties for gas distribution per details on drawings and applicable codes.
 - 2. Install manual shutoff valve in a remote location to isolate natural-gas supply to the generator enclosure or room.
- E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.04 IDENTIFICATION

- A. Equipment" and Section 260553 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.05 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in the first two subparagraphs as specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection
 - 1) Compare equipment nameplate data with drawings and specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify the unit is clean.
 - b. Electrical and Mechanical Tests
 - 1) Perform insulation-resistance tests in accordance with IEEE 43.
 - a) Machines larger than 200 horsepower (150 kilowatts). Test duration shall be 10 minutes. Calculate polarization index.
 - b) Machines 200 horsepower (150 kilowatts) or less. Test duration shall be one minute. Calculate the dielectric-absorption ratio.
 - 2) Test protective relay devices.
 - 3) Verify phase rotation, phasing, and synchronized operation as required by the application.

- 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 5) Conduct performance test in accordance with NFPA 110.
 - 6) Verify correct functioning of the governor and regulator.
2. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 3. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 4. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 5. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg (120 kPa). Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 6. Exhaust Emissions Test: Comply with applicable government test criteria.
 7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 percent and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 9. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.
- C. Coordinate tests with tests for transfer switches and run them concurrently.
 - D. Test instruments shall have been calibrated within the last 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
 - E. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
 - F. Provide a 4-hour run test utilizing load bank. Monitor current, voltage, temperature, record reading every 15 minutes. Test shall be operated a 1/2 load for 1 hour, 3/4 load for 1 hour, and full load for 1 hours.
 - G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
 - H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - I. Remove and replace malfunctioning units and retest as specified above.
 - J. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
 - K. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.06 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

3.07 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Training session shall be a minimum of 4-hours on-site to review all components of the generator set.

END OF SECTION

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SECTION 26 36 00

TRANSFER SWITCHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches, delayed transition, 3 or 4-pole, as shown on drawings.
 - 2. Front access only, NEMA 4X enclosure.
- B. Related Requirements:
 - 1. Section 26 23 13 "Engine Generators".

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
 - 1. Single-Line Diagram: Show connections between transfer switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
 - 2. Control wiring connections between generator, transfer switch and plant control system.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - 1. Features and operating sequences, both automatic and manual.
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.
- B. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- D. Comply with NEMA ICS 1.
- E. Comply with NFPA 70.
- F. Comply with NFPA 99.
- G. Comply with NFPA 110.
- H. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.07 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

1.08 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 24 months from date of Substantial Completion.

1.09 COORDINATION

- A. Coordinate size and location of concrete bases.
- B. Cast anchor-bolt inserts into bases

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

- A. Manufacturer subject to one of the following:
 - 1. ABB
 - 2. Eaton
 - 3. Cummins
 - 4. Schneider Electric/ASCO Power Technologies
 - 5. Approved Equal

2.02 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Ratings: As shown on the Drawings.
- B. Front access only. Back access is not acceptable.
- C. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- D. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
- E. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

- F. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- G. Electrical Operation: Accomplish by a non-fused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- H. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.
 - 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- I. Service-Rated Transfer Switch:
 - 1. Comply with UL 869A and UL 489.
 - 2. Provide terminals for bonding the grounding electrode conductor to the grounded service conductor.
 - 3. In systems with a neutral, the bonding connection shall be on the neutral bus.
 - 4. Provide removable link for temporary separation of the service and load grounded conductors.
 - 5. Surge Protective Device: Service rated.
 - 6. Ground-fault protection: Comply with UL1008 for normal bus.
 - 7. Service Disconnecting Means: Externally operated, manual mechanically actuated.
- J. Neutral Terminal: Solid and rated the same as the neutral bus.
- K. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- L. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Section 260553 "Identification for Electrical Systems."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- M. Enclosures: General-purpose NEMA 250, Type 4X outdoor, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.03 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 1 equipment according to NFPA 110.
- B. Integral main service circuit breaker disconnect rated for use as Service Equipment which is operable with the transfer switch door closed, and lockable in the open position.
- C. Main breaker shall be Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Power circuit breaker with 100% rating (in lieu of 80% rated thermal magnetic circuit breaker)
 - 2. Electronic trip circuit breakers with RMS sensing; field-replaceable rating plug or field replicable electronic trip; and the following field adjustable settings:
 - a. Instantaneous trip
 - b. Long and short-time pickup levels
 - c. Long and short time adjustments.
 - d. Ground-fault pickup level, time delay and I2t response for breakers over 800A.

3. The trip unit shall utilize ARMs Technology (Arc Flash Reduction Maintenance System). The ARMs Technology shall be provided in a system that shall reduce the trip unit Instantaneous pickup value when activated. The ARMs device shall not compromise breaker phase protection even when enabled. Once the ARMs unit is disabled, the recalibration of trip unit phase protection shall not be required. Activation and deactivation of the ARMs Technology trip setting shall be accomplished without opening the circuit breaker door and exposing operators to energized parts. The ARMs Technology shall provide a clearing time of 0.04 seconds.
 - a. The ARMs Technology shall be enabled via a switch on the trip unit. It shall also provide confirmation of protection via a Blue LED.
 - b. The ARMs Technology shall be provided with a switchgear panel mounted enable padlockable selector switch and indication via Blue LED pilot light.

- D. Automatic Delayed-Transition Transfer Switches: Pauses or stops in intermediate position to momentarily disconnect both sources, with transition controlled by programming in the automatic transfer-switch controller. Interlocked to prevent the load from being closed on both sources at the same time.
 1. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals for alternative source. Adjustable from zero to six seconds, and factory set for one second.
 2. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.
 3. Fully automatic break-before-make operation with center off position.
 4. Fully automatic break-before-make operation with transfer when two sources have near zero phase difference.

- E. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

- F. Automatic Transfer-Switch Features:
 1. Controller operates through a period of loss of control power.
 2. Controller to have LCD or touch-screen interface.
 3. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 4. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
 5. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 6. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
 7. Test Switch: Simulate normal-source failure.
 8. Switch-Position Pilot Lights: Indicate source to which load is connected.
 9. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
 10. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 11. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
 12. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

13. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
14. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is not available.

2.04 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pad-Mounting Switch: Provide NEMA 4X stainless steel enclosure with 18" mounting assembly with vented skirting as shown on Drawings.
- B. Identify components according to Section 260553 "Identification for Electrical Systems."
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.02 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.03 IDENTIFICATION

- A. Provide arc flash and available arc fault current labeling on the equipment per NEC 110.16 and 110.24.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Remove and replace malfunctioning units and retest as specified above.
- F. Prepare test and inspection reports.

3.05 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment. A minimum of 4-hours of on-site training shall be provided.
- B. Coordinate this training with that for generator equipment.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING (MnDOT 2101)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes removal and disposal of trees, shrubs, brush, stumps, roots, windfalls, unsound branches, and other plant life.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 32 92 12 - Establishing Turf and Controlling Erosion
- C. Method of Measurement:
 - 1. Qualifying Trees and Stumps
 - a. Only trees greater than 3 inches in diameter measured at a point 2 feet above the ground surface will be measured for payment.
 - b. Only stumps greater than 3 inches in diameter measured at a point 2 feet above the ground surface cleared under the Contract or measured at the point cutoff for an existing stump not cleared under the Contract will be measured for payment.
 - 2. Area Basis:
 - a. Determine quantity by measuring staked areas to nearest 0.05 of an acre.
 - b. All measurements will be made horizontally to a point 10 ft. outside the trunks of qualifying trees or stumps on the perimeter of the area being measured. The Engineer will measure separate areas less than 0.05 acre as 0.05 acre.
 - 3. Individual Unit Basis:
 - a. Determine quantity by field count of qualifying trees cleared or stumps grubbed.
- D. Basis of Payment:
 - 1. Pruning of branches on plantings being preserved shall be considered incidental.
 - 2. Payment for acceptable quantities of clearing and grubbing shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 3. Turf restoration for grubbing area that are in future phases shall be paid at the Contract Unit Price as listed on the Bid Form for Turf Establishment - Temporary.

1.02 REFERENCES

- A. MnDOT 2101 - Clearing and Grubbing

1.03 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.04 SUBMITTALS

- A. Photographs or video which show the condition of the Site, or specified parts thereof, prior to the clearing and grubbing operation.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROTECTION

- A. Do not commence operations until erosion and sedimentation control measures are in place.
- B. Confine operations to areas staked or trees marked for removal.
- C. Protect all trees and plant materials which are not designated for removal.
 - 1. Do not store materials within Tree Protection Zone.
 - 2. Keep Tree Protection Zone free of debris and construction waste.
 - 3. Do not excavate in the Tree Protection Zone unless indicated on Drawings.
- D. Conduct all operations in a manner that will not damage or injure surrounding plant life and property.
- E. Salvage topsoil where feasible in accordance with Section 31 23 10.

3.02 CLEARING OPERATIONS

- A. Cut and remove all designated trees, shrubs, bushes, windfalls, and other vegetation.
- B. Prune and remove any low hanging or unsound branches.
- C. No clearing work will begin until the Engineer and Contractor have reviewed trees scheduled for clearing and the Engineer has provided written authorization to the Contractor to start the work.

3.03 GRUBBING OPERATIONS

- A. Remove and dispose of designated stumps, roots and other remains.
- B. Remove stumps completely.
- C. Backfill depressions with native soils and compact.
- D. If grubbing future areas of the Project that will not be reconstructed within the next 12 weeks following grubbing operations, level the soil and hydroseed with temporary turf mix.

3.04 PRUNING

- A. All Pruning operations shall be performed in accordance with Section 2572 (Protection and Restoration of Vegetation) of the 2020 MnDOT Standard Specification for Construction.
- B. No Pruning work will begin until the Engineer and Contractor have reviewed trees scheduled for pruning and the Engineer has provided written authorization to the Contractor to start the work.

3.05 DISPOSAL OPERATIONS

- A. Submit written request to Engineer for disposal within right-of-way embankments.
- B. Submit written request to Engineer for burning operations.
- C. Disposal operations and limitations shall be in accordance with MnDOT 2101.

3.06 RESTORATION

- A. Repair or replace trees damaged by construction activities but not selected for removal as directed by Engineer.

END OF SECTION

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SECTION 31 23 10

EXCAVATION AND EMBANKMENT (MnDOT 2106)

PART 1 GENERAL

1.01 SUMMARY

- A. Construction of roadway excavations and embankments within designated construction limits.
- B. Related Sections:
 - 1. Section 31 25 10 - Stormwater Management
 - 2. Section 31 23 33 - Trench Excavation and Backfill
- C. Method of Measurement:
 - 1. Excavation - Common:
 - a. Common Excavation will include all planned excavation down to the top of subgrade (bottom of select granular borrow or aggregate section, whichever is lower), noted as the "Grading Grade".
 - b. Measure by volume in cubic yards of material in its original position within specified construction limits.
 - c. Basis of measure will be Excavated Volume (EV).
 - d. Compute volumes in cubic yards by average end area method determined from original and final cross sections (cross section method) or digital surface model method.
 - e. Volume does NOT include pavement removal volume, which is computed and paid for separately as pavement removal.
 - 2. Excavation - Subgrade:
 - a. Subgrade Excavation shall be considered as any excavation of subgrade material below the proposed typical section, noted as the "Grading Grade".
 - b. Locations are generally unplanned and likely to be random throughout the Project areas and are to remove substandard soils at locations approved by Engineer.
 - c. Measure by volume of material in its original position (EV).
 - d. Compute volumes in cubic yards by average end area method determined from original and final cross sections.
 - 3. Select Granular Embankment (MnDOT 3149.2B):
 - a. Measure by volume in cubic yards of compacted material in its final position in accordance with placement dimensions required by the Contract.
 - b. Basis of measure will be Compacted Volume (CV).
 - c. The plan quantity shown on the Bid Form (P) shall be considered the quantity for payment unless the scope of the work changes, in which case the changed areas will be computed for payment.
 - d. Compute volumes in cubic yards by average end area method determined from original and final cross sections.
 - e. Measure only materials that are accepted for use.
 - 4. Dewatering: Incidental to associated excavation and embankment Work.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of excavation and embankment shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 1901 - Measurement of Quantities
 - 2. 2104 - Removing Pavement and Miscellaneous Structures
 - 3. 2106 - Excavation and Embankment – Compacted Volume Method

4. 2574 - Soil Preparation

PART 2 PRODUCTS

- A. Materials
 - 1. Select Granular Material (MnDOT 3149)

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove ice and snow prior to grading operations.
- B. Grading shall conform to planned grades, cross-sections, and stakes.
- C. Confine operations to established limits.
- D. Maintain Site in a well-drained condition at all times.
 - 1. Provide drainage facilities concurrent with embankment operations.
 - 2. Provide temporary drainage facilities to maintain existing drainage courses until permanent facilities are operative.
- E. Remove topsoil, organic and unstable material from roadbed prior to placing embankment.
- F. Compact bottom of excavation in preparation for placement of embankment in accordance with MnDOT 2106.3D, Maximum Density.
- G. Perform required Contractor Quality Control (QC) Testing and Aggregate Certification according to the MnDOT Schedule of Materials Control prior to placing materials.

3.02 EXCAVATING OPERATIONS

- A. Conform to lines, grades and slopes staked by Engineer.
- B. Provide seepage trenches for granular backfill replacement of unstable areas.
- C. Use suitable excavated materials for embankment construction.
- D. Excavated materials will be classified in accordance with MnDOT 2106.2, approved by Engineer.
- E. Construct embankment layers from uniform materials.
- F. Place granular materials in upper most portion of embankment.
- G. Mechanically mix non-uniform soils to produce uniform moisture content and density.
- H. Excavate suitable topsoil material separately and stockpile.
- I. Do not place snow, ice, or frozen lumps exceeding 6 inches in roadbed embankment.
- J. Do not place stone, concrete or bituminous fragments exceeding 3 inches in upper 6 inches of roadbed embankment or within 18 inches of structure.

3.03 PLACING EMBANKMENTS

- A. Do not place material on soil which is frozen to a depth greater than 4 inches.

- B. Backfill excavations below subgrade and seepage trenches in accordance with this Section.
- C. Deposit and spread material in uniform layers, parallel to profile grade extending the full width of embankment.
- D. Place upper 3 feet of roadbed in maximum 8-inch layers.
- E. Place remainder of roadbed in maximum 12-inch layers.

3.04 COMPACTING EMBANKMENTS

- A. Compact upper 3 feet of embankment to not less than 100 percent of Standard Proctor Density.
- B. Compact remainder of embankment to not less than 95 percent of Standard Proctor Density for non-granular materials and 100 percent for materials meeting the requirements of MnDOT 3149.2B Granular and Select Granular Materials.
- C. Maintain proper moisture content during placement and compaction.
- D. Compact each layer of material with approved compaction equipment until no further evidence of consolidation.

3.05 FINISHING OPERATIONS

- A. Finish earthwork to within 0.1 foot of staked grade.
- B. Conduct finishing and topsoiling concurrent with grading operations to provide for erosion control.

3.06 DISPOSING OF EXCAVATED MATERIAL

- A. Surplus excavated materials shall become property of Contractor for disposal.
- B. Submit a Disposal Plan to Engineer prior to starting disposal operations.
- C. Deposit peat, muskeg, and other unstable materials in Site approved by Engineer.
- D. Dispose of combustible debris materials and noncombustible materials other than soils in accordance with MnDOT 2104.3D.

END OF SECTION

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SECTION 31 23 16

STRUCTURE EXCAVATIONS AND BACKFILLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Structure excavation.
 - 2. Foundation preparation.
 - 3. Backfill placement.

- B. Related Sections:
 - 1. Section 01 45 00 - Quality Control for Street and Utility Construction
 - 2. Section 31 23 19 - Dewatering
 - 3. Section 31 25 10 - Stormwater Management
 - 4. Section 33 31 00 - Sanitary Sewer Systems

1.02 REFERENCES

- A. MnDOT:
 - 1. 2451 - Structure Excavations and Backfills
 - 2. 3149 - Granular Material

1.03 SEQUENCING AND SCHEDULING

- A. Do not commence construction of structure foundation until soil test results are confirmed.

1.04 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 - 1. Method of Measurement:
 - a. Structure excavation:
 - 1) Measure by volume in cubic yards regardless of material encountered.
 - 2) Payment will be made for proposed quantity unless dimensional changes are authorized.
 - b. Granular materials:
 - 1) Measure by loose volume in cubic yards based on vehicular measure.
 - 2) Measure only materials that are accepted for use.
 - 3) Measure each material type separately.
 - 2. Basis of Payment:
 - a. Payment for structure excavation will also include:
 - 1) Removing and disposing of surplus excavated materials as required.
 - 2) Sheet piling, shoring and all necessary safeguards.
 - 3) Installing and maintaining facilities to provide for proper drainage of excavation.
 - b. Payment for structure excavation and backfills shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Primary Pond Control Structure (Alternate 6)

PART 2 PRODUCTS

2.01 MATERIALS

- A. Granular Backfill: MnDOT 3149D.
- B. Aggregate Backfill: MnDOT 3149E.
- C. Granular Bedding: MnDOT 3149F.
- D. Aggregate Bedding: MnDOT 3149G.
- E. Coarse Filter Aggregate: MnDOT 3149H.
- F. Filter Aggregates: MnDOT 3149J.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that foundation soils are in suitable condition to begin construction.
- B. Advise Engineer of soil types or conditions not in accordance with soil borings.

3.02 PREPARATION

- A. Temporary Construction:
 - 1. Provide sheeting, shoring, or other temporary facilities as required to prosecute Work.
 - 2. Provide warning signs, fencing or other temporary facilities as required to prevent unnecessary hazards to public.
 - 3. Provide pumping or other temporary means as required to establish and maintain dry conditions in excavation.

3.03 CONSTRUCTION REQUIREMENTS

- A. Excavation:
 - 1. Excavate, shape, and prepare foundation soils to elevations and dimensions designated on Drawings.
 - 2. Perform additional excavation as required to permit erection of forms and other temporary construction and to provide for proper compaction of backfill materials.
 - 3. Reuse all excavated materials.
- B. Foundation Preparation:
 - 1. Compact foundation soils to 100 percent of standard Proctor density.
 - 2. Replace unsuitable foundation soils with acceptable materials.
 - 3. Place and compact replacement materials in minimum 6-inch layers.
 - 4. Place crushed rock base under structure to thickness and material shown in drawings.
- C. Backfilling:
 - 1. Uniformly distribute backfill materials in maximum 12-inch layers.
 - 2. Compact to 100 percent of standard Proctor density under structure and along upper 3 feet of proposed grade prior to placement of successive layers.
 - 3. Compact to 95 percent of standard Proctor density around structure and below 3 feet from the proposed ground surface prior to placement of successive layers.
 - 4. Maintain proper moisture content during placement and compaction.
 - 5. Do not place backfill material on frozen foundations.
 - 6. Do not place material that will freeze during backfill or compaction.

7. Reuse all excavated materials when placing backfill.

3.04 FIELD QUALITY CONTROL

- A. Soil Tests:
 1. Refer to Section 01 45 10 for details on field quality control requirements.
 2. Soil bearing test on foundation soils will be taken at Owner's discretion.
 3. Soil density tests on backfill material will be taken at Owner's discretion.
 4. All failed soil density tests shall be recompacted until passing test is met.

3.05 FINISHING OPERATIONS

- A. Finish earthwork to within 0.1 foot of staked grade.
- B. Conduct finishing and topsoiling concurrent with grading operations to provide for erosion control.

3.06 PROTECTION

- A. Protect prepared foundation soils from freezing.
- B. Protect and maintain prepared foundation soils during dewatering operations.

END OF SECTION

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SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. System description.
 - 2. Installation and maintenance.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 31 25 10 - Stormwater Management
- C. Measurement and Payment:
 - 1. Where not noted in Drawings as part of lump sum bid item:
 - a. Dewatering shall be considered incidental to the excavation.
 - 2. Where noted in Drawings as part of the following lump sum bid items:
 - a. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1) Cleveland Lift Station
 - 2) Metering Manhole (Alternate 5)
 - 3) Primary Pond Control Structure (Alternate 6)

1.02 SYSTEM DESCRIPTION

- A. Design Requirements: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
- B. Performance Requirements:
 - 1. Continuously monitor and maintain dewatering operations to ensure:
 - a. Erosion does not occur.
 - b. Stability of excavations and constructed slopes.
 - c. The excavation does not flood.
 - d. That damage to subgrades and permanent structures is prevented.
 - e. That the excavation does not uplift, heave, or develop seepage boils.

1.03 SUBMITTALS

- A. Dewatering Plan:
 - 1. Describe dewatering system and associated system features.
 - 2. Show arrangement, locations, and details of the dewatering system; locations of risers, headers, filters, pumps, power units, discharge lines or other system components; and means of discharge, control of sediment, and disposal of water.
 - 3. Provide a schedule that shows the proposed timing and sequencing of operations.

1.04 REGULATORY REQUIREMENTS

- A. Comply with local and State installation requirements and sediment control regulations.

1.05 SITE CONDITIONS

- A. Conduct additional subsurface investigations as required to determine the specific dewatering needs for the proposed construction at this site.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. New or used materials, adequate in capacity for required usage, must not create unsafe conditions and must not violate requirements of applicable codes and standards.

PART 3 EXECUTION

3.01 PROTECTION

- A. Protect trees, shrubs, lawns, and construction area from damage due to installation and operation of dewatering devices.
- B. Prevent sediment and turbid or silty water from entering surface waters.
- C. Control sediment by one or more of the following methods and as required by permitting agencies and local, State, and Federal regulations:
 - 1. Construction of a detention basin.
 - 2. Use of a portable detention basin or upland sumps.
 - 3. Pump turbid water away from surface waters.
- D. Do not allow water discharge to run over roads, parking areas, or work areas where water or ice could cause a hazardous condition.
- E. Do not allow water to pond in the construction area.
- F. Protect existing or completed work from water or sedimentation damage.
- G. Protect workers and public from temporary structures or basins.
- H. Do not allow water to run over work in progress.

3.02 INSTALLATION

- A. Install dewatering devices adequate to keep the work dry and free of ground water to an elevation at least 3 feet below elevation work is being done.
- B. Do not install French drains, sumps, ditches, or trenches within 5 feet of a structure foundation or slab.
- C. Install, operate, and ensure dewatering system is functional prior to excavating below the groundwater level.
- D. Do not use crushed rock or granular soils beneath structure foundations unless shown on the Drawings.
- E. Install dikes, riprap, culverts, and piping as necessary to prevent erosion of site or siltation of surface waters.
- F. Maintain dewatering operations until excavations are backfilled.

- G. Remove unneeded equipment and pipe upon completion. Abandon wells as required by controlling agency.

END OF SECTION

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SECTION 31 23 33

TRENCH EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Trench excavation.
 - 2. Special pipe foundation.
 - 3. Trench backfill.
 - 4. Compaction.
 - 5. Pipe grade and alignment conflicts.

- B. Related Sections:
 - 1. Section 31 23 19 - Dewatering
 - 2. Section 31 34 10 - Geosynthetic Installation
 - 3. Section 33 11 00 - Water Distribution Systems
 - 4. Section 33 31 00 - Sanitary Sewer Systems
 - 5. Section 33 34 00 - Sewage Force Mains
 - 6. Section 33 41 00 - Storm Sewer Systems

1.02 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 - 1. Method of Measurement:
 - a. Trench Excavation and Backfill: Incidental to associated pipe installation.
 - b. Improved Pipe Foundation: Measure by weight of material acceptably placed in tons.
 - c. Compaction: Incidental to associated pipe installation.
 - d. Dewatering: Incidental to associated pipe installation.
 - 2. Basis of Payment:
 - a. Payment for quantities measured in this Section shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station.
 - b. Metering Manhole (Alternate 5).
 - c. Primary Pond Control Structure (Alternate 6).

1.03 REFERENCES

- A. MnDOT:
 - 1. 3149 - Granular Material

1.04 SUBMITTALS

- A. Provide for each granular material:
 - 1. Name and location of source.
 - 2. Sample gradation.

1.05 SITE CONDITIONS

- A. Groundwater: Provide trench dewatering if groundwater surface is above or within 3 feet of pipe zone.

1.06 WARRANTY

- A. Repair all trench settlements and resulting damage or displacement of surface facilities that occur within the Contract correction period.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Crushed Rock Pipe Foundation: 1.5 inch rock, 100 percent crushed.
- B. Granular Pipe Foundation: 3149.2F.
- C. Fine Aggregate Bedding: 3149.2G1.
- D. Improved Pipe Foundation: Shall follow the requirements of MnDOT 3149.2.G.2.
- E. Replacement Backfill: Suitable excess excavated material from the Project.

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Trench Excavation:
 - 1. Alignment and Grade:
 - a. Excavate trench to alignment and grade as staked.
 - b. Excavate no more than 100 feet in advance of pipe laying operation.
 - 2. Trench Width at Pipe Zone:
 - a. Center trench on pipe alignment.
 - b. Minimum width: Pipe outside dimension plus 12 inches.
 - c. Maximum width: Pipe outside dimension plus 24 inches (except rock excavation).
 - 3. Excavated Materials:
 - a. Use stable material for backfill.
 - b. Waste unstable material as directed.
 - c. Do not place materials on sidewalk, driveways, or drainageways.
 - 4. Drainage:
 - a. Provide dewatering trenches when required.
 - b. Drain trench water into natural channels or storm sewer.
 - c. Do not drain trench water into sanitary sewer.
- B. Pipe Foundations:
 - 1. Engineer to determine condition of trench bottom.
 - 2. Stable Trench Bottom Condition:
 - a. Shape trench bottom to conform to bottom half of pipe.
 - b. Excavate bell holes to permit proper jointing.
 - 3. Unstable Trench Bottom Condition:
 - a. Excavate below pipe grade to specified depth.
 - b. Refill with specified foundation material in accordance with Drawings details and compact.
- C. Trench Backfill:
 - 1. Pipe Zone:
 - a. Use specified foundation material free of rocks and other unsuitable debris.
 - b. Deposit material uniformly on both sides of pipe throughout entire trench width.
 - c. Place material in 6 inch lifts and mechanically compact.
 - d. Reference detail sheets included in Drawings.

2. Above Pipe Zone:
 - a. Use native materials free of debris and rock, concrete or clay lumps with a volume greater than 1/3 cubic foot.
 - b. Place in uniform lifts no more than 1 foot thick.
 - c. Mechanically compact each lift of the upper 3 feet of trench to a standard Proctor density of 100 percent.
 - d. Mechanically compact each lift under the upper 3 feet of trench to a standard Proctor density of 95 percent.
 - e. Do not backfill unless approved compaction equipment is operating.
 - f. Fine grade street subgrade to staked elevation and cross section.
3. Replacement Backfill:
 - a. Engineer to determine suitability of native material for backfill.
 - b. Use replacement backfill in lieu of native materials as directed.
4. Excess or Deficiency of Backfill Material:
 - a. Dispose of excess backfill material as directed after all trenches are backfilled.
 - b. Provide replacement backfill as required to establish required surface elevation.
 - c. Surplus material shall become property of Contractor for Disposal.
5. Storm sewer bedding and backfill, reference detail sheets included in Drawings.

3.02 FIELD QUALITY CONTROL

- A. Density tests on backfill materials will be as directed by Engineer.
- B. Recompect all areas represented by failed density tests.

3.03 PIPE CLEARANCES AND CONFLICTS

- A. Provide clearance between sewers and water main as follows:
 1. Maintain 10 foot horizontal between pipes.
 2. Maintain 18 inch vertical separation between pipes.
- B. When 18-inch vertical separation between sewer and water main cannot be maintained, provide special pipe crossing as follows:
 1. Advise Engineer of pipe conflict.
 2. Lower water main in accordance with Drawing or as directed.
 3. Provide 18 inch vertical separation between pipes.
 4. Construct sewer using pipe material and joints equal to water main at crossing point.
 5. Center pipe lengths at crossing point.
 6. Provide special foundation material for both pipes.
 7. Place insulation as directed.

END OF SECTION

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SECTION 31 25 10

STORMWATER MANAGEMENT (MnDOT 2573)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Temporary measures to control soil erosion and sedimentation.
 2. Furnishing, installing and maintaining erosion or sediment control devices.
 3. Managing discharge from dewatering operations.
 4. Preparation and filing of erosion control plan (SWPPP).
- B. Related Sections:
1. Section 31 23 10 - Excavation and Embankment
 2. Section 31 23 19 - Dewatering
 3. Section 31 23 33 - Trench Excavation and Backfill
 4. Section 31 34 10 - Geosynthetic Installation
 5. Section 32 92 12 - Establishing Turf and Controlling Erosion
 6. Section 33 41 00 - Storm Sewer Systems
- C. Method of Measurement:
1. Bale Barriers: Measure by linear foot of bales furnished and acceptably installed.
 2. Silt Fence: Measured along base of fence acceptably provided from outside to outside of end posts.
 3. Sandbag Barriers:
 - a. Measure by surface area acceptably installed along length of barrier times the height.
 - b. For variable bag thickness, measure surface area of each bag thickness acceptably installed separately.
 4. Flotation Silt Curtain: Measure by linear foot of curtain acceptably provided.
 5. Sediment Traps: Include original material and sediment removed.
 6. Temporary Slope Drains: Measure by linear foot of pipe furnished and acceptably installed.
 7. Sediment Removal:
 - a. Number of hours and actual equipment working time.
 - b. Spreading, hauling, and disposal costs are incidental.
 8. Sediment Control Logs: Measure by linear foot of logs furnished and acceptably installed.
 9. Culvert End Controls: Measure by each by measuring the individual ends protected throughout the Contract regardless of type or number of devices used at each end.
 10. Storm Drain Inlet Protection: Measure by each by the number of individual inlets protected throughout the Contract regardless of the type or number of devices used at each inlet.
 11. Flocculants: Measure each flocculant sock provided.
 12. Filter Berm: Measure by linear foot of berm acceptably provided.
 13. Construction Exit Controls: Measure by the number of acceptably installed and maintained.
- D. Basis of Payment:
1. Payment for acceptable quantities of Stormwater Management items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 2. Street Sweeping (Wet Pickup):
 - a. Payment will be at the Contract Unit Price per hour.
 - b. Payment includes all labor, materials, equipment, disposal, and other incidentals necessary to sweep roads adjacent to construction site to provide safe conditions for the traveling public, environmental reasons, local regulatory requirements, or as directed by Engineer. Travel time spent getting to and from the Project Site is incidental.

3. Where noted in Drawings as part of the following lump sum bid items:
 - a. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1) Primary Pond Control Structure (Alternate 6)

1.02 REFERENCES

- A. MnDOT:
 1. 1717 - Air, Land, and Water Pollution
 2. 2573 - Storm Water Management
- B. MnDOT District Vegetation Establishment Recommendations
<http://www.dot.state.mn.us/environment/erosion/vegetation.html>
- C. Minnesota Stormwater Manual
https://stormwater.pca.state.mn.us/index.php?title=Temporary_construction_erosion_and_sediment_control
- D. Protecting Water Quality in Urban Areas - Best Management Practices for Minnesota, published by the Minnesota Pollution Control Agency

1.03 DEFINITIONS

- A. BMPs: Best Management Practices
- B. For the NPDES permit process, the operator is defined as the Contractor
- C. SWPPP: Storm Water Pollution Prevention Plan

1.04 SUBMITTALS

- A. Proof of coverage under permit MN R100001 - NPDES/SDS Construction Stormwater Permit.
- B. Name of individual responsible for meeting the requirements of this Specification, and ensuring compliance with the NPDES/SDS Permit (if applicable), and any watershed district permits (if applicable).
- C. Proposed schedule for accomplishment of Work within, adjacent to, or affecting surface water.
- D. Erosion and sediment control schedule.

1.05 REGULATORY REQUIREMENTS

- A. For operations that disturb 1 acre or more of land area, apply online for NPDES/SDS Construction Stormwater Permit (MN R100001) as soon as possible.
 1. Construction may begin upon coverage notification from MPCA.
 2. Attach coverage card to SWPPP.
 - a. SWPPP to be kept on Site.
 - b. SWPPP and other applicable documents must be made available to federal, state, and local officials within 72 hours upon request for the duration of the permit and for 3 years following Notice of Termination (NOT).
 - c. Submit NOT within 30 days of final stabilization or of meeting termination conditions of the permit.
 3. Conduct inspections required by NPDES/SDS Construction Stormwater Permit.
 4. Maintain inspection log as required by the NPDES/SDS Construction Stormwater Permit.
- B. Exposed Soil Areas Adjacent to Surface Water:
 1. Provide year-round temporary erosion protection for all exposed soil areas with a continuous positive slope within 200 lineal feet of a surface water.

2. The maximum time these areas can remain open when not actively being worked is as follows:
 - a. 7 days on slopes steeper than 3:1.
 - b. 3 days on slopes steeper than 3:1 that drain to construction related impaired waters or Special Waters.
 - c. 7 days on slopes flatter than 3:1 that drain to construction related impaired waters or Special Waters.
 - d. 14 days on slopes between 3:1 and 10:1.

1.06 QUALITY ASSURANCE

- A. Refer to "Protecting Water Quality in Urban Areas - Best Management Practices for Minnesota.
- B. Minnesota Stormwater Manual (as referenced above).
- C. Obtain all necessary permits from responsible regulatory agencies.
- D. Ensure minimum interference with roads, streets, walks, and adjacent occupied or used facilities. Do not close or obstruct without permission from authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Riprap MnDOT 2511.
- B. Filter Berm MnDOT 2573.3E and MnDOT 3874.
- C. Water Treatment MnDOT 3875
- D. Silt Fence MnDOT 3886.
- E. Flotation Silt Curtain MnDOT 3887.
- F. Temporary Slope Drain MnDOT 3892.
- G. Sandbags MnDOT 3893.
- H. Sediment Control Log MnDOT 3897.
- I. Flocculants MnDOT 3898.
- J. Rolled Erosion Control Products MnDOT 3885
 1. Erosion Control Blanket: Tables 3885.2-1 through 3885.2-3.
- K. Anchors: Table 3885-4 Temporary seed, fertilizer, mulch, and disc anchoring: See Section 32 92 12.
- L. Stabilized Construction Exit: MnDOT 2573 and 3882.

PART 3 EXECUTION

3.01 PREPARATION

- A. Establish sediment control BMPs on all downgradient perimeters of the site and downgradient area of the site that drain to any surface water, including curb and gutter systems.
- B. Preserve a 50 foot natural buffer. If a buffer is infeasible on site, provide redundant (double) perimeter sediment controls when a surface water is located within 50 feet of a project's disturbance limit.

- C. Place erosion control for wetland protection prior to Work on any phase of the Project.
- D. Install safeguards to prevent water pollution from haul roads, work platforms, or other temporary construction facilities.
- E. Minimize sediment from entering surface waters, curb and gutter systems, and storm sewer inlets.
- F. Complete grading, finishing, erosion control and turf establishment on a drainage area basis to prevent excessive soil erosion.
 - 1. Shape exposed soil areas to permit runoff with minimal erosion.
- G. Coordinate erosion control measures with earthwork and turf establishment operations.
- H. Stabilize all exposed soil areas, including stockpiles, when construction activity has ceased or is completed on any portion of the site to limit soil erosion in accordance with section 1.05.B.

3.02 PLACING TEMPORARY EROSION CONTROL ITEMS

- A. Construct items in conformance with MnDOT 2573.3 and the typical sections and elevation controls shown on Drawings.
- B. Bale Barriers:
 - 1. Provide in compliance with MnDOT 2573.3.C.
 - 2. Place lengthwise on contour, with ends of adjacent bales tightly abutting.
 - 3. Wrap ends of dike uphill to prevent flow around ends.
 - 4. Bind with wire or nylon string around sides.
 - 5. Securely anchor with minimum of 2 stakes.
 - 6. Excavate trench the width of a bale and the length of proposed barrier to a minimum depth of 4 inches. Backfill excavated soil against barrier.
- C. Silt Fence:
 - 1. Provide in compliance with MnDOT 2573.3.B.
 - 2. Posts: MnDOT 3886.
 - 3. Hand Installed (HI): MnDOT 2573.3.B.3 and MnDOT 3886.
 - 4. Machine Sliced (MS): MnDOT 2573.3.B.2 and MnDOT 3886.
 - 5. Super Duty (SD): MnDOT 2573.3.B.4 and MnDOT 3886.
 - 6. Pre-Assembled (PA): MnDOT 2573.3.B.1 and MnDOT 3886.
 - 7. Turbidity Barrier (TB): MnDOT 2573.3.B.5 and MnDOT 3886.
- D. Sandbag Barrier
 - 1. Provide in compliance with MnDOT 2573.3D before excavation or grading begins.
- E. Flotation Silt Curtain:
 - 1. Provide in compliance with MnDOT 2573.3. G before excavation or grading begins.
 - 2. Meet MnDOT 3887 requirements for flotation silt curtain.
 - 3. Attach sections to prevent silt from permeating through joints.
- F. Sediment Control Logs
 - 1. Provide in compliance with MnDOT 2573.3.F before excavation and/or grading commences.
 - 2. Straw, Wood Fiber, Coir.
 - 3. Wood Chip, Compost, Rock.
 - 4. Wood Fiber and Blanket System.
 - 5. Place logs on smooth, prepped soils and prepare a shallow trench for sediment control log to be placed.
 - 6. Backfill and compact upgrade side of log.
 - 7. Stake logs every 2 feet (excluding rock log).
 - 8. Overlap logs 6 inches and stake each end.

- G. Sediment Traps:
 1. Earthen embankment with gravel outlet, across a drainage swale, for drainage area of less than 5 acres.
 2. Construct before rough grading.
 3. Requires 1,800 cubic feet of storage for every acre of drainage area.
 4. Embankment to discharge water through section of crushed stone having a median diameter of 3/4-inch and be 6 feet long per acre of drainage area. Crest of outlet must be 1 foot lower than embankment elevation.

- H. Temporary Diversion:
 1. Maximum allowable drainage area is 5 acres.
 2. Supporting ridge must be at least 9 inches high.
 3. Release diverted runoff through stabilized outlet, slope drain, or sediment trapping measure.
 4. Construct at end of each workday as needed.
 5. Locate at least 2 feet inside top edge of fill.
 6. Construct supporting ridge along lower side at a uniform height along entire length.

- I. Dust Control: Prevent spread of dust during performance of Work.
 1. Application of water for dust control shall be in accordance with MnDOT 2130 and as approved by the Engineer.

- J. Rolled Erosion Control Products:
 1. Provide in accordance with manufacturer's recommendations or in compliance with MnDOT 2573.3.F.
 2. Erosion Control Blanket MnDOT 3885.
 3. Anchors MnDOT 3885.

- K. Stabilized Construction Exit
 1. Provide in compliance with MnDOT 2573.3.H prior to commencement of earthwork or hauling of materials.
 2. Minimum length shall be greater than 50 feet or 5 tire rotations.
 3. If runoff flows to or from construction exit, intercept and treat accordingly.

3.03 EMERGENCY EROSION CONTROL

- A. Upon written order by Engineer, conduct temporary erosion control Work on an emergency basis.
 1. Mobilize with sufficient personnel, equipment, materials, and incidentals within 24 hours of receipt of order.
 2. Provide immediate corrective work followed by installation of erosion control measures.

3.04 REPAIR AND MAINTENANCE

- A. Inspect, repair, and maintain all erosion control measures to provide proper function throughout project in compliance with MnDOT 2573.3.P.
- B. Failure to maintain erosion control measures: Owner may hire another firm to maintain erosion control measures. Costs associated with hiring another firm will be deducted from the Contract.
- C. Silt Fence:
 1. Inspect immediately after each runoff event and minimum once daily during prolonged rainfall.
 2. Make required repairs immediately.
 3. When sediment deposits reach approximately one-half the height of the silt fence, remove sediment or install a second silt fence.
 4. Dispose of sediment as directed by Engineer.
- D. Flotation Silt Curtain:
 1. Remove material not originally in isolation zone.
 2. Dispose of material as directed by Engineer.
 3. Remove following the completion of work.

- E. Sediment Control Logs:
 - 1. Inspect immediately after each runoff event and minimum once daily during prolonged rainfall.
 - 2. Make required repairs immediately.
 - 3. Dispose of sediment as directed by Engineer.
- F. Erosion Control Blanket: Immediately repair if washed away or displaced.
- G. Street Sweeping:
 - 1. Contractor is responsible for ensuring adjacent paved streets are clean at the end of each work day.
 - 2. Remove tracked sediment on paved surfaces within 24 hours of discovery.
- H. Stabilized Construction Exit:
 - 1. Maintain when effectiveness of sediment removal has been reduced.
 - 2. Maintenance shall consist of removing sediment and cleaning the materials or placing additional materials to restore effectiveness.

3.05 FIELD QUALITY CONTROL

- A. Inspections and maintenance prior to final acceptance:
 - 1. Every 7 days.
 - 2. Within 24 hours of 1/2-inch storm or greater.
 - 3. Record and file with SWPPP.

3.06 CLEANUP AND RESTORATION

- A. Remove temporary erosion control items when area is permanently stabilized and upon completion of Work.
- B. Restore all plant, equipment, or other supplementary operation sites to prevent siltation and erosion.
- C. Repair any off-site damage resulting from failure to install or maintain BMPs.
- D. Restore and stabilize areas disturbed during removal of erosion controls.

END OF SECTION

SECTION 31 34 10

GEOSYNTHETIC INSTALLATION (MnDOT 2108)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installing:
 - 1. Geotextiles for:
 - a. Wrapping joints of concrete pipe culvert, or other drainage applications (Type 3).
 - b. Under riprap (Type 4).
 - c. Separation of materials for subgrade and base stabilization (Type 7).
 - d. Earth reinforcement (Type 6).
 - 2. Geogrids for multiple purposes including reinforcement, stabilization, and filtration.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 31 37 00 - Riprap
 - 4. Section 32 11 11 - Subgrade Preparation
- C. Method of Measurement:
 - 1. Measure by area in square yards of coverage.
 - 2. Measurement on slopes or vertical faces is made perpendicular to the plane of the slope or face.
 - 3. No measurement or allowance is made for seams or overlaps.
 - 4. Measure each type separately.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of geotextile installation shall be as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. D4355 - Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus
 - 2. D4439 - Terminology for Geosynthetics
 - 3. D4491 - Water Permeability of Geotextiles by Permittivity
 - 4. D4595 - Tensile Properties of Geotextiles by the Wide-Width Strip Method
 - 5. D4632 - Grab Breaking Load and Elongation of Geotextiles
 - 6. D4751 - Determining Apparent Opening Size of a Geotextile
 - 7. D4884 - Strength of Sewn or Bonded Seams of Geotextiles
 - 8. D4873 - Identification, Storage, and Handling of Geosynthetic Rolls and Samples
 - 9. D5199 - Measuring the Nominal Thickness of Geosynthetics
 - 10. D5261 - Measuring Mass per Unit Area of Geotextiles
 - 11. D6193 - Standard Practice for Stitches and Seams
 - 12. D6241 - Static Puncture Strength of Geotextiles and Geotextile-Related Products
 - 13. D6673 - Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method
 - 14. D6707-06 - Circular-Knit Geotextile for Use in Subsurface Drainage Applications
- B. MnDOT:
 - 1. 2108 - Geosynthetic Construction Materials
 - 2. 3733 - Geosynthetic Materials

1.03 DEFINITIONS

- A. QAL: Quality Assurance Laboratory, recognized by the AASHTO Accreditation Program (AAP)

1.04 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Product Data: Submit manufacturer's geosynthetic material specification data sheets, product literature, and data sheets, per MnDOT 3733.
- C. Shop Drawings:
 - 1. Submit Drawings showing geosynthetic sheet layout, location of seams, and direction of overlap.
 - 2. Submit description of proposed methods of geotextile deployment, , securing methods (temporary and permanent).
- D. Samples:
 - 1. Geosynthetic: 2 pieces, minimum, 18 inches long, taken across full width of roll of each type and weight of geotextile furnished for Project.
 - a. Maintain 1 piece in Project office for reference.
 - b. Label each sample with brand name and lot and roll number.
 - 2. Submit 1 sample each of staple, pin, washer, and stake for securing geosynthetic.
- E. Installation Schedule.
- F. Quality Assurance/Control Submittals:
 - 1. Certificate of Compliance from the supplier.
 - a. Include documentation stating the manufacturer's minimum average roll values (MARVs) for geotextiles.
 - 2. Test results from manufacturer.
 - 3. Documentation of lot and roll numbers delivered to site.
- G. Proposed QAL for review and approval by Engineer

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver to Site with opaque plastic covering to prevent ultraviolet degradation and contamination.
- B. Label each roll with the following:
 - 1. Name of Manufacturer
 - 2. Product Type and Style
 - 3. Product Grade
 - 4. Lot Number
 - 5. Physical Dimensions
- C. Store and handle according to manufacturer's directions.
- D. Do not store directly on ground. If stored outdoors, elevate minimum of 3 inches and protect with waterproof cover.
- E. Do not leave geosynthetic exposed to sunlight for more than 3 days.
- F. Handle in manner that maintains undamaged condition.
- G. Do not operate mechanical equipment directly on top of geosynthetic at any time.

1.06 SCHEDULING

- A. Schedule placement to prevent equipment operating in conjunction with excavation and placement of embankment material coming into contact with geosynthetic.

1.07 WARRANTY

- A. Manufacturer:
 - 1. Provide written manufacturer's warranty against manufacturing defects and material degradation for 5 years' from date of installation.
 - 2. Replacement coverage shall include all incidental costs associated with the replacement.
- B. Contractor:
 - 1. Provide guaranty against defects in installation and workmanship for 2 years' from date of Final Acceptance.
 - 2. Include costs of qualified service technicians, materials, and incidental costs required for the repair at no expense to Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Geotextile Fabric:
 - 1. MnDOT 3733: Type 3: Refer to Table 3733.2-1.
 - 2. MnDOT 3733: Type 4: Refer to Table 3733.2-1.
 - 3. MnDOT 3733: Type 7: Refer to Table 3733.2-1.
 - a. Nonwoven.
- B. Sewing Thread:
 - 1. Polypropylene, polyester, or Kevlar thread.
 - 2. Durability equal to or greater than geotextile being sewn.
- C. Securing Pins:
 - 1. Steel, 3/16-inch diameter, pointed at 1 end.
 - 2. Fabricate with a head to retain steel washer.
 - 3. Minimum Length: 12 inches
- D. Steel Washers for Securing Pins:
 - 1. Outside diameter not less than 1.5 inches.
 - 2. Inside diameter 1/4-inch or sized to fit pins if pins larger than 3/16-inch diameter.
 - 3. Thickness: 1/8-inch.
- E. Steel Wire Staples:
 - 1. U-shaped, 10 gage.
 - 2. Minimum 6 inches long.
- F. Geogrid shall be Triaxial grids as manufactured by:
 - 1. Tensar International Corporation.
 - 2. Advanced Drainage Solutions (ADS).
 - 3. Or Approved Equal.

2.02 SOURCE QUALITY CONTROL

- A. Conformance Testing by QAL:
 - 1. Perform Conformance Testing at the rate of 1 test per 10,000 square yards of geosynthetic placed.
 - 2. Owner pays for first successful test. Contractor pays for all failed tests.

3. Test results to be reviewed by Engineer and accepted or rejected, prior to the deployment of geotextile.
4. Test results shall meet, or exceed, the properties specified in this Section.
5. Manufacturer may obtain additional samples from rolls immediately before and after the roll from which a failing test occurred, and have them tested by QAL at manufacturer's expense. If these tests pass, only the failing roll will be rejected. If they fail, the entire lot will be rejected.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare surface to receive geosynthetic to a relatively smooth condition, free of obstructions and debris that may damage the geotextile material.
- B. Notify Engineer prior to placement. Obtain approval of Engineer that underlying materials are satisfactory for placement of geotextile.
- C. Maintain excavations and backfill surfaces in a well-drained condition at all times during placement of geotextile material.
- D. Provide dewatering if necessary for outlet of stormwater runoff and groundwater control during placement of fabric and backfill.
- E. Maintain minimum 1 foot of fill between the geotextile and mechanical equipment.
- F. Replace any geosynthetic that is exposed to the sun for more than seven (7) calendar days.

3.02 SURFACE PREPARATION FOR GEOGRID REINFORCEMENT

- A. Prepare surface to receive geogrid to a relatively smooth condition, free of obstructions and debris that may damage the geogrid material.
- B. Notify Engineer prior to placement. Obtain approval of Engineer that underlying materials are satisfactory for placement of geogrid.
- C. Maintain minimum 1 foot of fill between the geogrid and mechanical equipment.

3.03 INSTALLATION

- A. Place geosynthetic as required in the Drawings.
- B. Install in accordance with manufacturer's recommendations and with approved Shop Drawings.
- C. Lay and maintain geosynthetic smooth and free of tension, folds, wrinkles or creases.
- D. Provide temporary weights and pins to hold geosynthetic tight against the subgrade, foundation, or wall units, and as approved by Engineer.
 1. Push pins through geotextile until washer bears against geotextile and secures it firmly to subgrade.
 2. Install additional pins or temporary securing measures as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.
- E. Provide permanent pins, staples or stakes:
 1. Midway between edges of overlaps and 6 inches from free edges.
- F. Geogrid Reinforcement shall be used for subgrade reinforcement in locations approved by the Engineer. Locations are generally unplanned and likely to be random throughout the Project areas.

3.04 SHEET ORIENTATION

- A. Orient geosynthetic with main (long) direction of each sheet, perpendicular to the direction of slope, and as shown on Drawings.
- B. For roadway applications, orient geosynthetic parallel to the centerline of road unless specified otherwise in Drawings.

3.05 SEAM CONSTRUCTION

- A. Unseamed Joints:
 - 1. Overlapped:
 - a. Foundation/subgrade stabilization: Minimum 18 inches.
 - b. Riprap: Minimum 18 inches.
 - c. Other applications: Minimum 12 inches.

3.06 PLACING PRODUCTS OVER GEOTEXTILE

- A. Notify Engineer 24 hours' before placing material over geosynthetic.
- B. If tears, punctures, or other damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geosynthetic for repair.
- C. Bring soil cover to Work area with earth-carrying equipment.
 - 1. Deposit over previously spread soil cover.
 - 2. Push onto uncovered portion of geosynthetic with graders or dozers.
 - 3. Repeat until total area covered.
 - 4. Place fill in uniform lifts, not to exceed 12 inches.
- D. Soil cover for side slopes shall be placed at the bottom of the slope and pushed up to reduce any tension on geosynthetic.
- E. Completely cover installed geosynthetic at end of each workday.

3.07 INSTALLING GEOSYNTHETIC IN TRENCHES

- A. Place geosynthetic to completely envelope granular backfill, crushed rock, or other granular trench backfill.
- B. Place with sufficient slack that geosynthetic is in contact with trench walls after backfill.
- C. Wrap geosynthetic over top of granular backfill and overlap seam by 36 inches.

3.08 RIPRAP APPLICATIONS

- A. Overlap geotextile at each joint with upstream sheet of geotextile overlapping downstream sheet.

3.09 REPAIRING GEOSYNTHETIC

- A. Repair holes, tears, or otherwise damaged geosynthetic.
- B. Remove interfering material as necessary to expose damaged geotextile for repair.
- C. Place patch of undamaged geotextile over damaged area and at least 3 feet in all directions beyond damaged area.
- D. Secure patch as approved by Engineer.

E. Replace backfill to the specified lift thickness and density.

3.10 CLEANUP

A. Remove trash, waste material, and equipment used in connection with the Work of this Section.

B. Maintain premises in a neat and orderly condition.

END OF SECTION

SECTION 31 37 00

RIPRAP (MnDOT 2511)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Stone riprap.
 - 2. Filter material.
- B. Related Sections:
 - 1. Section 33 41 00 - Storm Sewer Systems
 - 2. Section 31 34 10 - Geotextile Installation
- C. Method of Measurement:
 - 1. Riprap:
 - a. Measure by volume in cubic yards based on staked surface dimensions and specified thickness.
 - b. Measure each type and class separately.
 - 2. Filter Materials:
 - a. Granular Filter:
 - 1) Incidental to pipe installation.
 - b. Geotextile Filter:
 - 1) Incidental to pipe installation.
- D. Basis of Payment:
 - 1. Bid Price Includes:
 - a. Materials
 - b. Excavation.
 - c. Foundation preparation.
 - d. Placing filter materials.
 - e. Placing riprap stone.
 - 2. Payment for riprap shall be at the Contract unit price as listed on the Bid Form. All associated work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2511 - Riprap

PART 2 PRODUCTS

2.01 MATERIALS

- A. All materials shall be in accordance with the respective MnDOT Specifications as follows:
 - 1. Riprap Materials: MnDOT 3601.
 - 2. Granular Filter: MnDOT 3601.
 - 3. Geotextile Filter: MnDOT 3733.

2.02 ACCESSORIES

- A. All accessories shall be in accordance with the respective MnDOT Specifications as follows:
 - 1. Geotextile Filter: MnDOT 3733:
 - a. Provide Type 4 under the following:
 - 1) Class III and IV random riprap and hand-placed riprap on slopes no steeper than 3:1, horizontal to vertical.

PART 3 EXECUTION

3.01 FOUNDATION PREPARATION

- A. Excavate and shape foundation areas to the location and cross section staked by Engineer.
- B. Compact all loose foundation material prior to filter material placement.
- C. Provide smooth surface, free of stones, sticks, and other debris.

3.02 FILTER MATERIAL

- A. Granular Filter:
 - 1. Spread to a minimum thickness of 6 inches over the prepared foundation or as required in the details on the Drawings.
 - 2. For under water placement, deposit material directly by means of a bucket.
- B. Geotextile Filter:
 - 1. Place multiple fabric widths with the longest dimension parallel to the direction of water flow.
 - 2. Splice multiple fabric widths by mechanical seaming or minimum 18-inch overlap. (36-inch under water).
 - 3. Overlap joints in shingle arrangement in the flow direction and from top to bottom of a slope to direct water flow over the joint without undermining the geotextile filter.
 - 4. Bury upgrade edges of fabric a minimum of 6 inches to direct water flow over the fabric to prevent under mining.
 - 5. Anchor fabric to prevent movement during riprap placement.
 - 6. Do not operate equipment on fabric.

3.03 RIPRAP STONE

- A. Placement:
 - 1. Begin placement at the lowest elevation and work upgrade.
 - 2. Do not drop stones from greater than 1 foot height.
 - 3. Do not dump stone at the top of slope and roll stone down the slope.
- B. Random and Quarry-run Riprap:
 - 1. Position stones to provide uniform size distribution and minimize void space.
 - 2. Level surface to provide uniform thickness and appearance.
- C. Hand-placed:
 - 1. Embed all stones in the foundation material.
 - 2. Minimize space between stones.
 - 3. Stagger joints up the slope.
 - 4. Define edges of riprap area using selected stones set to line and grade.
 - 5. Seat smaller stones between the larger stones to produce a uniform surface.

3.04 THICKNESS REQUIREMENTS

- A. All areas - minimum 80 percent of specified thickness.

B. Average - minimum 95 percent of specified thickness.

END OF SECTION

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SECTION 32 01 15

PULVERIZING BITUMINOUS PAVEMENT (MnDOT 2215)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes full depth reclamation (FDR) consisting of mechanically pulverizing existing bituminous pavement and aggregate base in place to provide a blended aggregate and bituminous mixture for use as a base course.
- B. Related Sections:
 - 1. Section 32 11 22 - Aggregate Base
- C. Method of Measurement:
 - 1. FDR:
 - a. Measure FDR by area in square yards regardless of pavement depth.
 - b. Unit includes cost of production, testing, placement, occasional variations in bituminous pavement thickness, removing vegetation and topsoil adjacent to the surface, repair to structures damaged by Contractor's operations or negligence, and necessary maintenance.
 - c. Integrant curb shall be considered part of the pavement area.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of pulverizing bituminous pavement shall be at the contract unit price as listed on the Bid Form. All associated work items, including removal of excess material to allow for pavement section, shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2215 - Reclamation
 - 2. 2232 - Mill Pavement Surfaces
 - 3. 3138 - Aggregate for Surface and Base Courses
 - 4. 3149 - Granular Material

1.03 DEFINITIONS

- A. Pulverized Mixture: That portion of pavement and aggregate base that is reclaimed and blended to produce a uniform graded aggregate base.

1.04 EXISTING CONDITIONS

- A. Reclamation Pavement Section:
 - 1. See Drawings and Geotechnical Report.

1.05 SCHEDULING

- A. In an attempt to reduce costs and the time of disruption to the community, to the neighborhood, and to the residents, the Owner is proposing to limit the amount of time any street may be without pavement. There are interim milestones on each of the residential streets that will begin on any given street at the time pavement is first removed or reclaimed on that particular street.
- B. Contractor should anticipate 3 or more mobilizations to remove pavement, based on the contract requirements outlined above and in the Agreement, Document 00 52 00.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Gradation of the Pulverized Mixture: Comply with MnDOT 2215 Table 2215.3-1.

2.02 EQUIPMENT

- A. The pulverizing machine utilized shall have the following capabilities:
 1. Comply with MnDOT 2215.3.D.1.a.
 2. Control dust and particulate matter created by the pulverizing process.
 3. Variable depth control.
 4. Variable speed control.

PART 3 EXECUTION

3.01 PULVERIZING OPERATION

- A. Comply with MnDOT 2215.3E.
- B. Pulverize pavement through the entire depth of bituminous and aggregate base.
- C. Establish and maintain grade control as required.
- D. Vary machine speed to produce required aggregate blend.
- E. Incorporate screening and crushing capabilities to reduce or remove oversized particles.
- F. Remove excessive oversized particles.
- G. At Contractor's option, pavement and base materials may be blended in a separate operation after pulverizing.
- H. Compact pulverized mixture to provide temporary driving surface.

3.02 SPREADING AND COMPACTION

- A. Comply with MnDOT .2215.3.E.3.

3.03 WORKMANSHIP AND QUALITY

- A. Comply with MnDOT 2215.3.E.4,

3.04 PROTECTION

- A. Locate and mark all in-place structures within the pavement area prior to pulverized operations.
- B. Repair or replace in-place structures damaged or disturbed by the pulverizing operations.

END OF SECTION

SECTION 32 11 11

SUBGRADE PREPARATION (MnDOT 2112)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes shaping and compacting of subgrade prior to placement of base course.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 32 11 14 - Test Rolling
- C. Method of Measurement:
 - 1. Measure by length in road stations of 100 feet along the centerline.
- D. Basis of Payment:
 - 1. Payment for subgrade preparation shall be at the contract unit price as listed on the Bid Form. All associated work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT 2112 - Subgrade Preparation

1.03 SEQUENCING AND SCHEDULING

- A. Prepare subgrade after unstable areas have been repaired and in place surface courses have been removed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. Re-excavate, compact and shape the top 12 inches of subgrade area to provide smooth, stable surface for the placement of base course thereon.
- B. Compact subgrade material to 100 percent of Standard Proctor Density.
- C. Continue operations until no rutting or displacement occurs under construction traffic.
- D. Provide a finished surface within 0.05 foot of the prescribed elevation at all locations.

3.02 CONTRACTOR QUALITY CONTROL (QC) TESTING

- A. Test according to the MnDOT Schedule of Materials Control.

END OF SECTION

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SECTION 32 11 14

TEST ROLLING (MnDOT 2111)

PART 1 GENERAL

1.01 SUMMARY

- A. Provide testing of subgrade stability prior to aggregate base construction by rolling with heavy equipment.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 32 11 11 - Subgrade Preparation
- C. Basis of Payment:
 - 1. Correcting and retesting of sections found to be unstable will be considered incidental.
 - 2. Payment for acceptable quantities of test rolling and all associated Work items shall be incidental.

1.02 REFERENCES

- A. MnDOT 2111 - Test Rolling

1.03 SCHEDULING AND SEQUENCING

- A. Perform test rolling after subgrade is established to proposed width and within 0.1 foot of staked grades at all locations.
- B. Do not perform test rolling until both Engineer and Contractor agree subgrade is acceptable.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform test rolling using one of the following:
 - 1. A pneumatic-tired roller (TR30) in accordance with MnDOT 2111.3.A.1.a.
 - 2. A loaded dump truck (TR10) in accordance with MnDOT 2111.3.A.2.a.
- B. Provide load for equipment:
 - 1. Load for TR30 in accordance with MnDOT 2111.3.A.1.b.
 - 2. Load for TR10 in accordance with MnDOT 2111.3.A.2.b.

PART 3 EXECUTION

3.01 PROTECTION

- A. Protect culverts and other structures during test rolling.
- B. Provide additional cover as required over inplace structures as protection during test rolling.
- C. Replace structures damaged during test rolling.

3.02 APPLICATION

- A. Test roll entire width of proposed pavement structure.

- B. Operate roller at a speed between 2-1/2 and 5 miles per hour.
- C. Make 2 passes over all surface areas.
- D. Unrolled areas between tire path shall not exceed 12 inches.

3.03 FIELD QUALITY CONTROL

- A. Refer to MnDOT 2111.3B Testing Requirements.
- B. The roadbed will be considered unstable at any location where surface shows yielding or rutting of more than 2 inches (TR30) or 0.4-0.6 inches (TR10) during test rolling in accordance with MnDOT 2111.3.C.
- C. Correct unstable areas in accordance with Section 32 11 11.
- D. Retest all corrected areas.

END OF SECTION

SECTION 32 11 22

AGGREGATE BASE (MnDOT 2211)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes construction of aggregate base courses on a prepared subgrade.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 32 11 14 - Test Rolling
- C. Method of Measurement:
 - 1. Aggregate Base:
 - a. Measure by volume in cubic yards based on the proposed dimensions.
 - b. Basis of measure will be Compacted Volume (CV).
 - c. The plan quantity shown on the Bid Form (P) shall be considered the quantity for payment unless the scope of the work changes, in which case the changed areas will be computed for payment also.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of aggregate base shall be at the contract unit price as listed on the Bid Form. All associated work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2211 - Aggregate Base
 - 2. 3138 - Aggregate for Surface and Base Courses

1.03 SUBMITTALS

- A. Provide for Each Aggregate Material:
 - 1. Name and location of source.
 - 2. Sample gradation.

1.04 HANDLING AND DELIVERY

- A. Stockpile and drain aggregate removed from below water for a minimum 24 hours prior to delivery.

1.05 SITE CONDITIONS

- A. Deposit aggregate only on dry, compact subgrade so that no rutting or displacement will occur under construction traffic.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate Base Materials: MnDOT 3138.
- B. Aggregate class: As indicated on the Bid Form.

- C. Reclaimed/Recycled Aggregate Base (Class 5)
 - 1. At the Contractor's discretion, the existing pavement and aggregate base may be reclaimed, salvaged, stockpiled, and reused on the Project as Aggregate Base (P). Aggregate material salvaged on site must be produced through a Full-Depth Reclamation (Pulverized Pavement) or other crushing/screening process to ensure the material is homogenous and shall meet a Class 5 specification and testing requirements outlined in Section 01 45 00.
 - 2. Reclaimed material shall be tested by the Contractor during production for quality control (QC) and shall provide the Owner with companion samples (incidental). Standard testing of the placed aggregate material shall be done according to the Minnesota Department of Transportation Office of Materials 2023 Schedule of Materials Control, MnDOT SD-15.

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Placing and Mixing:
 - 1. Place aggregate in layers to produce a maximum 3 inches of compacted thickness.
 - 2. With vibratory compaction, place to produce maximum 6 inches of compacted thickness.
 - 3. Deposit only the amount of aggregate which is intended to be spread and compacted during the same day.
 - 4. Add water as may be required during mixing to produce proper compaction.
- B. Spreading and Compacting:
 - 1. Mix aggregate uniformly to maintain proper gradation.
 - 2. Spread and compact each layer to the required cross section and density prior to placing a succeeding layer.
 - 3. Compact each layer to 100 percent of Standard Proctor Density.
- C. Tolerances: Construct each course to within 0.05 foot of the planned grades and staked elevations at all locations.
- D. Aggregate in Stockpiles: Deliver and stockpile aggregate as specified in the location or site designated by Engineer.

3.02 PROTECTION

- A. Place initial surface course or otherwise protect the in-place aggregate base within 72 hours after placement.
- B. Remove and replace any portion of the material which becomes contaminated after placement.

END OF SECTION

SECTION 32 12 13

BITUMINOUS TACK COAT (MnDOT 2357)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes treating a prepared base with bituminous material preparatory to placing bituminous course.
- B. Related Sections:
 - 1. Section 32 12 16 - Plant-Mixed Asphalt Pavement
 - 2. Section 32 16 20 - Concrete Curbing
- C. Method of Measurement:
 - 1. Bituminous Tack Coat:
 - a. Measure by volume in gallons at 60 degrees F of material acceptably placed.
- D. Basis of Payment:
 - 1. Sand applied at pedestrian crossings will be considered incidental.
 - 2. Payment for bituminous tack coat shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2360 - Plant Mixed Asphalt Pavement
 - 2. 2357 - Bituminous Tack Coat
 - 3. 3151 - Bituminous Material

1.03 SITE CONDITIONS

- A. Do not apply to wet surfaces.
- B. Do not apply during or immediately prior to precipitation.

1.04 SEQUENCING AND SCHEDULING

- A. Coordinate application to allow traffic movement in at least one direction without pick-up or tracking.
- B. Limit application to area on which the subsequent bituminous course will be placed on the same day.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bituminous Tack Coat: MnDOT 2357.2.A.

PART 3 EXECUTION

3.01 PREPARATION

- A. Complete all required repairs and reconditioning.

- B. Remove all foreign matter from the road surface.
- C. Verify that surface is clean and dry.
- D. Protect adjacent curb and gutter, sidewalk, manhole and gate valve covers, and other exposed surfaces from overspray.

3.02 EQUIPMENT

- A. Distributor to meet requirements of MnDOT 2360.3B.2.d.

3.03 APPLICATION

- A. Apply uniform coating on the contact surface of all fixed structures and the edge of in-place courses at the transverse and longitudinal joints.
- B. Application rate per square yard shall be in accordance with MnDOT 2357.3.D.
- C. Temperature of material at application to comply with MnDOT 2357.3.E
- D. Spread sand on newly tacked surfaces at pedestrian crossings.

END OF SECTION

SECTION 32 12 16

PLANT-MIXED ASPHALT PAVEMENT (MnDOT 2360)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Construction of pavement courses from hot plant-mixed bituminous - aggregate mixture.
 - 2. Demonstration of quality control through quality control testing.
- B. Related Sections:
 - 1. Section 32 12 13 - Bituminous Tack Coat
- C. Method of Measurement:
 - 1. Bituminous Mixture:
 - a. Measure each mixture type by weight in tons acceptably placed.
 - b. Weight shall be based on the sum of individual load tickets provided within 24 hours of the time of delivery to the Site.
 - c. If material is being wasted or placed excessively thick, Owner reserves the right to deduct quantities that are in excess of 1/4-inch over the plan thickness based on material weighing 118 pounds per square yard of area per inch of thickness.
 - 2. Bituminous Material: Incidental to the bituminous mixture.
 - 3. Contractor Testing and Quality Control: Incidental to bituminous mixture.
 - 4. Bituminous Mixture (Driveways & Trail):
 - a. Measure each mixture type by square yards acceptably placed. Includes aggregate base and subgrade preparation.
- D. Basis of Payment:
 - 1. Mixture cost includes additives as required.
 - 2. Payment for acceptable quantities of bituminous pavement shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
- E. No incentives apply to this Project.

1.02 REFERENCES

- A. AI SP-2 - Superpave Mix Design - Third Edition
- B. MnDOT 2360 - Plant Mixed Asphalt Pavement

1.03 DEFINITIONS

- A. Quality Control Program: All activities, including mix design, process control inspection, sampling, testing, and necessary adjustments in process that are related to the production of a hot mix asphalt (HMA) pavement which meets the requirements of this section.

1.04 SUBMITTALS

- A. Job Mix Formula:
 - 1. Submit 1 Job Mix Formula (JMF) for each mix to be used on the project.
 - 2. Each JMF as a minimum shall contain the information listed in MnDOT 2360.2.E.9.
 - 3. The JMF shall be signed by a Level II Quality Management mix designer, and submitted on MnDOT approved forms.

- 4- Submit the JMF to Engineer at least 7 working days prior to the start of asphalt production for Laboratory Mixture Design or 2 working days prior to the start of asphalt production for Modified Mixture Design.
- B. Asphalt Plant Inspection Report:
1. Prior to beginning asphalt production, submit an Asphalt Plant Inspection Report (TP 02142-02, TP 02143-02) to Engineer.
 2. This report must have been performed during the current construction season.
 3. If the asphalt plant has been moved since the most recent Asphalt Plant Inspection Report was written:
 - a. Request that the plant be re-certified by MnDOT according to MnDOT 2360.2.G.1.a.
 - b. Submit the new Asphalt Plant Inspection Report to Engineer.

1.05 PROJECT CONDITIONS

- A. Do not place mixtures when weather or roadbed conditions are determined to be unfavorable.
- B. Obtain written permission from Engineer to place mixture after October 30.

PART 2 PRODUCTS

2.01 MIXTURE DESIGNATION

- A. Provide the following: MnDOT 2360.1: As shown on Drawings.

2.02 MATERIALS

- A. Aggregate: MnDOT 2360.2.A.
- B. Asphalt Binder Material: MnDOT 2360.2.B: As shown on the Drawings.
- C. Additives: MnDOT 2360.2.C.
- D. Bituminous Mixture: MnDOT 2360.2.E.
- E. Recycled Asphalt Pavement (RAP) may be allowed in wearing course pavements with written approval by the Engineer prior to placement.

2.03 EQUIPMENT

- A. All equipment used in production and placement shall be in accordance with MnDOT 2360.3.B.
- B. Produce all bituminous mixtures at a Contractor-certified HMA plant in accordance with MnDOT 2360.2.G.1.a.

2.04 MIXTURE PROPORTIONS

- A. Submit a trial mix design for each mixture for review by Engineer in accordance with MnDOT 2360.2.E.
 1. Supply a Gyratory mixture in accordance with the following:
 - a. MnDOT 2360.2E.
 - b. The Asphalt Institute's Superpave Mix Design Manual SP-2.
 - c. MnDOT Laboratory Manual such that it meets the requirements of this specification.
 2. Addition of aggregates and materials not included in the mixture design submittals is prohibited.
 3. Supply a Modified Mixture Design according to MnDOT 2360.2.E.5.b or Production Mixture Design according to MnDOT 2360.2.E.5.c and the following criteria:
 - a. The aggregates have been tested for and meet all applicable quality requirements in this specification. This testing must have been performed during the current construction season.

- b. The Level II mix designer submitting the mixture design has a minimum of 2 years' experience in mix design.
- c. *Contractor and their representatives have not violated the requirements of MnDOT 1512 Unacceptable and Unauthorized Work.*
- d. Contractor shall supply a Laboratory Mixture Design following MnDOT 2360.2.E.5.a if all 3 of the requirements listed above for the Modified Mixture Design or Production Mixture Design are not met. The list of submittals required for Laboratory Mixture Design is given in Section 1.04 of this section.

2.05 SOURCE QUALITY CONTROL

- A. Provide and maintain a quality control program for HMA production.
 - 1. The quality control program shall meet the requirements of MnDOT 2360.2.G, Sections G.1.a, G.1.b, and G.4 through G.14.
- B. Quality Assurance - Plant: The project owner will retain Minnesota Department of Transportation Materials Personnel to conduct quality assurance observations and testing. The Quality Assurance program will comply with MnDOT 2360.2, Sections G.2, and G.3.
- C. Asphalt shall only be accepted from plants with active MnDOT certification for the current construction season. Contractor shall submit revised mix designs as they are revised by the supplier or construction seasons change.

PART 3 EXECUTION

3.01 PREPARATION

- A. Treatment of the Surface: Apply bituminous tack coat to existing bituminous or concrete surfaces and to surface of each course except final surface in accordance with Section 32 12 13.

3.02 PLACEMENT

- A. Spreading Operations:
 - 1. Spread each mixture to the required cross section with an approved paver.
 - 2. Spread by hand or motor grader only in areas not accessible to a paver.
 - 3. Coordinate paver speed with rate of delivery of mix to provide a uniform rate of placement.
 - 4. Complete placement of each course over full width of the section each day.
- B. Compacting Operations:
 - 1. Conduct initial and final rolling with a steel-wheeled roller in accordance with MnDOT 2360.3.D.
 - 2. Conduct secondary rolling with a pneumatic-tired roller.
 - 3. Commence compaction as soon as possible after mixture has been spread, without causing undue displacement of mixture.
 - 4. Operate rollers continuously until all areas are compacted to required density and all roller marks are eliminated.
 - 5. Compact each course uniformly by Maximum Density method in accordance with MnDOT 2360.3.D.1.
 - 6. Perform pavement density acceptance testing in accordance with MnDOT 2360.3.D.1.
- C. Thickness and Surface Requirements:
 - 1. After compaction, each course shall be within 1/4 inch of the required thickness.
 - 2. Remove and replace any areas that are not within tolerance.
 - 3. After rolling, each surface shall be free of segregated and open and torn sections and deleterious material.
 - 4. Each course shall be smooth and true to the planned grade and cross-section within the following tolerances:
 - a. Wearing course surfaces shall not vary more than 1/8 inch from the edge of a 10-foot straightedge placed parallel or perpendicular to centerline.

- b. Transverse slopes of each surface shall not vary from the proposed slope by more than 0.4 percent from plans.
 - c. The distance from centerline to edge of each course shall be not less than the proposed distance nor greater than 3 inches more than the proposed distance.
5. The provisions of MnDOT 2399 - Pavement Surface Smoothness do not apply to this Project.

D. Construction Joints:

- 1. Compact to produce a tightly bonded joint meeting surface tolerances.
- 2. Transverse Joints:
 - a. Place at right angles to centerline whenever placement operations are suspended. Suspension of Work will be allowed only at specified transverse joint locations as shown on Drawings.
 - b. Upon resumption of work, cut vertically for full depth of the course.
- 3. Longitudinal Joints:
 - a. Place parallel to centerline.
 - b. Place joints between strips not less than 6 inches measured transversely from like joints placed in underlying course.
 - c. Place all surface courses to not greater than 1/4 inch above adjacent manhole frames, valve boxes, or other fixed structures.
 - d. Place all surface courses a minimum of 1/4-inch above adjacent gutters.
- 4. Perform in accordance with MnDOT 2360.3.C.

3.03 FIELD QUALITY CONTROL

- A. Contractor is responsible for all field quality control.
- B. All field quality control testing personnel, facilities, and requirements shall be in accordance with MnDOT 2360.2.G.
- C. Perform compaction testing of bituminous mixtures in accordance with MnDOT 2360.3.D.

END OF SECTION

SECTION 32 15 00

AGGREGATE SURFACING (MnDOT 2118)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes construction of an aggregate wearing course on a prepared subgrade.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 31 23 10 - Excavation and Embankment
 - 3. Section 32 11 22 - Aggregate Base
- C. Method of Measurement:
 - 1. Measure by weight of material acceptably placed in tons.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of aggregate surfacing shall be at the contract unit price as listed on the Bid Form. All associated work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2118 - Aggregate Surfacing
 - 2. 3138 - Aggregate for Surface and Base Courses

1.03 SUBMITTALS

- A. Provide for each aggregate material:
 - 1. Name and location of source.
 - 2. Sample Gradation.

1.04 HANDLING AND DELIVERY

- A. Stockpile and drain aggregate removed from below water for a minimum 24 hours prior to delivery.

1.05 SITE CONDITIONS

- A. Deposit aggregate only on dry compact subgrade so that no rutting or displacement will occur under construction traffic.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate Surfacing Materials: MnDOT 3138.
- B. Class of Aggregate: As indicated on the Bid Form.
- C. Virgin crushed Limestone or recycled concrete meeting MnDOT Class 5 specification.
- D. No recycled bituminous shall be permitted.

2.02 CONTRACTOR QUALITY CONTROL (QC) TESTING

- A. Test according to the MnDOT Schedule of Materials Control.

PART 3 EXECUTION

3.01 AGGREGATE SURFACING, CLASS 5 – TEMPORARY ACCESS

- A. The Bid Form includes an item for Aggregate Surfacing, Class 5 (Temporary). This is to be used, where approved by Engineer, for temporary placement of aggregate to provide access to residences during the course of construction and where Class 5 aggregate material must be hauled into the Project Site.
- B. Contractor shall construct temporary aggregate surfacing at driveway locations (i.e., driveway blistering) at the same time as construction of aggregate base. If the Contractor fails to provide this driveway access within 24 hours of being notified by the Engineer or Owner to do so, then the Owner reserves the right to provide such access with Owner's work forces and shall invoice the Contractor for such work at a billing rate of three times the Contractor's Bid on the Project for aggregate surfacing. Owner will obtain payment for this work by a reduction in payment due to the Contractor for work completed on the Project.

3.02 CONSTRUCTION REQUIREMENTS

- A. Mix aggregate as required prior to spreading to produce and maintain uniform gradation.
- B. Deposit and spread aggregate on driveways to achieve the required depth and coverage.
- C. Compact aggregate with a steel-wheeled or pneumatic-tired roller until there is no further evidence of consolidation.
- D. Maintain the moisture content at or above 5 percent by dry weight during compaction.

END OF SECTION

SECTION 32 16 20

CONCRETE CURBING (MnDOT 2531)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Concrete curb.
 - 2. Concrete curb and gutter.
 - 3. Concrete valley gutter.
 - 4. Concrete driveway pavement.

- B. Related Sections:
 - 1. Section 32 18 20 - Walks
 - 2. Section 33 41 00 - Storm Sewer Systems

- C. Method of Measurement:
 - 1. Curb:
 - a. Measure by length in linear feet along face of the curb at gutter line.
 - b. Measure each design type separately.
 - 2. Curb and Gutter:
 - a. Measure by length in linear feet along face of the curb at gutter line.
 - b. Measure each design type separately.
 - 3. Valley Gutter: Measure by area in square yards that are in excess of normal curb and gutter dimensions.
 - 4. Driveway Pavement: Measure by area in square yards for each thickness.
 - 5. Reinforcement Bars for pedestrian ramps, match-ins, valley gutters, and in curb and gutter over service lines shall be considered incidental.

- D. Basis of Payment:
 - 1. Payment for concrete construction shall be at the Contract Unit Price listed on Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 1804 - Prosecution of Work (ADA) - Special Provisions
 - 2. 2211 - Aggregate Base
 - 3. 2461 - Structural Concrete
 - 4. 2531 - Concrete Curbing
 - 5. 3149 - Granular Material
 - 6. 3301 - Reinforcement Bars
 - 7. 3303 - Welded Wire Reinforcing
 - 8. 3702 - Preformed Joint Fillers
 - 9. 3754 - Poly-Alpha Methyl Styrene (AMS) Membrane Curing Compound
 - 10. 3755 - Linseed Oil Membrane Curing Compound
 - 11. 3756 - Plastic Curing Blankets
 - 12. 3902 - Form Coating Material

1.03 DEFINITIONS

- A. Surface Defects: Any of the following conditions:
 - 1. Any loss of aggregate or mortar from the surface that is larger than 1/4-inch in diameter and greater than 1/4-inch in depth.

1.04 SUBMITTALS

- A. Concrete Mix Submittals:
 - 1. Include name and address of transit-mix concrete supplier with submittals.
 - 2. Catalog information on admixtures or agents to be included in mix.
 - 3. List of concrete mix designs at least 15 days prior to start of Work.
- B. Quality Assurance/Control Submittals:
 - 1. Test Reports: Report test results to Engineer.
 - 2. Certificates: If transit-mix concrete is used, the transit-mix concrete supplier shall furnish Certificate of Compliance with Construction Documents.
- C. Cold Weather Protection Plan:
 - 1. Submit proposed time schedule and plans for cold weather protection in writing to Engineer in accordance with MnDOT 2531.3.G.3.
- D. Submit stamping device to be used to mark service line locations.

1.05 QUALITY ASSURANCE

- A. Regulatory Agencies:
 - 1. Comply with local governing regulations if more stringent than specified.
 - 2. Curb edges and curb cuts on public property shall conform to the requirements of authorities having jurisdiction.
 - 3. Produce concrete from MnDOT certified plants.

1.06 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete: MnDOT 2461.
- B. Reinforcement Bars: MnDOT 3301.
- C. Welded Wire Reinforcing: MnDOT 3303.
- D. Preformed Joint Filler: MnDOT 3702.
- E. Granular Materials: MnDOT 3149.
- F. Forms:
 - 1. Straight, clean, and adequately interlocked and braced.
 - 2. Provide wood or steel forms capable of sustaining concrete in proper line, grade, and cross section until set.
- G. Accessories:
 - 1. Curing Materials:
 - a. Burlap Curing Blankets MnDOT 3751
 - b. Plastic Curing Blankets: MnDOT 3756.
 - c. Poly-Alpha Methyl Styrene (AMS) Membrane Curing Compound: MnDOT 3754.
 - d. Linseed Oil Membrane Curing Compound: MnDOT 3755.

2.02 CONCRETE MIXTURES

- A. Based on method of placement as follows:
 - 1. Manual Placement: Mix No. 3F52.
 - 2. Slip-form Placement: Mix No. 3F32.
- B. Adjust the aggregate class A and gradation in the mixture to ensure compliance with 3.03 A.

PART 3 EXECUTION

3.01 FOUNDATION PREPARATION

- A. Excavate shape and compact foundation to planned section and grade.
- B. Remove unsuitable subgrade soil as directed.
- C. Provide and compact granular material to required depth.

3.02 INSTALLATION

- A. All work within pedestrian access routes (PAR) must comply with current ADA requirements. See MnDOT Special Provisions 1804 Prosecution of Work (ADA).
- B. Form Installation:
 - 1. Coat contact surfaces with form treating material conforming to MnDOT 3902 prior to concrete placement.
 - 2. Clean forms after each use.
- C. Slip-form Machine Placement: Inspect string line grade and verify with Engineer prior to placement.
- D. Placing and Finishing:
 - 1. Contactor shall have at least 2 people with a current ACI concrete flatwork associate, concrete flatwork finisher, or advanced flatwork finisher certification, and at least 1 of them must be onsite for every concrete pour.
 - 2. Wet foundation and inside form faces immediately prior to concrete placement.
 - 3. Strike off to required grade and float smooth.
 - 4. Hand-float top surface of curb face.
 - 5. Round joints and edges to 1/4 inch radii or sawcut to 1/8 inch wide within PAR.
 - 6. Lightly brush exposed surfaces to uniform texture.
 - 7. Fill cavities with mortar when side forms are removed.
 - 8. Check drainage. Finish gutter flowlines to eliminate low spots and avoid water entrapment.
- E. Service Line Location Markings:
 - 1. The Owner requires that sanitary sewer, water service, and sump pump service line locations be marked and recorded by the Contractor. This shall be accomplished by requiring the Contractor to place a stamped letter "S", "W", and "D" in the top of the concrete curb. The letters shall be 3 inches in height and protrude into the concrete a depth of 1/4-inch to 3/8-inch. If Contractor fails to place stamped letters as specified, Owner reserves the right to require Contractor to remove and replace curb panels at no cost to Owner.
 - 2. The curb stamps and stamping Work shall be provided by the Contractor as incidental Work.
- F. Metal Reinforcement: Provide and install according to plans and in accordance with MnDOT 2472 Metal Reinforcement.
- G. Joint Construction: Construct perpendicular to subgrade and aligned with similar joints in adjacent work.
 - 1. Transverse Isolation Joints:
 - a. Fill with 1/2 inch preformed joint filler material.

- b. Place transverse joints at right angles to alignment.
- c. Place as follows:
 - 1) At 60-foot intervals on tangent sections.
 - 2) 3 feet on each side of catch basins.
 - 3) At end of curved sections.
 - 4) At ends of curved portions of entrance and street returns.
 - 5) Where new construction surrounds or adjoins any existing fixed object.
 - 6) To separate curbs with isolation joints at driveway entrances with curved concrete aprons.
 - 7) To separate pedestrian ramps at intersection corners from curbs.
- 2. Contraction Joints:
 - a. Provide at 10-foot intervals in curb or curb and gutter constructions.
 - b. Provide at 20-foot intervals in solid median construction.
 - c. Form or saw to a minimum 2-inch depth from all exposed surfaces
- H. Curing and Protection:
 - 1. Provide in accordance with MnDOT 2531.3G:
 - 2. Cure minimum 72 hours after finishing.
 - 3. Protect from loss of moisture, rain damage, traffic, and extreme hot or cold temperatures.
 - 4. Curing Blanket Method:
 - a. Cover concrete with plastic or saturated burlap curing blankets as soon as practical without marring the surface.
 - b. Envelop concrete and prevent water vapor loss.
 - c. After curing, apply membrane curing compound to exposed surfaces.
 - 5. Membrane Curing Method:
 - a. Coat exposed surfaces with curing compound within 30 minutes after:
 - 1) Finishing or once bleed water has dissipated.
 - 2) Permanent removal of forms or curing blankets.
 - b. Apply uniformly at a rate of 1 gallon per 150 square feet of surface area with approved airless spraying machine.
 - 1) Provide airless spraying machines equipped with a recirculating bypass system that provides for continuous agitation of the reservoir material, separate filters for the hose and nozzle, and multiple or adjustable nozzle system that provides for variable spray patterns.
 - 2) Apply homogeneously to provide a uniform, solid, white, opaque coverage on exposed concrete surfaces (equal to a white sheet of typing paper) at the time of application.
 - c. Re-spray to provide proper coating.
- I. Backfill Construction: Protect newly placed concrete in accordance with MnDOT 2531.3.H.
- J. Joint Sealing: Not required.
- K. Deviations greater than 3/8 inch from a 10-foot straight edge on tangent lines or grades will be considered as defective work.
- L. Matching Existing Curb and Gutter: Where matching existing curb and gutter, reinforcement bars are to be drilled and grouted into the existing curb and gutter prior to placement of new curb and gutter.
- M. Spot curb and gutter replacement: Where either replacing existing curb and gutter or for repairs of defective work, contractor shall drill and grout reinforcement bars into adjacent curb and gutter prior to placement of new curb and gutter.

3.03 FIELD QUALITY CONTROL

- A. Surface Requirements: Within the warranty period, no finished surface area shall contain more than 1 surface defect per square yard. Any area not meeting this requirement will be considered as defective work.

B. Other Defective Work:

1. Any of the following conditions that occur within the warranty period will be considered as defective work.
 - a. Cracking outside of the control joints.
 - b. Surface imprints or chipping that does not conform to the specified texture and finish.

3.04 PROTECTION

- A. Backfill and compact adjacent area to cross-section shown on Drawings.
- B. Protect concrete from damage during backfill and compaction.
 1. Perform vibratory operations and backfilling at least 72 hours after placing the concrete or after the concrete reaches a compressive strength of at least 2,000 psi.
- C. Protect curbing from damage until acceptance of Work.

3.05 REPAIRS

- A. Remove and replace defective work in kind to the nearest control joint.

END OF SECTION

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SECTION 32 17 23

PAVEMENT MARKING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes application of temporary and permanent markings on pavement surfaces.
- B. Method of Measurement:
 - 1. Linear Pavement Markings:
 - a. Measure solid, broken, and dotted lines by distance in linear feet of applied material.
 - b. Gaps between broken and dotted lines will not be included in measurement.
 - c. Measure each of the following separately:
 - 1) Width
 - 2) Type
 - 3) Material
 - 2. Crosswalks:
 - a. Measure crosswalks by area in square feet of applied material.
 - 3. Pavement Messages:
 - a. Measure pavement messages by each as a unit of applied material.
- C. Basis of Payment:
 - 1. Payment for pavement markings and messages shall be at the Contract Unit Price as listed on the Bid Form.
 - 2. All associated Work items shall be considered incidental, including the following:
 - a. Materials.
 - b. Collection of survey data.
 - c. Marking of spot locations.
 - d. Initial pavement marking retroreflectivity.
 - e. Installation.
 - f. Pavement marking installation records.
 - g. Preparing the surface.
 - h. Controlling and protecting traffic.
 - i. Maintaining the Work through the duration of the Project.
 - j. Primers
 - k. Removing conflicting pavement markings and messages.

1.02 REFERENCES

- A. Minnesota Traffic Engineering Manual
- B. MnDOT:
 - 1. 2102 - Pavement Marking Removal
 - 2. 2580 - Interim Pavement Marking
 - 3. 2581 - Removable Preformed Pavement Marking and Message Tape
 - 4. 2582 - Pavement Markings
 - 5. 3354 - Preformed Pavement Marking Tape
 - 6. 3355 - Removable Preformed Pavement Marking Tape
 - 7. 3356 - Preformed Thermoplastic Pavement Marking
 - 8. 3590 - Multi-Component Liquid Pavement Markings
 - 9. 3591 - Water-Based Traffic Paint
 - 10. 3592 - Drop-On Glass Beads
- C. Minnesota Manual on Uniform Traffic Control Devices

1.03 SCHEDULE

- A. Place multi comp and paint pavement markings together with appropriate glass spheres in accordance with MnDOT 2582.
- B. Apply preformed pavement markings in accordance with manufacturer's specifications.
- C. Application of pavement markings during hours of darkness shall be allowed only by approval of Engineer.
- D. On pavement open to traffic, installation of pavement markings may be suspended by direction of Engineer during peak traffic hours or at any other time traffic is being unduly hampered or delayed by the Work in progress.
- E. Apply paint to bituminous surface within 24 hours after placement of final lift.
- F. Apply multi comp marking to pavement surface within time limits recommended by manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Preformed Pavement Marking Tape (Pref Tape): Provide in accordance with MnDOT 3354.
- B. Preformed Thermoplastic (Pref Thermo): Provide in accordance with MnDOT 3356.
- C. Multi-Component Liquid Pavement Marking (Multi Comp): Provide in accordance with MnDOT 3590.
- D. Water-Based Traffic Paint (Paint): Provide in accordance with MnDOT 3591.
- E. Drop-On Glass Beads: Provide in accordance with MnDOT 3592.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Clean the road by sweeping immediately prior to application.
- B. Do not apply pavement markings to wet surfaces.

3.02 APPLICATION

- A. Preformed Pavement Marking Application: Install preformed plastic pavement markings in accordance with the manufacturer's specifications and with MnDOT 2582.
- B. Multi-Component Liquid Pavement Marking Application:
 - 1. Apply pavement markings and glass beads in accordance with MnDOT 2582.
- C. Water-Based Traffic Paint Application:
 - 1. Equipment:
 - a. Application equipment for permanent markings shall consist of a machine of the spray type capable of applying the material under pressure at a controlled temperature through nozzles equipped with remotely controlled cutoff mechanisms and suitable line guides that will produce clean cut lines and prevent excessive material drift. The marking material shall be applied with truck-mounted traveling units properly equipped to apply the paint stripes as required. Where 2 or more lines are to be applied closely spaced, the machine shall be equipped to apply those stripes simultaneously. For application of broken lines, the spray

unit shall include an automatic feed control device capable of being set to produce the specified stripe to gap ratio. The truck equipment shall be capable of accumulating the length applied by each gun individually each day. Only material application shall activate the length accumulators. The read out shall be digital and not externally adjustable.

- b. Vehicles in the striper train shall be deployed and equipped with traffic control devices as set forth in the "Field Manual" of the Minnesota Manual on Uniform Traffic Control Devices. Additionally, the shadow vehicle shall be equipped with a truck-mounted attenuator on high speed (SPEED LIMIT 40 miles per hour and greater), high volume (ADT 1500 and greater) highways.
 - c. The equipment shall also be capable of applying glass beads by a pressurized system. All guns on the spray cartridge shall be in full view of the operators during the spraying operation.
 - d. Pavement markings shall only be applied when the air temperature is at least 50 degrees Fahrenheit unless the manufacturer, in writing, authorizes a lower temperature. Markings shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied. No striping operations will be permitted between sundown and sunrise without written permission from Engineer.
 - e. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage. Waste material, spent solvents and cleaning materials shall be properly stored and disposed of in accordance with all federal, state, and local laws, regulations, and ordinances.
2. Apply water-based traffic paint and glass beads in accordance with MnDOT 2582.

D. Spacing and Layout:

1. Apply all markings in accordance with Drawing layout, Details and MnDOT Pavement Marking Typical Detail Sheets.
2. Center 4 inch space between double lines on the roadway centerline, as shown on Drawings, or as directed by Engineer.
3. Provide 4 inch space between 4 inch solid yellow and 4 inch broken yellow where used for center left turn lane delineation or for centerline striping.
4. Apply broken lines in a pattern of 10 feet of marking and 40 feet of space.
5. Apply 24 inch wide stop lines from edge of gutter across all approach lanes to the intersection, as shown in Drawings.
6. Locate 24 inch wide stop lines 4 feet behind crosswalk pavement markings or as directed by Engineer.
7. Apply zebra crosswalk design in accordance with the Drawings and MnDOT Pavement Marking Typical Detail Sheets.
8. Transverse areas shown on Drawings and MnDOT Pavement Marking Typical Detail Sheets shall consist of:
 - a. Solid lines: 12 and 24 inch, in accordance with the Drawings.
 - b. Solid double yellow line: Install along each end of the transverse markings in accordance with the Drawings.
 - c. 20 feet of space shall be left between each transverse line, in accordance with the Drawings.
9. Turn Lane Pavement Messages:
 - a. Install as shown in Drawings, MN MUTCD and MnDOT Pavement Marking Typical Detail Sheets.
 - b. Top-to-bottom length of turn arrows shall be 6'-11".
 - c. Top-to-bottom length of words (ONLY) shall be 8'-0".
10. Railroad Crossing Pavement Messages: Install as shown in Drawings, MN MUTCD and MnDOT Pavement Marking Typical Detail Sheets.
11. Distance between arrows in 2-way center left turn lanes shall be 32 feet, measured from top of arrow to top of arrow.
12. Engineer shall place necessary "spotting" at appropriate points to provide horizontal control for striping, and determine necessary starting and cutoff points.
 - a. Skip-line intervals will not be marked.
 - b. Longitudinal joints and pavement edges shall serve as horizontal control when directed by Engineer.

13. At the time of applying the marking material, the application area shall be free of contamination. Contractor shall clean the roadway surface prior to the line application in a manner and to the extent required by Engineer.
 14. Application for the marking material shall be such as to provide uniform film thickness through the coverage area. Stripe ends shall be clean cut and square, with a minimum of material beyond the cutoff.
 15. All pavement markings not conforming to the requirements of the Contract shall be removed and placed or otherwise repaired to the satisfaction of the Engineer. Removal of unacceptable Work shall be accomplished with suitable blasting or grinding equipment unless other means are approved by Engineer.
 16. If Engineer requires removal and replacement of a deficient line, message or symbol, Contractor shall remove, by an approved process, at least 90 percent of the marking material without excessive scarring the existing pavement. The removal width shall be approximately 25 mm (1 inch) wider all around the deficient marking.
 17. A tolerance of + 1/4 inch per 10 feet from the specified width will be allowed for striping provided the variance is gradual and does not detract from the general appearance.
 - a. Lengths for the broken line segments may vary no more than plus or minus 3 inches.
 - b. Alignment deviations from the control guide or existing lines specified by the Engineer shall not exceed 2 inches.
 - c. Transverse position of linear markings may vary no greater than 1 inch per 10 feet. Material shall not be applied over a longitudinal joint.
 - d. Establishment of application tolerances shall not relieve the Contractor of the responsibility to comply as closely as practicable with the planned dimensions.
- E. Recessing: For Ground In (Gr In) pavement markings, recess the pavement markings in accordance with MnDOT 2582.3.B.7.
- F. Color: Provide pavement markings in the color specified for each respective material in Article 2.01 Materials above and shown on the Drawings.
- G. Retroreflectivity:
 1. Provide pavement markings meeting the minimum initial pavement marking retroreflectivity in accordance with MnDOT 2582.3.C.3 Table 2582.3-2.
 - a. Remove and replace materials not meeting the minimum initial retroreflectivity values
- H. Pavement Marking Installation Record:
 1. Provide a record of permanent pavement marking installations per MnDOT 2582.3.F.

3.03 PROTECTION OF TRAFFIC AND MARKINGS

- A. Furnish and install all necessary warning and directional signs and devices in order to; maintain traffic whenever pavement markings are applied in the presence of traffic, and to protect uncured markings as needed until traffic can cross markings without damaging markings.
- B. When necessary, a pilot car and flaggers shall be used to provide adequate control and direction of traffic.
- C. Warning signs and barricades shall be placed only where marking operations are in progress, shall be relocated as often as necessary, and shall not be left in place overnight.
- D. Traffic shall be allowed to keep moving at all times and the striping equipment shall be operated in a manner that will not make it necessary for traffic to cross uncured markings.
- E. Protective devices such as “cones” shall be an approved type that will not cause damage to the vehicle when accidentally struck.

END OF SECTION

SECTION 32 18 20

WALKS (MnDOT 2521)

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Concrete walkway.
 - 2. Temporary building access.
 - 3. Concrete truncated dome.

- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 32 11 22 - Aggregate Base
 - 3. Section 32 16 20 - Concrete Curbing

- C. Method of Measurement:
 - 1. Measure by area in square feet.
 - 2. Measure each thickness and type separately.
 - 3. Measure each pedestrian ramp per square foot.
 - 4. Alternate Pedestrian Route: Measure by Lump Sum.
 - 5. Concrete Step (Riser): Measure each series of steps by each as a unit.

- D. Basis of Payment:
 - 1. Placement of granular materials will be considered incidental.
 - 2. Excavation of existing soils before placement of walk and granular materials will be considered incidental.
 - 3. Payment for walk construction shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 4. Payment for truncated dome system shall be by square foot.
 - 5. Drilling and grouting reinforcement bars required for pedestrian ramp construction and match-ins shall be considered incidental.
 - 6. No measurement will be made of the various items that constitute Alternate Pedestrian Route, but all such work shall be construed to be included in the lump sum payment. The lump sum payment shall be compensation in full for all costs of furnishing, installing, maintaining, and removing the individual devices.

1.02 REFERENCES

- A. MnDOT:
 - 1. 1804 - Prosecution of Work (ADA) - Special Provisions
 - 2. 2360 - Plant Mixed Asphalt Pavement
 - 3. 2461 - Structural Concrete
 - 4. 2521 - Walks
 - 5. 3149 - Granular Material
 - 6. 3301 - Reinforcement Bars
 - 7. 3702 - Preformed Joint Fillers
 - 8. 3754 - Poly Alpha Methylstyrene (AMS) Membrane Curing Compound
 - 9. 3756 - Plastic Curing Blankets

1.03 DEFINITIONS

- A. Surface Defects: Any of the following conditions:
 - 1. Any loss of aggregate or mortar from the surface that is larger than 1/4-inch in diameter and greater than 1/4-inch in depth.

1.04 SUBMITTALS

- A. Bituminous Mixture: Submit job mix formula using proposed aggregate source.
- B. Concrete Mix Submittals:
 - 1. Include name and address of transit-mix concrete supplier with submissions for Section 01 29 10.
 - 2. Catalog information on admixtures or agents to be included in mix.
 - 3. List of concrete mix designs at least 15 days prior to start of Work.
- C. Shop Drawings: Provide for precast concrete or truncated domes.
- D. Samples:
 - 1. Submit color samples for exposed aggregates and joint sealants.
 - 2. Submit samples of embedment's, other materials and components, if requested by Engineer.
- E. Quality Assurance/Control Submittals:
 - 1. Test Reports: Report test results to Engineer.
 - 2. Certificates: If transit-mix concrete is used, the transit-mix concrete supplier shall furnish Certificate of Compliance with Construction Documents.
 - 3. Provide details of proposed method to seal truncated dome system and mitigate freeze/thaw damage through moisture intrusion to Engineer 2 weeks prior to commencement of Work.
- F. Preinstallation Meeting: Meet with Engineer prior to the start of installation.
- G. Cold Weather Protection Plan:
 - 1. Submit proposed time schedule and plans for cold weather protection in writing to Engineer in accordance with MnDOT 2521.3.E.3.

1.05 QUALITY ASSURANCE

- A. Comply with ADA requirement for use of truncated domes/detectable warning systems on pedestrian curb ramps.
- B. Produce concrete from MnDOT certified plants.

1.06 PROJECT CONDITIONS

- A. Drawings do not purport to show actual dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials:
 - 1. Concrete: MnDOT 2461.
 - 2. Preformed Joint Filler: MnDOT 3702.
 - 3. Bituminous Mixture: MnDOT 2360.
 - 4. Granular Materials: MnDOT 3149.
- B. Forms:
 - 1. Wood or metal with smooth contact face.

2. Minimum form height: Proposed concrete thickness.
- C. Accessories:
1. Curing Materials:
 - a. Burlap Curing Blankets MnDOT 3751.
 - b. Plastic Curing Blankets: MnDOT 3756.
 - c. Poly-Alpha Methyl Styrene (AMS) Membrane Curing Compound: MnDOT 3754.
 - d. Linseed Oil Membrane Curing Compound: MnDOT 3755.
 2. Slip-resistant Finish:
 - a. Factory-graded, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate.
 - b. Nonglazing, rustproof, unaffected by freezing, moisture, and cleaning materials.
 3. Truncated Dome System:
 - a. Meet requirements of Drawings.
 - b. Color:
 - 1) Contrast visually from adjacent walking surfaces.
 - 2) Color homogeneous throughout thickness of product.
 - 3) No epoxy coating required.

2.02 MIXTURE PROPORTIONS

- A. Concrete:
1. Mix: No. 3F52.
 2. Adjust the aggregate class and gradation in the mixture to ensure compliance with 3.02 F.

PART 3 EXECUTION

3.01 ALTERNATE PEDESTRIAN ROUTE

- A. Maintain and guide pedestrian traffic through the Project at all times using continuous Alternate Pedestrian Routes (APRs) per standards set forth in the MN MUTCD Chapter 6D. Provide each APR to the same level of accessibility of each existing access and walkway prior to construction. Incorporate accessible pedestrian signals (APS), temporary curb ramps, pedestrian barricades, pedestrian channelizers, detectable edges, temporary walkway surfaces and other accessible design features as necessary. Provide continuous walkway surfaces that are smooth, stable and slip resistant. Use accessible device standards as shown in Figures 6K-12 and 6K-13 in the Field Manual. Use 6F.74.1 from the MN MUTCD if using temporary walkway surface devices as part of the continuous walkway surface over short segments of rough, soft or uneven ground.
- B. Minimize disruption to pedestrians to the maximum extent feasible by providing APRs in the following order of preference:
1. Provide the APR on the same side of the street as the disrupted route utilizing bypasses.
 2. Where it is not feasible to provide a same side APR, provide an APR on the other side of the street.
 3. Where it is not feasible to provide an APR on the other side of the street, provide an APR detour with trailblazing signs.
- C. Schedule and coordinate the replacement of pedestrian access to accommodate the needs of businesses 7 days prior to the replacement. Leave the existing sidewalks in-place until such time that it is required to remove them to accommodate new construction. Pedestrian access may be provided to businesses through the use of any public access from adjacent parking lots and side streets. Provide front door access to buildings without alternate public entrances.
- D. Protect the pedestrian route with pedestrian barricades or pedestrian channelizing devices if it is adjacent to construction, excavation drop-offs, traffic, or other hazards. Protect the pedestrian route with portable barrier if it is on the shoulder or in a parking lane. When both sides of a pedestrian route require channelizing devices, use similar types, unless portable barrier is used to protect pedestrians from traffic.

- E. Notify the Engineer in writing at least 48 hours prior to the start of any construction operation that will necessitate a change in pedestrian access.
- F. Furnish the name, email, and phone number of at least one individual responsible for the maintenance of the APR. This individual shall be "on call" 24 hours a day, seven days per week during the times any devices, furnished and installed by the Contractor, are in place. Submit the required information to the Engineer at the pre-construction meeting.

3.02 PREPARATION

- A. Foundation:
 - 1. Aggregate base, Class 5.
 - 2. Excavate, shape, and compact subgrade soils as shown on the Drawings.
 - 3. Remove snow, ice, or frost from subbase surface. Do not place concrete on frozen surfaces.
 - 4. Proof-roll prepared subbase surface below concrete walks to identify soft pockets and areas of excess yielding.
 - 5. Remove unstable subgrade soils and loose material from compacted subbase surface.
- B. Temporary Walkways: Provide where required to maintain access into building entrances.
- C. Protection: Provide adequate barricades and personnel to protect fresh concrete from pedestrian traffic and graffiti.
- D. Forms: Clean after each use and coat with form-release agent.

3.03 CONCRETE INSTALLATION

- A. All work within pedestrian access routes (PAR) must comply with current ADA requirements. See MnDOT Special Provisions 1804 Prosecution of Work (ADA).
- B. Contactor shall have at least two people with a current ACI concrete flatwork associate, concrete flatwork finisher, or advanced flatwork finisher certification, and at least one of them must be onsite for every concrete pour.
- C. Placing:
 - 1. Thoroughly wet foundation and forms prior to concrete placement.
 - 2. Place and consolidate concrete to fill all voids.
 - 3. Screed surface with straightedge and strike off to required grade.
 - 4. Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause excessive moisture loss before and during finishing operations.
- D. Tolerances:
 - 1. Surface: Plus or minus 3/16 inch from 10 foot straightedge.
 - 2. Edges: Plus or minus 1/2 inch from staked location and grade.
- E. Joint Construction:
 - 1. Divide walk into uniform sized panels and outline with contraction or isolation joints.
 - 2. Joints shall be:
 - a. Vertical and straight.
 - b. Parallel to or at right angles to edge of walk.
 - c. Align with like joints in adjoining work.
 - d. 1/8-inch wide for contraction joint.
 - e. 1/2-inch wide for isolation joint.
 - 3. Round all joints and edges with a 1/4-inch radius edging tool.
 - 4. Joints may be saw cut:
 - a. If saw cutting, provide 1/8-inch contraction joints within PAR.
 - 5. When greater than 50 feet of continuous sidewalk runs are constructed, all joints shall be sawcut.
 - 6. Extend contraction joints to minimum 1/3 of thickness of walk.

7. Extend isolation joints to full thickness of walk.
8. Place 1/2 inch preformed joint filler adjacent to fixed objects.
9. Maintain forms in-place for minimum 24 hours after concrete placement.
10. Clean ends of joints and point-up any minor honeycombed areas.

F. Finishes:

1. Broom Finish:
 - a. Fine line texture, perpendicular to line of traffic.
 - b. Lightly brush surface to uniform texture.
2. Float Finish: Smooth.
3. Slip-resistant Aggregate Finish:
 - a. Before final floating, spread slip-resistive aggregate finish on surface according to manufacturer's written instructions.
 - b. Use curing compound recommended by slip-resistive aggregate manufacturer immediately after final finishing.
 - c. After curing, lightly work surface with steel wire brush or abrasive stone and water to expose nonslip aggregate.
4. Monolithic exposed-aggregate finish.
5. Edge joints.

G. Curing and Protection:

1. Provide in accordance with MnDOT 2521.3E.
2. Cure minimum 72 hours after finishing.
3. Protect from loss of moisture, rain damage, traffic, and extreme hot or cold temperatures.
4. Curing Blanket Method:
 - a. Cover concrete with plastic or saturated burlap curing blankets as soon as practical without marring the surface.
 - b. Envelop concrete and prevent water vapor loss.
 - c. After curing, apply membrane curing compound to exposed surfaces.
5. Membrane Curing Method:
 - a. Coat exposed surfaces with curing compound within 30 minutes after:
 - 1) Finishing or once bleed water has dissipated.
 - 2) Permanent removal of forms or curing blankets.
 - b. Apply uniformly at a rate of 1 gallon per 150 square feet of surface area with approved airless spraying machine.
 - 1) Provide airless spraying machines equipped with a recirculating bypass system that provides for continuous agitation of the reservoir material, separate filters for the hose and nozzle, and multiple or adjustable nozzle system that provides for variable spray patterns.
 - 2) Apply homogeneously to provide a uniform, solid, white, opaque coverage on exposed concrete surfaces (equal to a white sheet of typing paper) at the time of application.
 - c. Re-spray to provide proper coating.

H. Backfill Construction:

1. Protect concrete from damage during backfill and compaction.
 - a. Perform vibratory operations and backfilling at least 72 hours after placing the concrete or after the concrete reaches a compressive strength of at least 2,000 psi.

I. Surface Requirements: Within the warranty period, no finished surface area shall contain more than 1 surface defects per square yard. Any area not meeting this requirement will be considered as defective work.

J. Other Defective Work:

1. Any of the following conditions that occur before final completion of the Project:
 - a. Concrete surfaces not applied with curing media as noted in specifications.
 - b. Concrete surfaces vandalized or damaged before or after curing.
2. Any of the following conditions that occur within the warranty period will be considered as defective work.
 - a. Cracking outside of the control joints.

- b. Surface imprints or chipping that does not conform to the specified texture and finish.

3.04 REPAIR/RESTORATION

- A. Backfill areas adjacent to walk with excavated materials; grade and finish.
- B. Protect from damage during backfill and compaction.
- C. Protect from damage until acceptance of Work.

3.05 CONCRETE REPAIRS

- A. Remove and replace defective work in kind to the nearest control joint.
- B. Drill and grout reinforcement bars or dowels to adjacent panels if repairs are within or connect to pedestrian ramps.

3.06 CLEANING

- A. Do not allow accumulation of scraps and debris arising from Work of this Section.
- B. Maintain premises in neat, orderly condition.
- C. Promptly clean surfaces not to receive concrete.

END OF SECTION

SECTION 32 31 26

WOVEN WIRE FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide
 - 1. Woven wire fence.
 - 2. Vehicle gate.
 - 3. Pedestrian gate.
 - 4. Fence accessories.

- B. Related Sections:
 - 1. Section 01 12 16 - Work Sequence
 - 2. Section 01 33 00 - Submittal Procedures
 - 3. Section 10 14 23 - Security Signs
 - 4. Section 31 23 16 - Structure Excavations and Backfills

- C. Method of Measurement
 - 1. Woven wire fence: Measure by length in linear feet of fence installed.
 - 2. Pedestrian Gate: Measure each type and size of gate installed as a unit.
 - 3. Vehicle Gate: Measure each type and size of gate installed as a unit.

- D. Basis of Payment:
 - 1. Payment for acceptable quantities of fencing and gates, furnished and installed, shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

- E. Refer to Section 01 12 16 for information related to operations around the wastewater ponds during construction of the new fence and gates.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data, finishes, dimensions of individual components and profiles, and installation instructions for fencing, fabric, gates, and accessories.

- B. Shop Drawings:
 - 1. Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, hardware, and accessories.
 - 2. Indicate materials, dimensions, sizes, weights, and finishes of components.
 - 4. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and
 - 5. other required installation and operational clearances.

- C. Product Certificates: For each type of woven wire fence and gate, signed by product manufacturer.

- D. Testing: Strength test results for framing per ASTM F1043.

1.03 QUALITY ASSURANCE

- A. Provide woven wire fences and gates as complete units by single source including necessary erection accessories, fittings, and fastenings.

PART 2 PRODUCTS

2.01 GENERAL

- A. Fence shall consist of 48-inch high woven wire fabric surmounted by 2 strands of barbed wire.

2.02 WOVEN WIRE FENCE FABRIC

- A. Fabric shall be minimum 9 gage finished sized galvanized steel wires, 2-inch by 4-inch mesh, per ASTM A390.
- B. Coating shall be 1.2 ounce galvanized coating per ASTM A392.

2.03 BARBED WIRE

- A. Comply with ASTM A121
- B. Two strand, 12-1/2 gage wire with 14 gage, 4 point round barbs spaced 5 inches on center.
- C. Metal and finish to match fabric.
- D. ASTM A121 including Class 3 galvanized coating requirement.

2.04 POSTS

- A. Refer to Drawing details.
- B. Corner posts shall be minimum 5-inch diameter by 8 foot long preservative treated wood posts. 4 inch by 4 inch preservative treated wood top rails between corner posts.
- C. Line posts shall be minimum 3 1/2 inch diameter by 8 foot long preservative treated wood posts.
- D. Steel posts shall be 1.4 LBS/L.F. MIN. by 7.0 feet long

2.05 CONCRETE

- A. Concrete
 1. Consisting of portland cement - ASTM C150, aggregates - ASTM C33, and clean water.
 2. Mix materials to obtain concrete with minimum 28-day compressive strength of 3,000 psi using minimum 4 sacks of cement per cubic yard.
 3. 1-inch maximum size aggregate.
 4. Maximum 3-inch slump.
 5. 2 to 4 percent entrained air.

2.06 GATE

- A. Vehicle Gate:
 1. Size and location as shown on Drawings.
 2. Frame: Galvanized 1 5/8-inch diameter steel pipe.
 3. Fabric: No. 9 gage 2-inch by 4-inch non-climbable galvanized fabric.
 4. Center Brace: Double 3/8 inch by 3/4 inch channel iron
 5. Include two strands of barbed wire above frame
 6. Include chain latched padlocks for both gates
 7. Provide minimum 5 inch diameter by 8 foot long preservative treated posts adjacent to gates buried minimum of 3 feet. Two sets included at vehicle gate. Single set included at pedestrian gate.

PART 3 EXECUTION

3.01 SITE PREPARATION

- A. Removal of existing fencing must be completed prior to installation of new fencing.
- B. Installation shall not begin prior to completion of final grading.

3.02 POST LOCATION

- A. Space line posts equidistant at intervals not exceeding 10 feet.
- B. Set terminal posts (end and corner) at beginning and end of each continuous length of fence and abrupt changes in vertical and horizontal alignments. Refer to Drawings for details.
- C. Long straight runs pull posts: Intervals not to exceed 500 feet.

3.03 POST SETTING

- A. Dig or drill holes for posts to diameters and spacings indicated in the Drawings.
- B. Set posts in vertical position, plumb and in line.
- C. Backfill into excavation and compact.
- D. Embed corner, end, and brace posts in concrete. Refer to Section 03 30 00.

3.04 POST BRACE INSTALLATION

- A. Install post bracing at end posts and on both sides of corner and pull boxes.
- B. Bracing: Mounted horizontally between post to be braced and adjacent to line post.
- C. Space bracing at mid-height of fabric. Truss back to base of end, corner, and gate or pull post with 3/8-inch truss rod with turnbuckles.

3.05 FENCE FABRIC

- A. Install fabric on outside of area to be enclosed. Install 2 inches above ground level.
- B. Place fabric by securing one end, applying tension to remove slack before making attachment elsewhere.
- C. One stretcher bar shall be provided for each end post and 2 for each corner and pull post. Stretcher bar shall be threaded through fabric and fastened with clamp and bolts at intervals not exceeding 15 inches on center.
- D. Fasten fabric to line posts at intervals not exceeding 12 inches on center. Fasten fabric to rail and tension wire at intervals not exceeding 24 inches on center.

3.06 BARBED WIRE

- A. Pull barbed wire taut to remove sag, firmly install in slots of extension arms, and secure to post or terminal arm.

3.07 GATES

- A. Gates:
 - 1. install plumb, level, secure for full opening without interference.

2. Install ground-set items in concrete for anchorage.
3. Adjust hardware for smooth operation, lubricate where necessary.

3.08 ADJUSTING

- A. Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range.
- B. Confirm latches and locks engage accurately and securely without forcing or binding.
- C. Lubricate hardware.

3.09 SECURITY SIGN INSTALLATION

- A. Install security signs as shown in the Drawings. Refer to Section 10 14 23.

3.10 CLEANING

- A. Site:
 1. Do not allow accumulation of scraps, debris arising from Work of this Section.
 2. Maintain premises in neat, orderly condition.
- B. System:
 1. Immediately after erection, clean field welds, bolted connections, and abraded areas.
 2. Refinish exposed or abraded areas with same material used for shop finishing to comply with SSPC-PA 1 for touching up shop-finished surfaces.
 3. Comply with ASTM A780 for repair of damaged hot dip galvanized coating.

END OF SECTION

SECTION 32 40 00
SITE ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide (material list will vary per project specifics):
 - 1. Landscape Rock
 - 2. Tent Tiedowns

1.02 REFERENCES

- A. ACI 318 - Code Requirements for Structural Concrete
- B. ASTM:
 - 1. C94 - Ready Mix Concrete
- C. MnDOT:
 - 1. 2461 - Structural Concrete
 - 2. 2564.3 - Construction of Traffic Signs

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Landscape Rock: Submit size, color, and supplier location.
- C. Tent Tie Down: Mooring Eye manufacturer.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide site accessory units as coordinated assemblies made from components of standard construction furnished by 1 manufacturer for each system.
- B. Field samples: If requested, furnish sample of each type of site accessory to Engineer for review prior to installation.
- C. Regulatory Requirements: Comply with ADA requirements for site accessories.
- D. Preinstallation Meetings: If requested by Engineer, installer and manufacturer's technical representative shall meet with Engineer prior to start of installation.

1.05 PROJECT CONDITIONS

- A. Inspect Site prior to installation. If conditions do not meet approval, notify Engineer immediately.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mooring Eye:
 - 1. Accepted Manufacturer: Subject to compliance with requirements, acceptable manufacturers and products are:
 - a. Neenah R-3490-A.

- b. Or equal.

2.02 MATERIALS

- A. Landscape Rock:
 - 1. Provide same type, size, and color of existing landscape rock.

2.03 CONCRETE BASE

- A. Provide portland cement concrete slab with reinforcement.
 - 1. Mix: MnDOT 3G52.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with manufacturer' s recommendations.
- B. Tent Tie Down Concrete Base:
 - 1. Install in accordance with MnDOT 2461.
 - 2. Smooth surface by screeding and mechanical floating.
 - a. Use hand methods only where mechanical floating not possible.
 - b. Adjust floating to compact surface and produce uniform texture.
 - 3. Provide final brooming.
 - 4. After excess moisture or surface sheen has disappeared, apply spray-on retarder to surface in accordance with manufacturer's instructions. Remove with pressure spray and seal as specified.
 - 5. Cure minimum of 72 hours.

3.02 CLEANING

- A. After installation, clean all surfaces.
- B. Clean up remnants of excavation, concrete, other construction materials, and equipment used in Work.
- C. Separate and recycle waste materials in accordance with waste management plan and to extent economically feasible.

END OF SECTION

SECTION 32 91 00

TOPSOIL PLACEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Provide the following:
 - 1. Subsoil preparation.
 - 2. Soil composition.
 - 3. Placement of topsoil.
 - 4. Soils Report:
 - a. Existing topsoil.
 - b. Amended topsoil.
- B. Related Sections:
 - 1. Section 32 92 12 - Establishing Turf and Controlling Erosion
- C. Basis of Payment:
 - 1. Where not noted in Drawings as part of lump sum bid item:
 - a. Payment for acceptable quantities of select topsoil borrow shall be at the contract unit price as listed on the Bid Form.
 - b. Associated work items shall be incidental to unit price.
 - c. Importation of materials required for provision of topsoil is incidental to Work.
 - 2. Where noted in Drawings as part of the following lump sum bid items:
 - a. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1) Primary Pond Control Structure (Alternate 6)

1.02 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Quality Assurance/Control Submittals:
 - 1. Test Reports:
 - a. Provide following qualification tests and information for topsoil either imported or prepared from on-site material.
 - b. Submittal to be prepared by independent testing lab, state university soils science department, or other recognized soil physics testing laboratory to indicate that proposed material complies with specified requirements.
 - 1) Mechanical gradation analysis, ASTM D422.
 - 2) Materials qualification test.
 - 3) Recommendation for type and application rate of amendments needed to adjust topsoil to required nutrient levels for each proposed landscape operation, including, seeding, sodding, planting.

PART 2 PRODUCTS

2.01 SOILS MATERIALS

- A. Topsoil for Irrigated Areas:
 - 1. Material consisting of fertile, friable, fine sandy loam, uniform in composition.
 - 2. Capable of sustaining vigorous plant growth.
 - 3. Free of subsoil, stones, lumps, clods of hard earth, plants, plant roots, sticks, noxious weeds, slag, cinders, demolition debris or other extraneous matter over 1 inch in largest dimension.

4. Conforming to following chemical and physical attributes:
- a. Allowable limits of topsoil mechanical analysis based on percent of dry weight of samples:

	Minimum Percent	Maximum Percent
No. 4 Sieve	100	---
No. 10 Sieve	80	90
No. 200 Sieve	15	25
Silt (particles 0.005-0.05 mm) ⁽¹⁾	10	20
Clay (particles < 0.005 mm) ⁽¹⁾	5	10

⁽¹⁾ Silt-Clay ratio: 2:1 or less

- B. Topsoil for Non-Irrigated Areas:
1. Material consisting of fertile, friable, loam, uniform in composition.
 2. Capable of sustaining vigorous plant growth.
 3. Free of subsoil, stones, lumps, clods of hard earth, plants, plant roots, sticks, noxious weeds, slag, cinders, demolition debris or other extraneous matter over 1 inch in largest dimension.
 4. Conforming to following chemical and physical attributes:
 - a. Allowable limits of topsoil mechanical analysis based on percent of dry weight of samples:

	Minimum Percent	Maximum Percent
No. 4 Sieve	100	---
No. 10 Sieve	80	90
No. 200 Sieve	40	60
Silt (particles 0.005-0.05 mm) ⁽¹⁾	10	40
Clay (particles < 0.005 mm) ⁽¹⁾	5	20

⁽¹⁾ Silt-Clay ratio: 2:1 or less

- b. Allowable maximum limits of mechanical analysis of sand and gravel fraction based on dry weight of total fraction sample:

	Minimum Percent	Maximum Percent
Very Fine Sand (< 0.15 mm)	0	5
Fine Sand (0.15-0.25 mm)	0	20
Coarse Sand (0.25-1.00 mm)	60	100
Very Coarse Sand (1.00-2.00 mm)	0	10
Gravel (> 2.00 mm)	0	5

⁽¹⁾ Silt-Clay ratio: 2:1 or less

- C. Final Topsoil Nutrient Values After Amendment (if required):
1. Organic Matter: 4.0 percent minimum, 10.0 percent maximum.
 2. Extractable Phosphorus: 25 parts per million by weight minimum.
 3. Exchangeable Potassium: 125 parts per million by weight minimum.
 4. pH: 5.5 minimum, 7.0 maximum, 6-6.5 preferred.
 5. Soluble Salts: 3 mmhos/cm maximum.
 6. Lead Content: Less than 400 parts per million.
- D. On-site Base Mixture: To extent available, and if modified to meet requirements, select on-site material may be used as base mixture for preparation of topsoil.
- E. Import supplemental materials as necessary to satisfy specified topsoil requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which topsoil preparation and placement are to be performed.
1. Verify final subgrade has been established.

2. Verify topsoil meets requirements of this Section and soils testing lab report identifying required amendments is completed.

B. Discrepancies:

1. Immediately notify Engineer.
2. Do not proceed in areas of discrepancy until fully resolved.
3. Commencement of topsoil placement signifies acceptance of surface conditions. Do not proceed until unsatisfactory conditions have been corrected.

3.02 STORAGE/STOCKPILE

- A. Stockpile topsoil/planter soil component materials in such a manner that natural drainage is not obstructed and that no off-site sediment transmission will result.
- B. Place stockpiles with maximum 2:1 sideslopes.
- C. Construct a temporary perimeter dike with gravel outlet, or fabric sediment barrier around topsoil component stockpiles.
- D. Provide temporary seeding of stockpiles within 2 days of formation of stockpile.

3.03 PREPARATION AND PLACEMENT

A. Topsoil Placement Preparation:

1. Provide erosion and sediment control items such as diversions, berms, dikes, waterways, sediment basins, as specified or as needed.
2. Remove debris from areas to be topsoiled, including excess concrete and concrete spoils adjacent to back of curb locations, and excavation spoils.
3. Eliminate uneven areas and low spots; maintain indicated grades and make changes in grade gradual by blending slopes into more level areas.
4. After the areas to be topsoiled have been brought to inferred subgrade elevations, and immediately prior to dumping and spreading approved topsoil, loosen and condition the subgrade by power rototilling to a minimum depth of 8 inches to ensure removal of gross subgrade debris and bonding of the topsoil and subsoil; no substitute operations acceptable.
5. After rototilling and prior to placement of the topsoil, scalp or otherwise remove all visible stones, clods of hard earth, roots, plant parts, stumps, sticks, weeds, demolition or construction debris, or any other extraneous non-earth material in excess of 1 inch in size.

B. Topsoil Placement:

1. Do not place topsoil more than 2 weeks prior to planned commencement of Project planting operations.
2. Do not place wet or muddy topsoil, when subgrade is excessively wet, or in condition that may otherwise be detrimental to subsequent Work.
3. Correct irregularities in surface resulting from placement or other operations to prevent formation of depressions or water pockets.
4. Avoid excessive compaction of topsoil.
5. Protect topsoiled areas from weather based erosion until planting operations commence.

END OF SECTION

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SECTION 32 92 12

ESTABLISHING TURF AND CONTROLLING EROSION (MnDOT 2575)

PART 1 GENERAL

1.01 SUMMARY

- A. Establishment of herbaceous ground cover on designated areas.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 25 10 - Stormwater Management
- C. Method of Measurement:
 - 1. Turf Establishment: Measure by square yards of acceptably established turf. No measurement will be made of any individual component in providing acceptable turf. Turf Establishment includes the following:
 - a. Seed mixture as designated in the Drawings and Specifications.
 - b. Mulch/Hydraulic Stabilizers/Erosion Control Blanket/Turf Reinforcement Mat.
 - c. Fertilizer as designated in the Drawings and Specifications.
 - d. Soil Preparation
 - 2. Over-Seeding: Over-seeding during the maintenance period will be considered incidental. After maintenance period, measure by square yards of acceptably over-seeded area.
 - 3. Mowing and Weed Control: Mowing and weed control during the maintenance period will be considered incidental.
 - 4. Water for Turf Establishment: Measured in 1,000 gallons (MGal).
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of Establishing Turf and Controlling Erosion shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 2. Payment for Turf Establishment will be made per the following schedule:
 - a. When seed is placed, 60 percent of the bid unit price will be paid.
 - b. When 60-day maintenance period expires, 95 percent of the bid unit price will be paid for Seeding that meets Project Specifications.
 - c. When an acceptable stand of grass has been established, 100 percent of the bid unit price will be paid for Seeding.
 - 3. Where noted in Drawings as part of the following lump sum bid items:
 - a. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1) Primary Pond Control Structure (Alternate 6).

1.02 REFERENCES

- A. MnDOT:
 - 1. 2573 - Storm Water Management
 - 2. 2574 - Soil Preparation
 - 3. 2575 - Establishing Vegetation and Controlling Erosion
 - 4. 3876 - Seed
 - 5. 3877 - Topsoil Material
 - 6. 3878 - Sod
 - 7. 3879 - Agricultural Lime
 - 8. 3881 - Fertilizer
 - 9. 3882 - Mulch Material
 - 10. 3884 - Hydraulic Erosion Control Products

11. 3885 - Rolled Erosion Prevention Products
12. 3890 - Compost

1.03 SCHEDULE OF WORK

- A. Coordinate turf establishment to minimize lag time after topsoil placement.
- B. Plant seed mixtures during the seasons of planting in accordance with MnDOT 2575.3.A.2.a.
- C. All boulevards to have topsoil placed and prepped for seeding prior to the Substantial Completion date. This Work shall be completed even if weather delays the permanent seeding of the boulevards.

1.04 SUBMITTALS

- A. Submit certified test report for each seed mixture.
- B. Submit weed spraying and over-seeding schedule prior to application.
- C. Submit mowing schedule for the maintenance period.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect seed from moisture prior to use.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Seed: MnDOT 3876.
- B. Riprap Material: MnDOT 3601.
- C. Geosynthetic Materials: MnDOT 3733
- D. Mulch Material: MnDOT 3882.
- E. Hydraulic Erosion Control Products: MnDOT 3884.
- F. Rolled Erosion Prevention Products: MnDOT 3885.
- G. Poly Sheeting: MnDOT 3888.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove all undesirable weeds as directed.
- B. Operate equipment at right angles to direction of drainage.
- C. Fill all washouts prior to cultivation.
- D. Finish all areas to provide a smooth, moist, even textured foundation of uniform density.
- E. See MnDOT 2574 for additional information and specifications on topsoil and soil amendments.

3.02 APPLICATION

- A. Establish vegetation and control erosion in compliance with MnDOT 2575.3.
- B. Topsoil
 - 1. Topsoil shall be pulverized and free of heavy clay, peat, stones, plants, roots, sticks, and other foreign materials. The topsoil shall be tilled by disking, rototilling, or other approved method of tillage to a minimum average depth of 4.0 inches, and shall be leveled and raked to prepare a smooth and even seedbed with a loose and open surface. Stones and other debris over 1.5 inches in diameter shall be removed from the soil surface. A uniform grade shall be established so that no depressions or elevations are present, and so that the safe and effective operation of mowing equipment shall not be hindered after the turf grass is established.
 - 2. Prior to placing any topsoil the slopes shall be cut uniformly such that the finished seeded slope shall conform to the designated section. Topsoil shall be placed to a minimum depth of 4 inches. The topsoil shall be raked and all lumps and irregularities removed prior to placing the seed. Operations to remove lumps or irregularities shall be incidental to topsoil placement. The topsoil shall not be too loose whereby footprints greater than 1.0 inches are observed, nor shall it be too dense whereby only footprints less than one-eighths of an inch are observed.
 - 3. Care shall be taken to ensure that the topsoil does not contaminate the subgrade or base of the roadway. Grading stakes, stones, trash, root masses, and other debris which may hinder the distribution of fertilizer, compost, seed, or seed mulch during seeding operations shall be removed from the site when seedbed preparation operations are completed. Soil, fertilizer, compost, and seed shall be removed from paved areas as soon as possible after seedbed tilling, grading, and seeding operations are completed.
- C. Placing Seed: Apply seed in accordance with MnDOT 2575.3.B.
- D. Applying Mulch: Apply mulch in accordance with MnDOT 2575.3.C.
- E. Disc Anchoring: Anchor mulch in accordance with MnDOT 2575.3.D.
- F. Hydraulic Erosion Control Products:
 - 1. Apply hydraulic tackifiers, mulch, and matrix in accordance with MnDOT 2575.3.E.
 - 2. The Contractor shall protect existing driveways, curb and gutter, landscaping, plantings, walls, and all other in place items from hydro-seed overspray.
 - 3. Any overspray shall be removed by the Contractor within 24-hours of receiving notice from the Engineer.
- G. Placing Rolled Erosion Control Products:
 - 1. Erosion Control Blankets:
 - a. Place blankets within 24 hours after seeding.
 - b. Place blankets in accordance with MnDOT 2575.3.G.2.
 - 2. Turf Reinforcement Mats: Provide in accordance with MnDOT 2575.3.G.3.
 - 3. Winter Blankets: Provide in accordance with MnDOT 2575.3.G.1.c.
- H. Shoulder Mulch Overspray: Provide in accordance with MnDOT 2575.3.H.
- I. Compost Blanket: Provide in accordance with MnDOT 2575.3.I.
- J. Weed Control: Provide in accordance with MnDOT 2575.3.J.

3.03 OVER-SEEDING

- A. Due to timing of initial seeding operations and potential weather conditions during germination and growing period, the Engineer may approve over-seeding of portions of the turf establishment area to supplement initial turf establishment activities.
- B. Over-seeding shall be applied with seed mixture originally placed unless otherwise approved by Engineer.

- C. Over-seeding shall take place between July 20 and September 20, unless agreed to by the Contractor, Engineer, and Owner.
- D. To ensure proper conditions for successful germination of the over-seeding area, Contractor shall properly prepare the over-seeding area's soil and moisture conditions dictate. Preparation of over-seeding area shall be incidental. Preparation of the over-seeding area may include, but not be limited to any of the following:
 1. Watering/pre-wetting
 2. Drilling/Aerating/Split seeding
 3. Hydro-mulching
 4. Fertilizer
 5. These and all associated items are incidental.

3.04 RESTORATION

- A. Comply with MnDOT 2575.3.O.

3.05 FIELD QUALITY CONTROL

- A. Acceptance of work shall be in accordance with MnDOT 2575.3.N.
- B. Non-compliant Work shall be corrected in accordance with MnDOT 2575.3.Q.
- C. Turf establishment will be accepted on an area basis as designated on the Drawings after the maintenance period expires.
- D. All erosion control items must also be in place and properly maintained prior to acceptance.
- E. Once accepted, Contractor is relieved of any further maintenance or repair except for the repair of damages due to causes entirely within the Contractor's control.

3.06 MAINTENANCE

- A. Clean, protect, and maintain in accordance with MnDOT 2575.3.K.
- B. Maintain seeded areas for a period of **60 growing days** after planting.
 1. Maintenance includes watering, weeding, mowing, and fertilizing to establish turf and create an adequate root system on the seeded areas. The Engineer will then make the final inspection and consider acceptance of the seed.
 2. If the maintenance period does not conclude by November 1, the remaining balance on the warranty will carry over to begin on April 15 of the following year.
 3. For seeded areas, bare spots which persist after three weeks of favorable growing weather shall be re-cultivated and re-seeded as many times as necessary until acceptable turf is established. Acceptable turf shall contain no erosion washes, no bare spots greater than 0.5 square foot, no bare areas comprising more than 0.5 percent of any given 1,000 square foot area, and no deformation of turf areas caused by mowing or other Contractor equipment.
 4. Maintenance period may be extended if seeded areas are not acceptable after growing period has ended.
- C. Weed seeded areas by hand pulling or spot spraying with a contact herbicide only.
- D. Replace areas that are found to be dead, unhealthy, or not achieving normal growth.
- E. If maintenance period extends beyond fall growing season, continue maintenance into spring growth season.

- F. Watering seeded areas:
1. Apply water as needed in combination with rainfall to achieve the following:
 - a. Minimum rate: 2 inches per week.
 - b. Maximum interval between waterings: 72 hours.
 - c. Minimum application per watering: 0.25 inch.
 2. The Contractor shall provide all the labor, equipment, and traffic control, including no parking signs, for the application of water in turf restoration areas for the duration of the maintenance period.
 3. Watering shall be required throughout the growing period/maintenance including the period from June 1 to July 20. A growing day is any calendar day between April 15 and November 1.
- G. During extreme heat or drought periods, increase watering to maintain moist soil to a depth of 4 inches.

END OF SECTION

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SECTION 33 01 30

TELEVISION INSPECTION OF SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes inspection of existing and newly constructed sewer lines by means of closed-circuit television.
- B. Related Sections:
 - 1. Section 33 31 00 - Sanitary Sewer Systems
- C. Method of Measurement:
 - 1. Sanitary Sewer Services: Measure by each service regardless of size.
- D. Basis of Payment:
 - 1. Sanitary Sewer Services (Preliminary): Payment shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental, including televising of sewer services post liner installation.
 - 2. Cleaning and televising of sanitary sewer main post installation shall be considered incidental to construction of the new main.
 - 3. All information generated and the media on which it is provided shall become property of the Owner.

1.02 DEFINITIONS

- A. Main Pipe Segment: The length of pipe connecting 2 manholes.
- B. Sanitary Sewer Service:
 - 1. Preliminary: Pipe section from the main to the building foundation.
 - 2. Post: Pipe section of improved service.

1.03 SUBMITTALS

- A. Video Inspection:
 - 1. Provide 2 copies of visual and audio record of inspection on USB Flash Drive.
 - 2. Features:
 - a. Color, digital file format compatible with Microsoft Windows Media Player capable of recording audio and video components of inspection.
 - b. Video display of footage counter continuously showing distance from reference point.
 - c. Slow and stop motion.
 - d. Speed: Maximum televising velocity of 30 to 35 feet of pipe per minute.
 - 3. Audio record should include:
 - a. Date and time of inspection.
 - b. Operator name.
 - c. Street or surface location of reference manhole.
 - d. Size and type of pipe being inspected.
 - e. Direction of camera.
 - f. Description of all significant items including:
 - 1) Broken or damaged pipe.
 - 2) Points of infiltration.
 - 3) Root intrusions.
 - 4) Scale and corrosion.
 - 5) Service connections.
 - 6) Pipe deflections.

- 7) Other discernable features.
- g. Distance of each item from the reference manhole.
- h. Location of each item with respect to pipe axis.
4. Audio record shall correspond with written log.
5. Identify location and date of inspection on digital file storage media USB Flash Drive.

B. Written Logs:

1. Supply typewritten record of inspection on a standard format.
2. Written record should correspond with audio record.
3. Written record should include all information required for audio record.
4. Include photographs or still images of items of particular interest.
5. Furnish 2 copies.

1.04 QUALIFICATIONS

- A. All Work shall be performed by personnel who have been specifically trained for equipment used and who have experience in televised inspections.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Television Camera:

1. Specifically designed and constructed for operations associated with sewer inspection.
2. Adequate quality to accurately reproduce all colors and provide a clear, focused picture of the entire pipe interior for all conditions encountered.
3. Operative in 100 percent humidity conditions.
4. Adjustable mounting in order to center lens in a variety of pipe diameters.
5. Built-in light source positioned to minimize reflective glare.
6. Adjustable focal distance from 6 inches to infinity.
7. Articulating feature to provide for viewing of up to 90 degrees in all directions.
8. Variable speed operation propelled by:
 - a. Power winch.
 - b. Hand winch.
 - c. Self propelled.
9. Footage counter to measure distance traveled.

B. Television Monitor:

1. Vehicle mounted for viewing in a weather-protected environment.
2. Minimum Screen Size: 9-inch.
3. Minimum 350 line resolution color picture.
4. Display footage counter superimposed on screen.

2.02 ACCESSORIES

A. Provide:

1. Vehicles, as required.
2. 2-way radio/telephone communication equipment.
3. Video and audio signal cable.
4. Digital color video equipment.
5. Equipment to generate photographs from individual video frames.
6. Power source.
7. Winches and cables.

PART 3 EXECUTION

3.01 PREPARATION

- A. Preliminary Work Performed by Contractor:
 - 1. Locate and expose all manholes required for access to sewer system.
 - 2. Clean and flush pipe segments to be inspected.
- B. Preliminary Work Performed by Owner:
 - 1. Provide access to manholes with adequate area for operation of inspection equipment and personnel.

3.02 PERFORMANCE

- A. Description of Work:
 - 1. Propel closed-circuit television camera through designated pipe segments to document condition of pipe, joints, and service connections.
 - 2. Use in-place manholes for access to pipe segments.
 - 3. Operate camera from remote video monitor display.
 - 4. Record camera from remote video monitor display.
 - 5. Record camera output on digital video media for future viewing.
 - 6. Pipe segments to be inspected are shown on the Drawings, and include:
 - a. main line sanitary sewer pipes,
 - b. lateral pipes connected to main line sanitary sewer pipes,
 - c. sanitary sewer manholes.
- B. Sewage Flow Control:
 - 1. When sewage flows in pipe segment to be inspected exceed minimum levels for a complete inspection of the pipe interior, perform one of the following control methods.
 - a. Plugging and blocking:
 - 1) Provide plugs which will allow a controlled release of sewage flow.
 - 2) Insert plugs in the upstream manhole of the pipe segment to be inspected.
 - 3) As the inspection is performed, shut off or reduce flows to minimum acceptable level for adequate inspection.
 - b. Bypass pumping:
 - 1) Eliminate flow in pipe segment to be inspected by inserting solid plugs in upstream manhole.
 - 2) Provide pumping equipment and conduits to transfer sewage flows from upstream side of the plug to a downstream manhole, around the pipe segment during the inspection.
 - 2. When excessive flow is entering pipe segment being inspected from outside source, Contractor shall proceed with one of the following methods:
 - a. Coordinate with source owner to stop or reduce flow to acceptable levels.
 - b. Reschedule inspection of pipe segment to when flows are at acceptable levels.

3.03 INSPECTION PROCEDURE

- A. Move camera through entire pipe segment in a downstream direction.
- B. Winches:
 - 1. Winch assembly shall not obstruct camera view.
 - 2. If non-remote control winch is used, provide 2-way communication between television monitor and winch operator.
- C. Center lens in pipe area.
- D. Maximum Camera Speed: 30 feet per minute.
- E. Relay video signal from camera to monitor and digital video recorder.

- F. Produce audio record concurrently with video record.
- G. Stop camera when necessary to properly document significant items and take photographs as requested by Owner.
- H. Use articulating feature to obtain the best possible view of service connections and other items.
- I. Zero footage counter at inside wall of manhole in each pipe segment.
- J. In case of obstruction in pipe segment, reset camera in downstream manhole and propel upstream to opposite side of obstruction.

3.04 FIELD QUALITY CONTROL

- A. Verify accuracy of footage counter by measuring surface distance between manholes with a measuring wheel.
- B. Footage counter shall be accurate to within 1 percent of the length of pipe segment.

END OF SECTION

SECTION 33 01 37

POINT REPAIRS BY CHEMICAL GROUT

PART 1 GENERAL

1.01 SUMMARY

- A. Chemical grout point repairs in areas of excessive groundwater infiltration that may interfere with installation and curing of CIPP lining.
- B. Chemical grout repairs shall occur prior to CIPP lining of sanitary main and laterals.
- C. Related Sections:
 - 1. Section 01 51 00 - Temporary Utilities
 - 2. Section 33 01 30 - Television Inspection of Sewers
 - 3. Section 33 01 38 - Structural Cured-in-Place Pipe Lateral Lining (CIPPLL) for Sanitary Sewers
- D. Method of Measurement:
 - 1. Measure each acceptably grouted repair as a unit.
- E. Basis of Payment:
 - 1. Payment for acceptable quantities of chemical grout point repairs shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. F2304-03 - Standard Practice for Rehabilitation of Sewers Using Chemical Grouting
 - 2. F2454-05 - Standard Practice for Sealing Lateral Connections and lines from the mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting.

1.03 SUBMITTALS

- A. Information on the chemical grout compounds that will be used, product data sheets when available, the installation method, and equipment.
- B. Where man entry is the method of grouting installation, Contractor shall provide confined space entry safety plan.

PART 2 PRODUCTS

2.01 CHEMICAL GROUT

- A. Grout materials shall have the following characteristics and shall be selected and applied consistent with the manufacturer's recommendation for each specific application.
 - 1. While being injected, the grout must be able to react/perform in the presence of groundwater.
 - 2. Grout shall have ability to increase grout mix viscosity, density and gel strength by increased concentration of constituents or the use of approved additives.
 - 3. The cured grout must withstand submergence in water without degradation.
 - 4. The resultant grout formation must be homogeneous and prevent the infiltration of ground water through the pipe joint.
 - 5. The grout must not be biodegradable.
 - 6. The cured grout should be chemically stable and resistant to organics found in sewage.
 - 7. Residual grout shall be easily removable from the sewer line to prevent blockage of the sewage flow.

- B. Water based chemical grout products and manufacturers.
 1. DeNeef Hydro Active Multi Gel NF.
 2. Avanti AV-100.
 3. Avanti AV-118.
 4. Or approved equal.
- C. Acrylate based grout products and manufacturers.
 1. DeNeef AC-400.
 2. DeNeef Gelacryl SR.
 3. Or approved equal.
- D. Urethane grout product information
 1. Final reaction products stable, non-biodegradable, flexible gel, impermeable to water at pressures up to 15 psi.
 2. Use gel control agent to control curing time.
 3. Use root inhibitor (50 percent active dichlobenil) when roots are present in manholes.

2.02 APPLICATION EQUIPMENT

- A. Provide equipment needed to apply the chemical grout in pipe.
- B. Grouting equipment is to be operated from the mainline sewer and with the ability to seal bladders from 4 inch to 6 inch in diameter.
- C. The chemical grouting system shall allow sealing materials to be pumped through instant reading, controlled flow meters and then through hoses to an injection probe. Contractor shall drill ports in the joints as required to allow injection probe access. The chemical grouting system shall be integrated so that proportions and quantities of materials and pressures for chemical grout can be instantly monitored and regulated in accordance with the type and size of defect, percentage of voids being filled, type of soil surrounding the pipe segment and the rate of flow of the chemical grout in relation to the back pressures. The system shall be capable of conducting the pressure tests.
- D. Obtain Owner's approval for use of alternate chemical grouting equipment prior to initiating the work.

PART 3 EXECUTION

3.01 GENERAL

- A. Point Repair Cleaning
 1. Cleaning of the sanitary pipe shall include removal of roots and obstructions in the main and lateral sufficient for the grouting operation.
- B. Pre-Point Repair Inspection
 1. After cleaning the pipe and prior to application of chemical grouting materials, inspect the pipe segments.
 2. After application of chemical grouting materials, inspect the pipe segments to ensure water infiltration has been eliminated in the section to be lined.
- C. Chemical Grout Formulation
 1. Mix each batch of chemical grout according to the manufacturer's published directions and requirements.
- D. Chemical Grout Checks
 1. Check and record the characteristics of each batch of grout after it is mixed and before it is used in a repair. Monitor both induction period and chemical grout characteristics for each packer daily. If acceptable chemical grout characteristics do not exist, adjust the chemical grout or discard the batch.

2. The Owner will have the right to request an adjustment of the chemical grout or that the batch is discarded.
- E. Chemical Grout Application
1. Watch for material to appear in surface cracks. After the material stops moving, drill another hole and repeat injection process. Return at least twice to previously injected ports and re-inject with more grout. Each port will be injected a total of at least three times.
 2. After completion of the grouting, the injection packers shall be cut off flush with surface as necessary.
- F. Acceptance Testing
1. After the chemical grout has cured, conduct visual acceptance testing at each point repair using CCTV per Section 33 01 30. Point repairs that fail the acceptance testing shall be repaired until the point repair meets acceptance testing criteria. Conduct the following acceptance tests at each point repair.
 - a. Visual Test
 - 1) Use a CCTV camera to visually inspect the point repair. Acceptance of the visual test shall be attained when the Owner verifies a leak-free, uniform point repair.

END OF SECTION

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SECTION 33 01 38

STRUCTURAL CURED-IN-PLACE PIPE (CIPP) LINING FOR SANITARY SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Sanitary Sewer cured-in-place-pipe (CIPP) Lining at locations shown on drawings, including:
 - a. Clean pipe of debris and roots, mineral deposits, and other deposits in pipe and provide post cleaning CCTV inspection and documentation.
 - b. CIPP liners, installed by means of water or steam inversion, and post lining CCTV inspection and documentation.
- B. Related Sections:
 - 1. Section 33 01 30 - Television Inspection of Sewers
- C. Method of Measurement:
 - 1. Sanitary Sewer CIPP Lining shall be measured by length in units of linear feet from center of manhole to center of manhole.
- D. Basis of Payment:
 - 1. Unit Price as listed on Bid Form.
 - 2. Associated Work items: Incidental.
 - 3. The unit price bid for Sanitary Sewer CIPP Lining shall be considered compensation in full to:
 - a. Clean and perform preliminary cleaning. Cleaning shall include, but is not limited to, removing all roots, cutting and brushing protruding taps, removing mineral deposits, and loose pieces of pipe, as deemed necessary by the Engineer.
 - b. Determine whether existing connections are active or inactive.
 - c. Prepare the pipe for lining.
 - d. Notify affected residents including residents located downstream to the nearest manhole, at least 24 hours in advance of proposed lining installation and any limited or restricted usage of sewer lines.
 - e. Control flow of sewage, including bypass pumping, if required.
 - f. Dewater the sewer pipe.
 - 1) Stop or manage infiltration, as necessary to allow for CIPP liner installation and curing, by:
 - a) Application of chemical grout
 - b) Pre-lining
 - c) Bypass pumping
 - d) Other means, as approved by the Engineer
 - g. Install and cure the CIPP Liner in accordance with the manufacturer's requirements, and as directed by the Engineer.
 - h. Install hydrophilic seals at the ends of the liner in manholes to provide a water-tight seal and eliminate infiltration from between the liner and the host pipe. Hydrophilic seals shall be approved by the Engineer.
 - i. Reinstall and reconnect active service connections, as directed by the Engineer.
 - j. Perform post lining CCTV inspection and documentation.
 - k. Lining will not be considered complete until all post cleaning and post lining documentation has been submitted and is approved by the Engineer.

1.02 REFERENCES

- A. ASTM:
 - 1. D1248 - Polyethylene Plastics Molding and Extrusion Materials
 - 2. D1784 - Installation of Deformed PVC and Chlorinated PVC Components

3. D2122 - Dimensions of Thermoplastic Pipe and Fittings
4. D3034 - PSM PVC Sewer Pipe and Fittings
5. D3350 - Polyethylene Plastics Pipe and Fittings Materials
6. F1216 - Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of a Resin-Impregnated Tube
7. F1504 - Folded (PVC) Pipe for Existing Sewer and Conduit Rehabilitation
8. F1533 - Deformed Polyethylene (PE) Liner
9. F1606 - Installation of Deformed Polyethylene (PE) Liner
10. F1743 - Rehabilitation of Existing Pipelines and Conduits by Pulled-inplace Installation of Cured-inplace Thermosetting Resin Pipe (CIPP)

1.03 SYSTEM DESCRIPTION

- A. Sanitary Sewer CIPP Lining Design Requirements:
 1. Hot water or steam shall be used to invert liner.
 2. Provide for maintenance of flow at all times at all repair locations at no additional cost to Owner.
 3. Comply with Appendix XI of ASTM F1216 for Fully Deteriorated Gravity Pipe Condition:
 - a. In the liner thickness calculations, the minimum ovality of the host pipe shall be 5 percent, the groundwater elevation over the pipe shall be equivalent to the surface grade, the enhancement factor (K) shall not be greater than 7.0, the minimum safety factor shall be 2.0, and the flexural modulus of elasticity shall be reduced to account for long term effects and used in the design equation E1. The reduction shall be 75 percent for HDPE material, 65 percent for PVC material and 50 percent for cured-in-place pipe systems.
 - b. Design calculations signed by a Professional Engineer, registered in the State of Minnesota must be submitted to the Engineer for approval.

1.04 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. CIPP Product Data: Submit manufacturer's product literature and application and installation requirements for materials used in the liner, including:
 1. Manufacturer's product certification for materials used in the liner.
 2. Proposed method of cure (steam or hot water).
 3. Liner pipe thickness design. No liner will be approved for installation until liner thickness calculations have been submitted and reviewed for conformance with the specifications and installation requirements. See design requirements in Article 1.03.
 4. Proposed plan for temporary conveyance of sewer flow.
 5. Proposed schedule to be approved by Engineer and Owner.
 6. Manufacturer's recommendation for tensile strength, flexural strength and modulus of elasticity.
- C. Hydrophilic Seal Product Data: Submit manufacturer's product literature and installation requirements for hydrophilic seals to be used at connections to manholes.
- D. Tests:
 1. See Section 01 45 00.
 2. Submit test results from previous field installations in the USA of the same curing method, resin system, and tube materials as proposed for the actual installation. These test results must verify that the physical properties specified have been achieved in previous field applications.
 3. Submit test results from materials sampling and testing, as described in Article 3.04.
- E. Sewer CCTV video inspection footage shall be submitted to Engineer or Owner at completion of pre-lining cleaning and at completion of lining and connection reinstatements for approval.
 1. Submit pre-lining CCTV video footage for pipes indicated in the drawings to Engineer for approval a minimum of 24 hours before lining indicated pipes. Connections shall be noted as being "active – to be reinstated" or "inactive – not to be reinstated" on the PDF report. No pipes shall be lined until the contractor receives written approval for any particular manhole to manhole segment.
 2. Final submittal shall contain CCTV video footage, PACP database, PDF reports, and curing data. Hard copies of the PDF reports are not required.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Work shall be done in accordance with applicable state and local codes, rules, and ordinances.
 - 2. Certify that CIPP shall meet the chemical resistance requirements of ASTM F1216 Appendix X2.

1.06 PROJECT CONDITIONS

- A. View Site prior to bid opening to determine obstructions or Site conditions which may affect Work.
- B. Provide for continuity of sanitary sewer service to each facility connected to the affected sections and ensure no sewage backup to private property.
- C. Sewer service lines to individual users may be disconnected for a period not to exceed 4 hours in any 1 day.
- D. Notice to residential properties must be given a minimum of 1 day in advance. Notice to commercial or industrial properties must be given a minimum of 2 days in advance. Additional notice shall be given to properties at the discretion of the Engineer. The contractor shall attempt to contact each property owner; a door hanger shall be given to all residents. See Article 1.06.J of this Section for door hanger information.
- E. Commercial or industrial properties may require Contractor to perform sewer service disconnection while businesses are closed. Contractor shall coordinate notification with ordering of lining materials.
- F. Cleaning of pipelines downstream from businesses suspected to produce grease shall be inspected by Contractor prior to lining. Additional cleaning shall be performed at no additional cost to the Owner.
- G. Make manholes accessible for Work.
- H. Provide necessary traffic control in accordance with Section 01 55 25.
- I. Provide necessary temporary conveyance of sanitary flows in accordance with Section 01 51 00.
- J. Door Hanger for notification to properties for interruption of service. Information required to be present on door hanger:
 - 1. A header stating "City of Silver Lake Sewer Lining".
 - 2. Date and time period of interruption.
 - 3. The text "The sanitary sewer system your property is connected to will be TEMPORARILY OUT OF SERVICE on the above date and time period. Your cooperation during this time period is greatly appreciated, PLEASE: Limit Toilet Use. REFRAIN FROM: Showering/Baths and Washing clothes and dishes as this will impact the work done on the sewer main and could cause a backup into your home."
 - 4. Name, address and phone number of Contractor's office.
 - 5. Name and mobile phone number of site representative of Contractor.
 - 6. The text "A resin odor may be present outside while this work is performed. **MAKE SURE THAT all toilets, shower, sink, and floor drains have water in them or this odor will enter your home**."
 - 7. The text "All work dates and times are subject to change".

PART 2 PRODUCTS

2.01 MATERIALS

- A. Finished Liner: Chemically resistant to withstand internal exposure to domestic sewage. The Contractor shall certify that CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2.

- B. Cured-In-Place (CIPP) Liner Requirements:
 - 1. Resin:
 - a. Liner bag: Impregnated with polyester resin for general chemical applications.
 - b. No fillers except those required for viscosity control unless approved by Engineer.
 - c. Viscosity control: Up to 5 percent by mass thixotropic agent, which will not interfere with visual inspection.
 - d. Pigment to enhance visual clarity for inspection with video equipment.
 - e. Epoxy resins may be used by Contractor if conditions are deemed to warrant their use.
 - 2. Felt Content: Cured thickness of liner plus 10 percent minus 4 percent not including thickness of polyurethane inner liner.
 - 3. Resin Content: 10 to 15 percent by volume greater than volume of felt in the liner bag.
 - 4. Conform to the following minimal structure standards listed herein:
 - a. Tensile Strength: ASTM D638, 3000 psi.
 - b. Flexural Modulus of Elasticity: ASTM D790, 250,000 psi.
 - c. Flexural Strength: ASTM D790, 4500 psi.
 - 5. Fabric Liner: Fabricate to size to fit the internal circumference of pipe. Allow for circumferential stretching during insertion for such sizing.
- C. Provide watertight manhole connections.
 - 1. Install a hydrophilic seal at each manhole connection, to prevent infiltration into the manhole from between the CIPP liner and the host pipe.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that CIPP liner installation may be performed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.

3.02 PREPARATION

- A. Provide a minimum of 2 complete working cutter units plus spare key components on the site before each lining process begins.

3.03 CIPP LINER INSTALLATION

- A. Perform lining of sewer after all other sewer work has been completed.
- B. Perform liner installation in accordance with manufacturer recommendations.
- C. Fully extend the tube to its termination point, hold the tube tight against the pipe wall, and produce dimples at service connections and flared ends at maintenance holes.
- D. Use lubricants as necessary.
- E. Do not over stress the liner material.
- F. Place temperature gages to determine the temperature of incoming and outgoing water from the heat source.
- G. Supply a suitable heat source and water/steam circulation equipment to deliver hot water/steam throughout the section to be cured by means of a pre-strung hose to uniformly raise the water/steam temperature above the temperature required to effectively cure the resin in accordance with the manufacturer's recommendations.
- H. Maintain manufacturer's recommended hydrostatic pressure and temperature throughout the curing process and for the duration recommended by manufacturer.

- I. Initial cure shall be considered complete when the exposed portions of pipe are hard and sound and remote temperature sensor indicates the temperature is high enough to create an exotherm.
- J. Slowly cool the hardened CIPP liner to a temperature below 100 degrees F before releasing the internal pressure. Cool down may be accomplished by introducing cool water or steam into the inversion standpipe to replace water or steam drained from the downstream end.
- K. Significant wrinkles, as determined by the Engineer, shall be cause for rejection of the liner. Rejected liners shall be completely removed and the pipes relined to provide a smooth pipe interior. The cost for all such removals and relining shall be borne by the Contractor.
- L. Provide slow final pressure release to avoid development of a vacuum in newly formed CIPP liner.
- M. Provide watertight hydrophilic seals at connections to manholes.
- N. After the sewer lining is complete, the Contractor shall re-establish all active service connections as soon as practical and before any adverse effect is experienced by the resident.
- O. If the Contractor is unable to re-establish sewer service connections inside the pipe and excavation is necessary, the cost and liability of such excavation shall be the responsibility of the Contractor, including any additional restoration or turf establishment.
- P. Where spot repairs of sanitary sewer main have occurred, Contractor shall complete repair of sanitary sewer main prior to sewer lining. Sewer lining shall occur from manhole to manhole, through any pipe repairs.

3.04 CIPP MATERIALS SAMPLING AND TESTING

- A. Material Sampling:
 - 1. Provide necessary forms of the same diameter of the host pipe and secure a minimum 8-inch long full diameter confined test sample from each CIPP segment lining.
 - 2. Locate the test sample from an intermediate manhole or at a termination point and invert through the form.
 - 3. Cut the CIPP sample to coincide with multiple-piece form if used for CIPP larger than 15-inch diameter to facilitate removal from the manhole.
 - 4. If it is deemed not possible to obtain confined test samples due to CIPP size and site specific conditions, as confirmed by the Engineer, a plate test sample will be prepared on-site from actual CIPP and cure in a clamped mold placed in the downtube or manhole.
- B. The following tests at the following minimum frequencies will be performed by the Contractor. The results of these analyses will be assumed to be representative of the liners. The Contractor may elect to perform additional testing. The Contractor may, at his discretion and cost, conduct additional testing to improve the resolution of performance test characterization. Any testing Contractor elects to perform shall be performed by an independent, certified ISO 17025 testing facility. Each test shall be performed by a laboratory with an American Association for Laboratory Accreditation (A2LA) for the specific test to be performed.
 - 1. Short-term Flexural (Bending) Properties - The initial tangent flexural modulus of elasticity and flexural yield strength measured in accordance with ASTM D790.
 - a. Frequency: 1 test per sample
 - 2. Thickness measured in accordance with ASTM D3567.
 - a. Frequency: 1 test per sample
 - 3. Long-term Flexural Modulus of Elasticity measured in accordance with ASTM D2990. Test will be performed for a minimum of 10,000 hours under test conditions and loadings described below. The data points from 1,000 hours to 10,000 hours, or such other time period as determined by the Engineer based on the curve or slope of the plotted data, of the Long-term Flexural Modulus shall be extrapolated using a Microsoft Excel log-log scale linear regression analysis to determine the minimum service life performance of the resin-fabric.
 - a. Testing will be conducted at:
 - 1) Temperature: 21 to 25 degrees C

- 2) Relative humidity: 50 percent minimum
- 3) Load: Load used in ASTM D2990/DIN EN 761 testing as submitted in accordance with paragraph 1.8.A.5
- b. Frequency: 1 test per sample
4. Chemical Resistance: The chemical resistivity of the liner measured in accordance with ASTM F1216, Appendix X2.
 - a. Chemical Resistance: The chemical resistivity of the liner measured in accordance with ASTM F1216, Appendix X2 Acceptance of the CIPLL shall be based on the Engineer's evaluation of the resin impregnation quality control reports, laboratory test results for the prepared samples, and Post-construction Inspection video.

3.05 CIPP ACCEPTANCE

- A. Acceptance of the CIPP shall be based on the Engineer's evaluation of the resin impregnation quality control reports, laboratory test results for the prepared samples, and Post-construction Inspection video, which shall demonstrate:
 1. Compliance with the required liner physical properties and thickness.
 2. Evidence of groundwater infiltration through the liner and at interface with the host pipe in the lateral and main is zero.
 3. There is no evidence of excessive wrinkles, splits, cracks, breaks, lifts, kinks, scalds, blisters, delamination's or crazing in the liner.
 4. Achieving the minimum service life as determined by using the actual thickness and short term flexural modulus of elasticity modified by the creep retainage measured by ASTM D2990 extrapolation.
 5. Compliance with required length and diameter of liner.
 6. Liners meet requirements for chemical resistivity.
- B. If any defective liner is discovered after it has been installed, it shall be removed and replaced with a sound liner at no additional cost to the Owner. Obtain approval of the Engineer for method of repair, which may require field or workshop demonstration.

3.06 RESTORATION

- A. Re-establish service connections as soon as practical and before any adverse effect is experienced by residents. Service lateral reinstatement shall have a brushed finish to provide smooth transition into main sewer.
- B. Reopen branch connections to buildings without excavation using a remote controlled cutting device monitored by a CCTV camera.
- C. If excavation is necessary to re-establish connections, the cost and liability shall be the responsibility of the Contractor, including any additional restoration and turf establishment.
- D. If, due to access, landscaping or turf is disturbed, restoration shall be the responsibility of the Contractor.

3.07 SEWAGE SPILL PROCEDURES

- A. Immediately notify the State of Minnesota Duty Officer at the Department of Public Safety at 651.649.5451, the City Engineer, and the Public Works Director for the city in which Project is located.
- B. The Duty Officer will instruct on further notification procedures.
- C. Take immediate action to prevent sewage from entering any water body or storm sewer by directing sewage flow into the existing sanitary sewer system.

END OF SECTION

SECTION 33 01 39

STRUCTURAL CURED-IN-PLACE PIPE LATERAL LINING (CIPPLL) FOR SANITARY SEWERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Sanitary sewer cured-in-place-pipe lateral lining (CIPPLL) at locations shown on drawings. Provide all materials, equipment, labor and incidentals for the installation of CIPPLL. Existing laterals may be 4-inch through 6-inch nominal diameter. Laterals do not have existing cleanouts.
 - a. Provide Engineer with a Pre-Construction Inspection submittal of laterals to be lined. Engineer will direct the Contractor as to the required length and ovality of each lateral liner within seven calendar days of receipt of the Pre-Construction Inspection submittal.
 - b. The lateral lining process shall be accomplished using a flexible tube of particular length and sized for the various diameters and fittings encountered, and a thermo-set resin with physical and chemical properties appropriate for the application. The lateral lining shall extend from the sewer main connection up the lateral to the location indicated on the Drawings or as directed by Engineer.
 - c. Laterals lining will provide a non-leaking connection at the interface of the mainline and lateral pipelines.
 - d. The CIPPLL shall cure into a hard, impermeable liner pipe of the specified thickness and form a structurally sound liner pipe with a uniformly smooth interior providing hydraulic flow equal to or greater than the existing lateral in original condition.
- B. Requirements:
1. This Contract requires work in active sewers. Follow all federal, state, and local requirements for safety in confined spaces.
 2. Conduct worker safety training within one year of start of work that includes reviewing the hazards associated with all equipment, materials, and work practices. Additional safety considerations including safely handling, mixing, and transporting of reagents should be provided by the liner manufacturer, and should include safe operating practices and procedures, appropriate personal protective equipment (PPE) for the various lining operations, and proper storage, transportation, mixing, and disposal of resins, additives, and their associated containers.
- C. Related Sections:
1. Section 01 51 00 - Temporary Utilities
 2. Section 33 01 30 - Television Inspection of Sewers
 3. Section 33 01 38 - Structural Cured-in-Place Pipe (CIPP) Lining for Sanitary Sewers
- D. Method of Measurement:
1. Sanitary Sewer CIPPLL Lining shall be measured by the each installed for lengths as shown in the Drawings.
 2. Clean Lateral: Measured by each sanitary sewer service successfully cleaned.
- E. Basis of Payment:
1. Payment for acceptable quantities of CIPPLL shall be at the contract unit price listed on the Bid Form.
 - a. All associated work items are incidental.
 - b. Includes all materials, equipment, and labor needed to prepare the lateral to receive the CIPPLL after completing lateral cleaning.
 - c. Includes all materials, equipment, and labor needed to install the CIPPLL.
 - d. Includes all materials, equipment, and labor to install sanitary sewer service cleanouts needed for proper installation of lateral lining.
 - e. Includes all materials, equipment, and labor needed to provide advance notice, updates, and notice that their lateral is back in service to each affected property owner.

- f. Includes all materials, equipment, and labor needed to bypass the flow around each service receiving CIPPLL.
 - g. In the event a CIPPLL installation fails, it includes all materials, equipment, and labor needed to access the failed pipe, repair the failure to the satisfaction of the Engineer, and restore the affected area to the satisfaction of the Engineer.
 - h. Includes all materials, equipment, and labor needed to prepare and submit to the Engineer submittals requested in Article 1.04 of this Section.
 - i. Includes all materials, equipment, and labor needed to prepare and submit to the Engineer submittals requested in Article 3.06 of this Section.
 - j. Materials, equipment, labor, and multiple mobilizations needed to prepare and submit to the Engineer the digital CCTV files for inspection work
 - 1) After cleaning and measuring the lateral prior to lining
 - 2) After lining and reinstating the lateral but before notifying the property owner that their lateral is back in service
 - k. In the event that excavation becomes necessary, includes all materials, equipment, and labor needed to provide and maintain any temporary and/or permanent restorations to the satisfaction of the Engineer.
2. Payment for acceptable quantities of Clean Lateral shall be at the contract unit price listed on the Bid Form.
- a. Payment includes all materials, equipment, and labor needed to properly clean each sanitary sewer lateral prior to televising if required. All associated work items are incidental.

1.02 REFERENCES

- A. Standards referenced in this Section include:
- 1. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Agents.
 - 2. ASTM D790-07 -Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 3. ASTM D2990-01 - Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.
 - 4. ASTM D3163-01(2008) -Test Method for Determining Strength of Adhesively Bonded Rigid Plastic Lap-Shear Joints by Shear By Tension Loading.
 - 5. ASTM D5813-04 -Specification for Cured-In-Place Thermosetting Resin Sewer Pipe.
 - 6. ASTM D5868-01(2008) -Test Method for Lap Shear Adhesion for Fiber Reinforced Plastic (FRP) Bonding.
 - 7. ASTM F1216-07B -Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
 - 8. ASTM F1743 -Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
 - 9. ASTM F2019 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-In-Place Thermosetting Resin Pipe (CIPP).
 - 10. ISO 178 - Determination of Flexural Properties.
 - 11. DIN EN 761 - Glass Reinforced thermosetting plastics (GRP) pipes.
 - 12. DIN EN 13566-4 - Plastics piping systems for renovation of underground non-pressure drainage and sewerage networks.

1.03 DESIGN REQUIREMENTS

- A. 50-Year Flexural Strength (ASTM D790, D2990, or DIN EN 761): 2,500 psi minimum.
- B. 50-Year Flexural Modulus (ASTM D790, D2990, or DIN EN 761): 200,000 psi minimum, with no greater than a 55 percent reduction from initial (hour 0.02) strength.
- C. CIPPLL Thickness:
 - 1. The required structural CIPPLL wall thickness for the portion of the liner in the lateral shall be determined using:
 - a. A minimum overall safety factor of 2.0.
 - b. A minimum service life of 50 years under continuous service.

- c. A modulus of soil reaction of 850 psi.
 - d. A soil density of 120 lbs/ft³.
 - e. A Poisson's ratio of 0.3.
 - f. An enhancement factor of 7.
 - g. A groundwater elevation over the pipe equivalent to surface grade.
 - h. An ovality of 6 percent in the lateral, unless otherwise specifically stated on a case-by-case basis.
 - i. HS-20 loading.
 - j. A soil depth equal to the depth of the upstream or downstream manhole on that pipe segment, whichever is deeper.
- D. In no case shall the portion of the liner in the lateral be thinner than 4.5mm. In the event the design calculations determine a thickness less than 4.5 mm. The designer shall show all of the calculations leading to the thinner result, then show the thinner result struck out and 4.5 mm thickness written next to it.
- 1. The long-term flexural modulus and long-term flexural strength used in the design shall be the values as rated for the specified service life and as submitted in Paragraph 1.8. Contractor may elect to use weaker long-term flexural modulus and long-term flexural strength values than indicated in the submittal for these properties to account for differences in field prepared liners versus laboratory prepared liners, so long as other requirements regarding limits to thickness are not compromised.
 - 2. The liner thickness for each lateral shall be determined by the Contractor and submitted per Paragraph 1.04 of this Section.

1.04 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. CIPPLL:
 - 1. The names of the resins and strands/fibers/mats/tubes manufacturers.
 - 2. Independent third party ISO 17025 accredited laboratory test reports identifying by name and demonstrating that the exact resin and, if utilized, strands/fibres/mats/tubes to be used for this project meets the requirements for initial structural properties, including short-term flexural modulus of elasticity, short-term flexural strength (bending stress), and tensile strength, (performed in accordance with ASTM F1216 and ASTM D790 and/or ISO 178 with a wall thickness measured per DIN EN 13566-4) and chemical resistance (performed in accordance with ASTM F1216-Appendix X2 or ASTM D5813).
 - 3. Independent third party accredited laboratory test reports identifying by name and demonstrating that the exact resin and, if utilized, strands/fibres/mats/tubes to be used for this project has been tested for long-term flexural modulus of elasticity and long-term flexural strength (i.e., 10,000 hour minimum creep testing performed in accordance with ASTM D2990/DIN EN 761 for design conditions applicable to this project). If the liner used for testing is not the exact liner to be used on this project, submit a detailed description of the physical properties of both the liner used in the test and the liner to be used for this project to demonstrate that the two liners are comparable in terms of physical properties. When test data for installed liners are available, they shall be used to establish design basis for long-term flexural modulus of elasticity and long-term flexural strength. When only factory-supplied sample test data are available, 50 percent of the below determined values shall be used to establish design basis for long-term flexural modulus of elasticity and long-term flexural strength.
 - a. Test will be performed for a minimum of 10,000 hours under test conditions and loadings described below. Independent third party test data of the entire ASTM D-2990/DIN EN 761 data set are required as substantiation of the values used in design. The data points from 1,000 hours to 10,000 hours (or longer, if these data are available), or such other time period as determined by the Engineer based on the curve or slope of the plotted data, of the Long-term Flexural Modulus shall be extrapolated using a Microsoft Excel log-log scale linear regression analysis, unless Engineer determines that the data set better suit another regression method, to determine the service life performance characteristics of the proposed liner.

- b. Testing will be conducted at:
 - 1) Temperature: 21 to 25 degrees C.
 - 2) Relative humidity: 50 percent minimum.
 - 3) Load: Equivalent to 25 percent of the initial yield stress measured in accordance with ASTM D790/ISO 178, or as approved by Engineer.
 - 4. The type and volume of catalysts and promoters added to the resin.
 - 5. Manufacturer's Quality Control Plan or procedures that ensure proper materials are used in the resin impregnation process and in liner shipping and storage.
 - 6. Installation and quality control plan, including:
 - a. Bypass pumping plans
 - b. Mainline and lateral sewer cleaning plan and cleanliness requirements
 - c. Liner shot plan and sequence
 - d. Liner installation standard procedures, including, but not limited to:
 - 1) Minimum and maximum allowable installation pressures and speeds
 - 2) Minimum and maximum allowable curing temperatures, pressures, and heat up, curing, and cooling durations and speeds
 - 3) Boiler pressure calculations (for non-circulating methods)
 - 4) Temperature monitoring plan
 - 5) Odor controls procedures
 - 6) Plan to manage flow from laterals during lining.
 - 7. Individual liner lengths; transition locations; resin quantities; curing schedule for each liner, including heating, curing, and cool-down schedule; liner materials; thicknesses and layers; and inversion or spray application pressures (maximum and minimum) for each segment.
 - 8. Submit structural design calculations and specification data sheets listing all parameters used in the liner design and thickness calculations based on Appendix XI of ASTM F1216 for each pipe segment/lateral. All calculations shall be prepared under and stamped by a Professional Engineer registered in the State of Minnesota.
- C. End seal material to be used and method of installation.
- D. Contingency Plan, including methods and equipment to be used to repair unacceptable liner defects, for removing failed liners, and for availability and accessibility of backup equipment such as air compressors and boilers.
- E. Pre-Construction Inspection Deliverables: CCTV video inspection footage shall be submitted to Engineer or Owner at completion of pre-lining cleaning for approval.
- 1. Conduct Pre-Construction Inspection of lateral and mainline connection in accordance with Section 33 01 30 Television Inspection of Sewers.
 - 2. Submit Pre-Construction Inspection CCTV video footage for pipes indicated in the drawings to Engineer for approval a minimum of 24 hours before lining indicated pipes.
 - 3. Submit one "request for approval" for each manhole to manhole segment, including lining details for each lateral connection such as proposed diameters, lengths, ovality, locations of transitions in size, sequence, and other pertinent information.
 - 4. No pipes shall be lined until the contractor receives written approval from the Engineer for any particular manhole to manhole segment.
 - 5. Final submittal shall contain CCTV video footage, PACP database, PDF reports, and curing data. Hard copies of the PDF reports are not required.
- F. Post-construction Inspection Deliverables.
- G. Individual liner lengths; transition locations; resin quantities; curing schedule for each liner, including heating, curing, and cool-down schedule; liner materials; thicknesses and layers; and inversion or spray application pressures (maximum and minimum) for each segment.
- H. The type and volume of catalysts and promoters added to the resin, the time of addition, the method of incorporation into the resin, and the quality control procedures required to ensure adequate dispersal and minimization of air entrainment.

- I. Quality control report for resin impregnation of each CIPPLL showing information such as resin lot numbers, volumes of resin, and catalyst used. Include a checklist so that each critical step in the resin impregnation process is checked off and initialed.
- J. Curing log of CIPPLL temperature and pressure at each lateral during the curing process to document that proper temperatures and cure times have been achieved. Submit curing logs weekly.
- K. Field Sample Preparation Plan outlining detailed procedure for preparing samples, including resin preparation, mixing, wetout, insertion, curing, cooling, and post-sample examination to confirm representativeness.
- L. Name and location of ISO 17025 testing laboratory to perform CIPP tests, Provide certification that each test shall be performed by a laboratory with an American Association for Laboratory Accreditation (A2LA) for the specific test to be performed.
- M. Performance Quality testing results.

1.05 QUALITY ASSURANCE

- A. No change of material, design values, or procedures specified herein may be made during the course of the Work without the prior written approval of the Engineer.
- B. Regulatory Requirements:
 - 1. Work shall be done in accordance with applicable state and local codes, rules, and ordinances.
 - 2. Certify that CIPP shall meet the chemical resistance requirements of ASTM F1216 Appendix X2.

PART 2 PRODUCTS

2.01 APPROVED SYSTEMS

- A. The following CIPPLL systems are approved for use on this project using Blindshot method:
 - 1. T-Liner, as manufactured by LMK Enterprises, Inc.
 - 2. Lateral liner as manufactured by BLD Services.
 - 3. Epros DrainMtH Liner, as manufactured by Trelleborg, Inc.
 - 4. Or Approved Equal.
- B. The following trenchless cleanout installation system is approved for use on this project:
 - 1. VAC-A-TEE as manufactured by LMK Enterprises, Inc.
 - 2. Or Approved Equal.

2.02 MATERIALS

- A. Fabrics, Strands, Fibers, Mats, Tubes:
 - 1. The tube shall consist of one or more layers of flexible needled felt or an equivalent nonwoven or woven material, or a combination of nonwoven and woven materials, capable of carrying resin and withstanding installation pressures and curing temperatures. The tube shall be compatible with the resin system used. The material shall be able to fit irregular pipe sections and negotiate bends, if applicable. If the tube contains fiberglass, the fiberglass shall be corrosion resistant E-CR glass conforming to ASTM D578.
 - 2. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination. No dry or unsaturated layers shall be evident.
 - 3. The tube shall be capable of conforming to offset joints, bells and deformed pipe sections up to 20 percent of original pipe diameter.
- B. Resin:
 - 1. The liquid thermosetting resin shall saturate the tube and produce a properly cured liner.

2. Polyester, vinyl ester, or epoxy resin and catalyst systems are acceptable. The resin must be able to cure in the presence of water and the initiation temperature for cure should be less than 180 degrees F (82.2 degrees C).
 3. The wall color of the interior pipe surface after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- C. Non-Leaking Seals:
1. Provide non-leaking end seals to prevent water from migrating between the liner and host pipe. Provide one of the following:
 - a. Hydrophilic seals
 - b. Leak-resistant caulk
- D. Sanitary Cleanout (CIPP)
1. SDR 35 or SC 40 PVC riser pipe with cap and metal rebar for locating.
 2. One-piece saddle tee compatible with riser pipe.
 - a. Top mount, snap-on saddle tee shall be water-tight with appropriate adhesives as recommended by the manufacturer.
 - b. Approved equal saddle tee. Saddle tee shall be rigid with water-tight connection and adhesives/stainless steel clamps. No flexible saddle tees allowed.

2.03 DELIVERY, STORAGE, AND HANDLING

- A. Care shall be taken in shipping, handling and storage to avoid damaging the liner. Extra care shall be taken during hot and cold weather construction. Replace any liner damaged in shipment as directed by the Owner.
- B. Adequately support and protect the CIPPLL while stored. Store CIPPLL in a manner as recommended by the manufacturer and as approved by the Engineer.

2.04 INSTALLED CHARACTERISTICS

- A. The lateral liner shall be a resin-impregnated, flexible felt, fiberglass scrim and reinforced needled felt, or equivalent material which is inserted into the lateral to be rehabilitated and cured-in-place by an acceptable method. Laterals to be lined may transition from one pipe size to a different pipe size, and any such laterals will require custom-fabricated liners. The resin shall be suitable for the design conditions as well as the curing process.
- B. The liner shall be custom-manufactured with transitions in diameter to match field conditions. Field measure main, lateral and outside drop diameters and lengths, including transitions in pipe diameters, and size liners accordingly. The liner shall be continuous in length and wall thickness shall be uniform.
- C. When cured, the liner shall form a continuous, hard, impermeable liner that is chemically resistant to chemicals found in domestic sewage per ASTM F1216, Appendix X2 and abrasion resistance.
- D. The liner shall be fabricated to a size that when cured will tightly fit the pipe being rehabilitated. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing the liner. All dimensions shall be field verified by the Contractor prior to delivery of the liner. The contact tolerance is 1.0 mm. Where any space or gap between the outside surface of the liner and the inside surface of the existing pipe exceeds 1.0 mm as is visually evident liner fit will be deemed deficient and corrective action will be required. Where irregularities of the existing pipe exists such as offset joints, protrusions, bumps, and deformations, and the irregularities remain after the pipe has been prepared in accordance with the Contract Documents, exception to the contact tolerance will be allowed in the irregularity zone. The exception shall not present an obstruction to sewage flow.
- E. CIPPLL will extend from the main to the length approved by the Engineer following the Pre-Construction Inspection.

- F. Additional Requirements for standard CIPPLL installations from the main:
 - 1. Both the CIPPLL in the main and lateral shall form a structural cylinder rehabilitating at least 14 inches of the main (centered on the lateral's opening in the wall of the main) and 360-degrees of the main and extend up the lateral as a continuous liner to its point of termination.
 - 2. The finished lateral liner shall be a complete, non-leaking lining from the mainline sewer, including the connection between the lateral and the mainline sewer, including non-leaking seals at the tap, on the lateral liner 1 to 18 inches from the main, and one within 18 inches of the upstream end of the lateral liner (or at the manhole wall for installations in outside drop connections).
 - 3. The lateral portion of the liner shall consist of one or more layers of flexible felt, fiberglass scrim and reinforced needled felt, or equivalent material.
- G. Additional Requirements for CIPPLL Blindshots:
 - 1. The finished lateral liner shall be a complete, non-leaking lining.
 - 2. The liner shall be a single-piece system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that CIPPLL installation may be performed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.

3.02 PREPARATION

- A. Lateral lining shall only occur after the corresponding mainline sewer has been lined, tested, and approved by the Engineer. If the corresponding mainline sewer is not going to be lined, lateral lining shall proceed in accordance with the approved schedule of work. Ensure the proper sequence of work between the mainline and lateral lining activities.
- B. Clean laterals and mainline sewer prior to Pre-Construction Inspection, such that the pipes are free of roots, grease, sand, rocks, sludge and other debris.
- C. Clear the mainline of obstructions such as solids, dipped joints or broken pipe that will prevent the insertion of the liner. If inspection reveals an obstruction that cannot be removed by the conventional cleaning equipment, make an excavation and repair the obstruction. This work shall be approved by the Engineer prior to commencement of the work.
- D. Seal any lateral connections that are allowing significant infiltration that may interfere with the installation and curing of the CIPPLL. This work shall be approved by the Engineer prior to commencement of the work.
- E. Conduct Pre-construction Inspection of the lateral lines to plan rehabilitation work and obtain approval, in accordance with 1.04.E of this Section.
 - 1. If unknown physical conditions in the work area that differ materially from those ordinarily encountered are uncovered during the investigation, the Contractor shall notify the Engineer.
 - 2. If the existing lateral between the main line sewer and the location of the end of the proposed CIPPLL is found to be damaged through no act of the Contractor, make an excavation and repair the lateral.
- F. CIPPLL shall only occur after the Engineer has directed the Contractor as to the required length of each lateral liner.
- G. Visually inspect lateral and main immediately prior to CIPPLL lining to demonstrate that the lateral is clean and free of roots, grease, sand, rocks, sludge, or structural impediments that would affect long-term viability of the lateral liner.
- H. Provide necessary traffic control in accordance with Section 01 55 25.

- I. Provide necessary temporary conveyance of sanitary flows in accordance with Section 01 51 00.
- J. Notify residents at affected properties of anticipated interruptions in service. Information required to be present on door hanger:
 - 1. A header stating "City of Silver Lake Sewer Lining Project"
 - 2. Date and time period of interruption.
 - 3. The text "The sanitary sewer system your property is connected to will be TEMPORARILY OUT OF SERVICE on the above date and time period. Your cooperation during this time period is greatly appreciated, PLEASE: Limit Toilet Use. REFRAIN FROM: Showering/Baths and Washing clothes and dishes as this will impact the work done on the sewer main and could cause a backup into your home."
 - 4. Name, address and phone number of Contractor's office.
 - 5. Name and mobile phone number of site representative of Contractor.
 - 6. The text "A resin odor may be present outside while this work is performed. **MAKE SURE THAT all toilets, shower, sink, and floor drains have water in them or this odor will enter your home**."
 - 7. The text "All work dates and times are subject to change"

3.03 CIPPLL INSTALLATION

- A. Saturate tube with the resin in accordance with manufacturer's instructions. Liner wet out may not be done on any surface whose temperature is greater than 70 degrees F.
- B. Provide flow control sufficient to allow CCTV observation of mainline packer throughout liner installation.
- C. Insert lateral liner into lateral in accordance with manufacturer's instructions.
- D. Completely protect the resin-saturated lateral tube during positioning and installation. No resin shall be lost by contact with pipe.
- E. After insertion is complete, apply a suitable recirculation system capable of delivering air, steam, or water, as required by the liner system manufacturer, uniformly throughout the section to achieve a consistent cure of the resin. Maintain the curing temperature/temperature rise rate in accordance with the approved cure procedures. Prevent temperatures/temperature rise rates that could scald or bubble the liner. Scalded or blistered liner will be rejected if, in the opinion of the Engineer, the performance of the liner is compromised.
- F. During curing, provide controls to prevent odors from entering private residences and businesses.
- G. Prevent air, steam, or curing water from entering the private residence as much as possible.
- H. Continue curing until the desired product is achieved.
- I. Initiate a controlled cool-down to cool the hardened liner to a temperature below 110 degrees F, in accordance with the approved cure procedures. Provide a view of the lateral liner contacting the lateral pipe from the beginning to the end of the repair.
- J. After the curing process is complete, remove all installation and curing equipment from the host pipe. No material other than the cured CIPPLL shall remain in the host pipe. Remove any excess liner material protruding into sewer main or manhole by remote robotic cutting equipment or manual means, in accordance with manufacturer's instructions.
- K. Provide a finished CIPPLL that is free of visual defects such as foreign inclusions, dry spots, pinholes, delamination, lifts, blisters, cracks, or wrinkles in any location in excess of 10 percent of the host pipe inside diameter. Verify there is no potential for obstruction of flow.

- L. If a point repair is required after the liner has cured, use a tube segment with compatible (preferably identical) properties as the existing liner to splice across the point repair. Point repair shall extend a minimum of 12 inches on each side of the defect.
- M. Do not line over any branched connections in a lateral unless directed to on the Drawings or by Engineer.

3.04 SANITARY CLEANOUT INSTALLATION

- A. Timing of installation may vary based on Contractor CIPPLL system. It may occur before or after installation of CIPPLL as required by chosen CIPPLL installation.
- B. Locate sanitary sewer service.
- C. If installing VAC-A-TEE as manufactured by LMK Enterprises, follow manufacturer's instructions for installation.
- D. If installing through traditional excavation, excavate to existing sanitary sewer service. Core drill a hole at the crown of the pipe and install the saddle wye. Apply sealant and clamps as required.
- E. Riser pipe to be solvent welded.
- F. Restore disturbed surfaces to previous condition.
- G. Cleanouts in certain areas of lining will not be feasible due to above ground concrete conditions. Service lining from inside the building to the main is allowed.

3.05 POST-CONSTRUCTION INSPECTION OF THE COMPLETED WORK

- A. Conduct Post-Construction Inspection of lateral and mainline connection in accordance with Section 33 01 30.
- B. Contractor must NOT notify the property owner that their lateral is in service until after the Engineer approves its condition by watching this CCTV inspection. This particular CCTV inspection, and its deliverable to the Engineer, shall be done promptly to assure 'same day' lateral reinstatement at each property.

3.06 CIPPLL MATERIALS SAMPLING AND TESTING

- A. Material Sampling:
 - 1. Prepare, cure and provide to Engineer one restrained sample for every 50 CIPPLL installations of each resin-fabric combination used for this project or fraction thereof, in a manner that represents the conditions experienced during installation of the in-ground liners and in accordance with the Field Sample Preparation Plan submitted in Paragraph 1.04.K of this Section.
 - 2. The sample submitted shall have the main portion cut a minimum of two inches beyond the maximum dimension of the mainline portion of the liner. The lateral portion of the sample shall be a minimum of 4 feet long.
 - 3. Cut two cylindrical samples from the center of the restrained pipe sample. Each sample shall be a minimum of 12 inches long. Label samples with the contract number, date of installation, lateral address, segment number(s), and specified thickness. SEND ONE SAMPLE TO INDEPENDENT THIRD-PARTY LABORATORY FOR TESTING. Deliver the second sample to Engineer. Contractor may elect to take additional samples at no additional cost to the Owner.
- B. Testing: The following tests at the following minimum frequencies will be performed by the Contractor. If more than one sample of a tube/resin/installation methods is collected and tested over the course of the Work, the average of the sample results will be considered representative of all the liners installed for that particular resin-fabric combination. For example, 4 samples of a particular tube/resin/installation method combination are analyzed for flexural strength; the results are 2000, 4500, 5500, and 6000 psi. The average flexural strength is 4500 for liners constructed from this

tube/resin/installation method combination. The Owner or the Contractor may elect to perform additional testing, at his discretion and cost, to improve the resolution of performance test characterization. All testing shall be performed by an independent, accredited ISO 17025 testing facility. Each test shall be performed by a laboratory with an American Association for Laboratory Accreditation (A2LA) for the specific test to be performed.

1. Short-term Flexural (Bending) Properties: The initial tangent flexural modulus of elasticity and flexural yield strength measured in accordance with ASTM D790.
 - a. Frequency: 1 test per sample.
2. Thickness measured in accordance with ASTM D3567.
 - a. Frequency: 1 test per sample.
3. Long-term Flexural Modulus of Elasticity retention measured in accordance with ASTM D2990 or DIN EN 761. Test will be performed for a minimum of 10,000 hours under test conditions and loadings described below. The data points from 1,000 hours to 10,000 hours, or such other time period as determined by the Engineer based on the curve or slope of the plotted data, of the Long-term Flexural Modulus shall be extrapolated using a Microsoft Excel log-log scale linear regression analysis to determine the minimum service life performance of the resin-fabric.
 - a. Testing will be conducted at:
 - 1) Temperature: 21 to 25 degrees C.
 - 2) Relative humidity: 50 percent minimum.
 - 3) Load: Load used in ASTM D2990/DIN EN 761 testing as submitted in accordance with paragraph 1.04.B.3 of this Section.
 - b. Frequency: 1 test per sample.

3.07 CIPPLL ACCEPTANCE

- A. Acceptance of the CIPPLL shall be based on the Engineer's evaluation of the resin impregnation quality control reports, CIPPLL temperature curing logs, laboratory test results for the prepared samples, and Post-construction Inspection video, which shall demonstrate:
 1. Compliance with the required physical strength properties and thickness.
 - a. For each pipe segment, the calculated required thickness of the liner based on the installed material properties will be determined using the actual installed liner thickness and material properties as measured by the quality control tests required in Paragraph 3.05 and appropriate applicable formula from ASTM F1216, Appendix X1. The measured short term flexural strength and short term flexural modulus of elasticity will be converted into long term flexural strength and long term flexural modulus of elasticity by using the percent retention value achieved by the representative long term flexural modulus of elasticity testing.
 2. There is no evidence of excessive wrinkles, splits, cracks, breaks, lifts, kinks, scalds, blisters, delaminations, or crazing in the liner.
 3. Compliance with required length and diameter of liner.
 4. If any defective CIPPLL is discovered after it has been installed, it shall be removed and replaced with either a sound CIPPLL or a new pipe at no additional cost to the Owner. Obtain approval of the Engineer for method of repair, which may require field or workshop demonstration.
 5. For CIPPLL with defects:
 - a. If the Contractor elects to excavate and repair defects in the CIPPLL, cut and remove the defective section of CIPPLL plus the host pipe to a minimum of two feet beyond each end of the defective CIPPLL. Use SDR 26 or Schedule 40 PVC to replace the removed liner and host pipe. On either side of the proposed repair, carefully remove the host pipe from around the existing sound liner to expose a minimum of five inches of sound liner. Use stainless steel shielded flexible repair couplings to connect the new PVC directly to the sound liner.
 - b. If the Contractor elects to repair defects in the CIPPLL using trenchless methods, submit method to Engineer for approval. The method must prevent infiltration from entering lateral and shall not cause a significant reduction in lateral cross-sectional area as compared to the lined portion of lateral.
 - c. At the Owner's sole option, the Owner may have the Engineer conduct an evaluation of the diminished value of any defective CIPPLL as described below and recommend a reduced payment for the liner. At Contractor's option, Contractor may accept the recommended reduced payment or address all defective conditions until an acceptable condition is achieved. Acceptance of reduced payment may necessitate the Contractor making a refund payment to the Owner.

- 1) For CIPPLL that have observed groundwater infiltration, poorly opened lateral taps, or excessive wrinkles, splits, cracks, breaks, lifts, kinks, scalds, blisters, delaminations, crazing, or other defects in the liner, Engineer will make an estimation of reduced value. For the purposes of this calculation, the sum of all the bid items pertaining to lining the CIPPLL under this specification section shall be considered as the “full bid price” for a given lateral. Reduced value will be calculated by the following criteria:

Score	Hydraulic Condition (10% of CIPPLL Value)	Structural Condition – Applies to Defects Above the Springline (60% of CIPPLL Value)	O&M Condition – Applies to Defects Below the Springline (30% of CIPPLL Value)
5	Up to 1 pinhole stains (PACP IS) per 15 feet of liner	None	None
4.5	Up to 3 pinhole stains (PACP IS) per 15 feet of liner	Protrusion defects greater than allowable size but less than 10% of liner ID and covering less than 1% of liner length	Protrusion defects greater than allowable size but less than 10% of liner ID and covering less than 1% of liner length
4	Greater than 3 pinhole stains per 15 feet of liner; greater than 1 foot of seam leakage per 15 feet of liner; any pinholes within 2 inches of tap connection; all defects covering less than 5% of liner length	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 1% but less than 5% of liner length	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 1% but less than 5% of liner length
3	Active leakage (PACP IW, ID); pinholes, seam leakage, or other minor defects covering greater than 5% but less than 20% of liner length; minor leakage from one end seals	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 5% but less than 10% of liner length; defects greater than 10% of the liner ID and less than 1% of the liner length	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 5% but less than 10% of liner length; defects greater than 10% of the liner ID and less than 1% of the liner length
2	Multiple active leakage (PACP IW, ID); pinholes, seam leakage, or other minor defects covering greater than 20% of liner length; one defective end seal (i.e. exposed at pipe end, separated); minor leakage from more than one end seal	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 10% of liner length; defects greater than 10% of the liner ID and more than 1% but less than 5% of liner length	Protrusion defects greater than allowable size but less than 10% of liner ID and covering more than 10% of liner length; defects greater than 10% of the liner ID and more than 1% but less than 5% of liner length; any sharp edge defect likely to snag rags in lateral.
1	Active leakage (PACP IR, IG), one end seal missing; more than one end seals defective	Protrusion defects greater than 10% of liner ID and more than 5% of liner length.	Protrusion defects greater than 10% of liner ID and more than 5% of liner length; any sharp edge defect likely to snag rags in main.

- 2) For example, the reduced value of CIPPLL that has a Hydraulic Condition score of 4.5, a Structural Condition score of 3, and an O&M Condition of 5 would be calculated by the following:

$$\text{reduced value} = \frac{4.5}{5} \times (10\%) + \frac{3}{5} \times (60\%) + \frac{5}{5} \times (30\%) = 75\% \text{ of full bid price}$$

6. For CIPPLLs that do not meet the required calculated thickness based on installed material performance test data, partial payment will be determined by multiplying the price for that liner by the actual installed liner thickness divided by the calculated required thickness of the liner. No payment over 100 percent of the value of the CIPPLL will be made. For example, the reduced value of liner that has an installed thickness of 6.0 mm with a calculated thickness based on material performance testing of 7.5 mm would receive only 80 percent of the value of the liner.

3.08 CIPPLL SUMMARY

- A. Locate and verify presence of transitions in laterals.
- B. Lateral liner lengths listed are approximate. Actual lengths will be determined by the Engineer after review of Pre-construction Inspection submittal. Typical length shall be 30-feet and at least 8-feet past the back of curb.

3.09 SEWAGE SPILL PROCEDURES

- A. Immediately notify the State of Minnesota Duty Officer at the Department of Public Safety at 651.649.5451, the City Engineer, and the Public Works Director for the city in which Project is located.
- B. The Duty Officer will instruct on further notification procedures.
- C. Take immediate action to prevent sewage from entering any water body or storm sewer by directing sewage flow into the existing sanitary sewer system.

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water main pipe and fittings.
 - 2. Valves and boxes.
 - 3. Hydrants.
 - 4. Services.
 - 5. Insulation.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill

- C. Method of Measurement:
 - 1. Water Main:
 - a. Measure by distance in linear feet.
 - b. Measure along pipe axis with no deduction for fittings or valves.
 - c. Measure in the horizontal plane unless pipe grade exceeds 15 percent.
 - d. Unit includes tracer wire, magnesium grounding anode rod, and thrust restraint.
 - 2. Fittings:
 - a. Measure by weight in pounds.
 - b. Basis of Weight:
 - 1) Meet AWWA C153.
 - 2) Exclude weights of glands, gaskets, rods, bolts, and other accessories.
 - 3. Valves and Boxes: Measure valve and box of each size and type as a unit.
 - 4. Hydrants:
 - a. Measure hydrants of each size and type as a unit.
 - b. Unit includes installation of hydrant, base, blocking, hydrant marker flag, and crushed rock.
 - 5. Hydrant System Special (Yard Hydrant):
 - a. Measure yard hydrant as a unit.
 - b. Unit includes installation of hydrant, base, blocking, and crushed rock.
 - 6. Corporation Stops:
 - a. Measure Corporation Stops of each size and type as a unit.
 - b. Unit includes service saddle.
 - 7. Curb Stops and Boxes:
 - a. Measure curb stops and boxes of each size and type as a unit.
 - b. Unit includes box extensions.
 - c. Unit includes tracer wire box (Water), magnesium anode rod, all fittings, material, labor and other accessories.
 - 8. Service Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure each size separately.
 - c. Measure from center of water main to center of curb stop plus 1-foot for slack.
 - d. Unit includes fittings and tracer wire.
 - 9. Insulation: Measure by area in square yards.
 - 10. Connection to Existing Water Service or Main
 - a. Measure as a unit for each connection to an existing service or main.
 - b. Unit includes locating, adaptor, and all else necessary to achieve a water-tight connection.
 - 11. Water Main Offset:
 - a. Measured as a unit for each section of water main that is installed at a depth greater than 8 feet deep.
 - b. Unit includes all fittings, pipe exceeding laying length, and insulation.

12. Casting Assembly Special #1:
 - a. Measure each as a unit.
 - b. Unit includes adjustment, frame, and lid with labor necessary for installation.

D. Basis of Payment:

1. Payment for acceptable quantities of water main and appurtenances shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

A. ASTM:

1. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
2. A536 - Ductile Iron Castings
3. B88 - Seamless Copper Water Tube
4. B152 - Copper Sheet, Strip, Plate, Rolled Bar
5. D429 - Tests for Rubber Adhesion to Rigid Surfaces
6. D2842 - Test for Water Absorption of Rigid Cellular Materials
7. D1248 - Polyethylene Plastics Extrusion Materials for Wire and Cable
8. D2737 - Polyethylene (PE) Plastic Tubing
9. D3035 - Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
10. D3350 - Polyethylene Plastics Pipe and Fittings Materials
11. F593 - Stainless Steel Bolts, Hex Cap Screws, and Studs
12. F594 - Stainless Steel Nuts
13. F714 - Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter (4" and larger)

B. AWWA:

1. C105 - Polyethylene Encasement for Ductile -Iron Pipe Systems
2. C110 - Ductile-Iron and Gray-Iron Fittings
3. C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
4. C150 - Thickness Design of Ductile Iron Pipe
5. C151 - Ductile-Iron Pipe, Centrifugally Cast for Water or other Liquids
6. C153 - Ductile-Iron Compact Fittings for Water Service
7. C502 - Dry-Barrel Fire Hydrants
8. C504 - Rubber-Seated Butterfly Valves
9. C509 - Resilient-Seated Gate Valves for Water Supply Service
10. C515 - Reduced-Wall, Resilient-Seated Gate Valves, for Water Supply Service
11. C600 - Installation of Ductile Iron Water Mains and their Appurtenances
12. C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
13. C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch for Water Distribution
14. C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4-inch thru 3-inch, for Water Service
15. C906 - Polyethylene Pipe and Fittings, 4-inch through 63-inch for Water Distribution

1.03 SUBMITTALS

- A. Submit Certificate of Compliance for products listed under Article 1.04.
- B. Submit proposed method of joint conductivity.
- C. Submit list of pipe, fittings, apparatuses, and all associated materials.

1.04 QUALITY ASSURANCE

- A. Provide Certificates of Compliance from the manufacturer certifying that the following products meet the respective requirements listed in Article 1.02:

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 1. Inspect all pipe and products during the unloading process.

2. Notify Engineer of any cracked, flawed or otherwise defective products.
 3. Remove all products found to be defective by the Engineer from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with AWWA C600 or C605.

PART 2 PRODUCTS

2.01 WATER MAIN PIPE

- A. Ductile Iron: AWWA C151.
1. Cement-Mortar Lining: AWWA C104.
 2. Thickness Class:
 - a. 8-inch and smaller: 52.
 3. Joints: Push-On.
 4. Joint Conductivity:
 - a. Conductive gaskets as manufactured by American Ductile Iron Pipe Co. or equal.
 - b. Field Application Methods:
 - 1) Burndy - Thermoweld by Burndy Corp., Norwalk, Connecticut.
 - 2) Cadweld by Erico Products Co., Cleveland, Ohio.
 - c. Copper Jumpers:
 - 1) Minimum 1/16 inch by 1/2 inch wide flat copper strip.
 - 2) Annealed round copper wire conforming to ASTM B152, Type DHP.
 - d. Nuts and Bolts: Silicon Bronze.
 5. External coating:
 - a. Metallic Zinc:
 - 1) Sprayed in accordance with ISO 8179-1 Standard for Ductile Iron External Zinc-based Coating-Part 1.
 - 2) Minimum active inner layer of 200 gams/m².
 - 3) Asphalt topcoat.
 6. Encasement:
 - a. Polyethylene Sheet: AWWA C105 Low Density.
 - b. Thickness: 8 mil.
- B. High Density Polyethylene (HDPE)
1. Outside dimension:
 - a. Ductile Iron Pipe Size (DIPS).
 2. C906 Dimension Ratio (DR): 11.
 3. Joints:
 - a. Field butt fused.
 - b. HDPE by Mechanical Joint (MJ) butt fused adapter with stainless steel stiffener.
 4. Laying lengths: 40 ft.
 5. Pipe compound: PPI TR-4 PE4710.
 6. Color: Black with Blue Stripes.
 7. Continuously mark pipe with the following information:
 - a. Size and dimensions.
 - b. Name of manufacturer.
 - c. Cell class.
 - d. ASTM basis.
 - e. Pipe test category.
 - f. Plant identification.
 - g. Production data.
 - h. Operator number.
 - i. Resin supplier code.
 8. Any section of pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the Site. However, a defective portion of pipe, as defined above, may be cut out and butt-fused in accordance with the procedures herein.

9. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from the construction Site.

C. Polyvinyl Chloride (PVC):

1. Polyvinyl Chloride (PVC):
 - a. AWWA C900 (4-inch through 12-inch).
2. Dimensional Ratio (DR): 18.
3. Joints: Bell, integral wall section with factory-installed, solid cross-section elastomeric ring.
4. Outside dimensions: ductile iron.
5. Laying Lengths: 20 feet (plus or minus 1 inch).
6. Color: Blue

D. Or Approved Equal.

2.02 FITTINGS

A. Ductile Iron: AWWA C153.

B. Cement-Mortar Lining: AWWA C104.

C. Finish:

1. Protective coatings:
 - a. Fusion-bonded epoxy coating:
 - 1) AWWA C116.
 - 2) Exterior and interior surfaces.
 - 3) Thickness: 6-8 mils.

D. Joints: Mechanical with ASTM F593 and F594 type 304 Stainless Steel bolts and nuts.

2.03 VALVES AND BOXES

A. Gate Valves:

1. Resilient Seated: AWWA C515.
2. Working Pressure: 200 psi.
3. Ends: Mechanical Joint with ASTM F593 and F594 type 304 Stainless Steel bolts and nuts.
4. Wedge: Ductile Iron, complete rubber encapsulated.
5. Operating Stem: Non-Rising with O-ring Seals.
6. Operating Nut: 2 inch Square, Open Left.
7. Markings to be cast on the bonnet or body:
 - a. Open indicating arrow.
 - b. Manufacturer's name.
 - c. Pressure rating.
 - d. Year of manufacture.
 - e. Size.
8. Finish:
 - a. Fusion-bonded epoxy coating complying with AWWA C550.
 - b. Interior and exterior surfaces.

B. Boxes:

1. Cast Iron, 5-1/4 inch shaft.
2. Vertical, 3 piece, Buffalo type.
3. Box length to provide for 7.5 feet of pipe cover.
4. Adjustable to 6 inches up or down from standard box length.
5. Drop lids:
 - a. 5-1/4 inch.
 - b. Marked "Water."
6. Adapter: Gate Valve Adaptor or equal.

2.04 HYDRANTS

- A. Dry Barrel: AWWA C502.
- B. Waterous Pacer WB67 or equal.
- C. Hose Connections: 2 each at 2-1/2 inch diameter.
- D. Steamer Connection: 1 each at 4-1/2 inch diameter.
- E. Threads: National Standard.
- F. Operating Stem: Open Left with O-ring Seals.
- G. Traffic flange.
- H. Hub: 6-inch Mechanical Joint with ASTM F593 and F594 type 304 Stainless Steel bolts and nuts.
- I. Main Valve Opening: 5 inch diameter.
- J. Barrel Diameter: 5 inch.
- K. Drain to operate only when hydrant is closed.
- L. Bury Depth: 8.5 feet (ground to bottom of hub).
- M. Minimum Nozzle Height (from flange): 24 inches.
- N. Cap Nuts: Pentagon.
- O. Color: Red.
- P. Provide permanent markings which indicate:
 - 1. Manufacturer's name.
 - 2. Year of manufacture.
 - 3. Bury depth.
- Q. Accessories:
 - 1. Hydrant flags:
 - a. FlexStake, RoDon Hydra-Finder, Nordic Flexi-Flag, or equal.
 - b. Color: Red.
 - c. Polyurethane hinge.
 - d. Length: 5 feet.
 - 2. Hydrant Identification Tags.
 - 3. Chains on nozzle caps.
 - 4. Tracer Wire Box:
 - a. Color: Blue.
 - b. Copperhead, Kris-Tech, or equal.

2.05 HYDRANT SYSTEM SPECIAL (YARD HYDRANT)

- A. Type: Woodford R34, IOWA Model Y34, or approved equal.
- B. Product shall have standard lever control with variable flow (Lockable when not in use).
- C. Head and lever shall be red finish.
- D. Drain below frost line.

2.06 SERVICE PIPE

- A. Copper: ASTM B88.
 - 1. Type: K, Soft.
- B. High Density Poly Ethylene (HDPE):
 - 1. Iron Pipe Size: SDR 11.
 - 2. PPI Designation PE 4710.
 - 3. ASTM D3035.
 - 4. Fittings: Requires butt-fused HDPE x NPT threaded adapter.
- C. Polyethylene (PE) water service pipe shall conform to the requirements of ASTM B 88 for Seamless Copper Water Tube, Type K, Soft Annealed temper, Polyethylene Pipe, as per AWWA C901 and fittings as per ASTM D1785, D2241, D2246, D2467, and D2740 as specified. Corporation stops, saddles, curb stops, and curb stop service boxes shall conform to the requirements of AWWA C800 as detailed in the Drawings and Specifications.

2.07 SERVICE SADDLE

- A. Service Saddle:
 - 1. Stainless steel.
 - 2. 2 bolt design.
 - 3. Type: Romac 306, Smith-Blair 372 or equal.

2.08 CORPORATION STOPS

- A. Type: Mueller B-25008, or equal.
 - 1. Inlet: AWWA taper thread.
 - 2. Outlet: Conductive compression connection.

2.09 CURB STOPS AND BOXES

- A. Valve:
 - 1. Mueller B-25155 Ball Curb Valve, or equal.
 - a. Inlet: Conductive compression connection.
 - b. Outlet: Conductive compression connection.
- B. Box:
 - 1. Type: Mueller H10300 or Ford EM-2-75-56 or approved equal.
 - 2. Length: 7.5 feet.
 - 3. Adjustable to 6 inches up or down from specified length.

2.10 INSULATION

- A. Rigid, extruded polystyrene board insulation.
- B. Thermal Resistance (R): 5.0.
- C. Thickness: 2 inch.
- D. Board Size: 48 inch by 96 inch.
- E. Compressive Strength: Minimum 25 psi.
- F. Water Absorption in accordance with ASTM D2842: 0.1 percent by volume, maximum.
- G. Edges: Square.

2.11 ENCASEMENT

- A. Polyethylene Sheet: AWWA C105 Low Density.
- B. Thickness: 8 mil.

2.12 CASTING ASSEMBLY SPECIAL #1

- A. Type: Ford A1, McDonald 74M1A with 74M1L8, or approved equal.
- B. Standard pentagon bolt furnished with locking lids.
- C. Frame and lid shall be cast iron per ASTM A48, Class 25.
- D. Black finish marked "Water".

2.13 TRACER WIRE AND CONNECTIONS

- A. Tracer wire for open cut shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- B. Connectors:
 - 1. All main line tracer wires must be interconnected in intersections, at main line tees, and main line crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.
 - 2. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
 - 3. Non locking friction fit, twist on, or taped connectors are prohibited.
- C. Termination/Access:
 - 1. All tracer wire termination points must utilize an approved tracer wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
 - 2. All grade level/in-ground access boxes shall be appropriately identified with water cast into the cap and be color coded.
 - 3. A minimum of 2 feet of excess/slack wire is required in all tracer wire access boxes after meeting final elevation.
 - 4. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
- D. Hydrants: Tracer wire must terminate at an approved (see Detail Drawing) above-ground tracer wire access box, properly affixed to the hydrant grade flange. Affixing with tape or plastic ties shall not be acceptable.
- E. Grounding:
 - 1. Tracer wire must be properly grounded at all dead ends/stubs and locations where PVC main line connects to DIP or cast iron pipe.
 - 2. Grounding of tracer wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
 - 3. When grounding the tracer wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the tracer wire, at the maximum possible distance.
 - 4. When grounding the tracer wire in areas where the tracer wire is continuous and neither the main line tracer wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the tracer wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to tracer wire with a mainline to lateral lug connector.

5. Where the anode wire will be connected to a tracer wire access box, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Connection to Existing System:
 1. Cut-In Connection:
 - a. Isolate segment of pipe to be cut and drain water from the line.
 - b. Connect tee and sleeve assembly to pipe ends.
 - c. Install blocking as required.
 2. Connect to Inplace Fitting:
 - a. Isolate segment of inplace pipe and remove blocking as required.
 - b. Remove plug and drain water from the line.
 - c. Install blocking as required.
- B. Pipe Installation:
 1. Install pipe at the alignment and grade shown on the Drawings.
 2. Provide a minimum of 7.5 feet of cover over the pipe.
 3. Install appurtenances in the locations shown on the Drawings.
 4. Remove all dirt and foreign material from the pipe interior prior to installation.
 5. See Section 31 23 33 for pipe foundation and backfill procedures.
 6. See Section 31 23 33 in case of conflicts with existing pipes.
- C. Valve and Box Installation:
 1. Verify that subgrade material is adequate to support valve assembly.
 2. Install valves with stems vertical and plumb.
 3. Install boxes plumb and centered over the valve nut.
 4. Verify that box remains plumb and centered during backfill.
 5. Adjust box cover to required grade.
- D. Hydrant Installation:
 1. Verify that subgrade material is adequate to support hydrant.
 2. Place thrust block, crushed rock and tar paper in accordance with Drawing details.
 3. Install and maintain hydrant in a plumb position.
 4. Where groundwater is present, plug drain hole and affix "Pump After Use" tag to the hydrant.
- E. Joint Conductivity:
 1. Provide electrical bond across all joints between pipes and appurtenances.
 2. Install copper jumpers by either shop or field applications.
 3. Fasten multiple jumper strips with silicon bronze bolts and nuts.
 4. Welding:
 - a. Grind surfaces to be welded to remove coating and oxide and to provide clean metal surface.
 - b. Use metallic-arc process for shop applications.
 - c. Use exothermic process for field applications.
 - d. Refinish welded area with protective coating after connection is made.
- F. Thrust Restraint:
 1. Install thrust restraints at all bends, tees and plugs.
 2. Concrete Blocking:
 - a. Place between the fitting and undisturbed trench wall.
 - b. Minimum thickness: 12 inches.

- c. Minimum area in square feet shall be in accordance with the following:

Pipe	Tee or Plug	1/4 Bend	1/32 and 1/8 Bend	1/16 Bend
6 inch	2.9	3.1	1.6	0.8
8 inch	3.7	5.3	2.9	1.4
10 inch	5.7	8.1	4.4	2.2
12 inch	8.1	13.4	6.6	3.2
16 inch	15.1	21.4	11.6	5.9
20 inch	23.2	30.2	18.1	9.3
24 inch	33.6	48.5	26.1	13.3

- d. Size blocking based on the larger main.
e. Verify that bolts are accessible after concrete is poured.
3. Timber Blocking:
a. Use for temporary blocking only for maximum 8 inch mains.
b. Minimum timber size: 4 inch by 4 inch.
4. Restrained Joints:
a. Submit method and type to Engineer for approval.
b. Install in accordance with manufacturer's recommendations.
- G. Service Installation:
1. Corporation Stops:
a. Provide watertight connection with approved tapping machine.
b. Install under main pressure.
c. Place a double wrap of Teflon tape around the threads prior to installation.
2. Copper Service Pipe:
a. Install pipe between corporation stop and curb stop with no joints or unions.
b. Bury Depth: 7.5 feet.
c. Provide minimum 1 foot of slack in the pipe to allow for settlement and movement.
3. Curb Stop and Box:
a. Install at the location shown on the Drawings.
b. Verify that subgrade material is adequate to support the curb box assembly.
c. Install boxes plumb and centered over the tee head.
d. Verify that box remains plumb and properly aligned during backfill.
e. Adjust box cover to required grade.
f. Key all curb stops after backfill to ensure proper operation.
4. Tracer Wire Box (Water):
a. Install at location as shown on the Drawings.
b. Verify that box remains plumb and properly aligned during backfill.
c. Adjust box cover to required grade.
- H. Encasement:
1. Comply with AWWA C105.
2. Wrap all pipe and fittings in the location shown on the Drawings.
3. Clean all surfaces of pipe and appurtenances prior to wrapping.
4. Provide sufficient slack to prevent damage during backfill.
5. Provide minimum 6 inch overlap at joints.
6. Secure overlap and joints with compatible adhesive tape.
7. Repair damaged wrap with tape or polyethylene patch.
- I. Tracer Wire Installation:
1. Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
2. Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

3. Any damage occurring during installation of the tracer wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
4. Tracer wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5-foot intervals.
5. Main line tracer wire shall not be connected to existing conductive pipes. Treat as a main line dead end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the tracer wire.
6. Lay main line tracer wire continuously, bypassing around the outside of valves and fittings on the north or east side.
7. Wire splice connections shall be witnessed by the Engineer or the City Public Works Department staff.

3.02 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:
 1. Pressure and Leakage Test:
 - a. Perform pressure and leakage test in accordance with AWWA C600.
 - b. Test Pressure: 150 psi.
 - c. Test Duration: 2 hours.
 - d. Gage Requirements:
 - 1) Size: 4-1/2 inch dial.
 - 2) Range: 0 to 200 psi.
 - 3) Gradation: 2 psi.
 - 4) Accuracy: 1/2 percent.
 - e. Do not allow pressure to vary more than 5 psi during the test.
 - f. Do not allow pressure to vary more than 2 psi during the last hour of the test.
 - g. Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{296,000}$$

L = Allowable Leakage in Gallons Per Hour
 S = Length of Pipe Tested in Feet
 D = Nominal Diameter of Pipe in Inches
 P = Average Test Pressure During Test in Pounds/Square Inch (Gage)

2. Testing Services:
 - a. Perform separate pressure and leakage test on the services with the corporation stops open.
 - b. Test Pressure: 100 psi.
 - c. Allowable Leakage: None.
 - d. At Contractor's option, service testing may be done concurrent with main testing.
3. Electrical Conductivity Test:
 - a. Perform electrical conductivity test to verify that electrical thawing of the system may be accomplished by Owner.
 - b. Test Parameters:
 - 1) Perform test within 1 week after pressure testing.
 - 2) Perform test after back-filling is completed and while line is at normal operating pressure.
 - 3) Test Current: 350 amperes DC plus or minus 10 percent.
 - 4) Test Duration: 5 minutes.
 - 5) Test between hydrants in segments of convenient length.
 - c. Procedures:
 - 1) Furnish DC current source, cable and all required equipment of adequate capacity to accomplish the test.
 - 2) Clamp cables to hydrant flange bolts.
 - 3) Conduct test with hydrant in the open position and caps on.

- 4) Measure current continuously throughout the test with a DC ammeter hooked on a cable lead.
- 5) Start test at minimum current level and increase to test level.
- 6) Drain hydrant and tighten caps after test.
- d. Failure and Correction:
 - 1) Failure of a segment shall be determined by current measurements that are insufficient, intermittent or unsteady.
 - 2) Isolate and correct defective contact points as indicated by failed tests.
 - 3) Retest failed segments after correction.
- B. Temporary Measures for Testing Water Main:
 - 1. The Project Work is to be constructed in phases. This may necessitate the need for Contractor to use temporary measures at various locations to test the new water main for leakage. The Contractor may need to install temporary fittings, flushing hydrant, or a valve to perform the required testing. After completing the test, the fittings, flushing hydrant, or valve shall be removed and the pipe ends connected. No separate payment will be made for the necessary materials and labor to accomplish this testing work.

3.03 DISINFECTION

- A. Disinfect all newly installed water mains, appurtenances and services in accordance with AWWA C651.
 - 1. Tablet or Continuous Feed Method:
 - a. Hold chlorine solution in pipe for a minimum period of 24 hours.
 - 1) Initial dosage: 50 ppm minimum.
 - 2) Residual dosage after hold period: 10 ppm minimum.
- B. Flush system within 24 hours after disinfection is completed.
- C. Sampling and Testing:
 - 1. After final flushing, obtain 2 sets of samples taken a minimum of 24 hours apart.
 - 2. Each sample set shall include:
 - a. One sample for every 1,200 feet of main.
 - b. One sample at each dead-end.
 - c. Ensure that 1 sample is obtained from each branch of main.
 - d. Minimum sample required: 2
 - 3. Perform coliform tests on each sample.
 - 4. Re-chlorinate if any sample tests positive for coliform.

3.04 AS-BUILT RECORDS

- A. Record accurate locations of sewer and water services installed as part of this Project, in accordance with the following:
 - 1. Measure and record the size and length of each separate sewer or water service.
 - 2. Measure and record the horizontal distance upstream or downstream from the sanitary sewer wye to adjacent water service corporation cock or water service fitting connection at main.
 - 3. Measure and record the horizontal distance upstream or downstream from the sanitary sewer service pipe to adjacent water service curb stop and box or water service connection at right-of-way line.
 - 4. Note if installed water service depth is different than specified.

END OF SECTION

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SECTION 33 21 11

WELL REHABILITATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Well #1 and Well #2
 - a. Remove Existing Pumping Equipment and Inspection
 - b. Televis Well
 - c. Cleaning and Development (if needed)
 - d. Re-Televis Well (if cleaning done)
 - e. Repair/Replace Pump and Motor
 - f. Install Piping (as needed)
 - g. Re-Install Pumping Equipment
 - h. Cleanup/Closeout
- B. Method of Measurement:
1. Mobilization/Demobilization:
 - a. Measure as a complete unit on a lump sum basis.
 - b. Includes transporting tools & equipment to and from the site. Site preparation, protecting of existing equipment.
 - c. Miscellaneous costs such as insurance and overhead.
 2. Removal, Inspection, and Reinstallation of Pump, Motor, and Downhole Equipment:
 - a. Measure as a complete unit on a lump sum basis.
 - b. Includes disconnecting, protection, inspecting for items to repair/replace, and reconnection of the pump, motor, and downhole equipment, plus associated materials and labor.
 3. Initial Televising of Well: Measure as a complete unit on a lump sum basis.
 4. Well Equipment Items (as scheduled on Bid Form): Measured as complete units for quantities actually installed (if any).
 5. Pump and Motor Repair: See Allowances (Section 01 21 00).
 6. New Pump and Motor (if selected by Engineer): Measure as a complete unit on a lump sum basis.
 7. Well Cleaning Items (if selected by Engineer):
 - a. Special mobilization/demobilization of well rig for cleaning and wire brush cleaning of well:
 - 1) Measured as a complete unit on a lump sum basis.
 - b. Wire brush cleaning of casing:
 - 1) Measure as a complete unit on a lump sum basis.
 - c. Bailing and removal of waste material:
 - 1) Measured on a cubic yard basis for the quantity removed from well.
 8. Repeat Televising of Well: Measure as a complete unit on a lump sum basis.
 9. Testing: Measure as a complete unit on a lump sum basis.
 - a. Plumbness and alignment
 - b. Performance pumping
- C. Basis of Payment:
1. Payment for acceptable quantities of well construction items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 2. The quantities listed on the Bid Form are listed for the purpose of evaluating bids. Final payment will be based on actual quantities and work performed.

1.02 REFERENCES

- A. AWWA:
1. A100 - Standard for Water Wells

- B. MDH:
 - 1. Chapter 4725 - Water Well Construction Code

1.03 DESCRIPTION

- A. Rehabilitation of existing City of Silver Lake's Well #1 and Well #2 using tools and procedures as described in these specifications.

1.04 PROJECT SITE

- A. Location: The well sites are located as shown on Drawings.
- B. Work Area: Confine all operations to immediate area around well site.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Well drilling machines: Register in accordance with MDH Chapter 4725.1800.
- B. Submersible well pump and motor: See Section 33 28 20.
- C. Discharge pipe: See Section 33 28 20.

PART 3 EXECUTION

3.01 SITE PROTECTION

- A. Protect all existing equipment by covering with plastic or other acceptable materials as needed.

3.02 WELL REHABILITATION

- A. Removal, Inspection, and Reinstallation of Pump, Motor, and Downhole Equipment.
 - 1. Disconnect power and remove wellhead.
 - 2. Protect adjacent wellhouse equipment with plastic.
 - 3. Remove all down-hole well equipment (pump, motor, column piping).
 - 4. Clean, inspect, and inventory equipment to prepare estimate of unit quantities to rehabilitate well equipment.
 - 5. Unless obviously defective, sandblast the pump and motor prior to inspection by Owner/Engineer.
 - 6. Present cost estimate (using unit prices bid) of replacement of well equipment to Owner/Engineer, for decision on whether to repair or replace pump/motor.
 - a. Repairs to well pump and motor will be paid for using the allowance. If the costs exceed the allowance, the Owner/Engineer will direct the Contractor to furnish and install a new submersible well pump and motor.
 - b. If replacement options are selected, Contractor shall check with Owner to offer delivery of salvaged pump, motor, and equipment that are being replaced.
 - c. If Owner is not salvaging equipment, it is the responsibility of the Contractor to dispose of properly.
 - 7. Upon completion of initial televising and well cleaning work (if ordered), reassemble the well equipment in well and provide required testing.
- B. Televising Well:
 - 1. Initial televising after removal of down-hole well equipment.
 - 2. Settle well by flushing with potable water for 48 hours, prior to televising.

3. Use color camera with articulating head to record condition of entire well.
 - a. Provide written log of televising.
 - b. Provide two (2) DVD video logs. One to Owner and one to Engineer.
 - c. Within 10 days of submittal of video log, Owner/Engineer will provide a decision and direction of completion of well cleaning items.

- C. Furnish and install downhole well equipment in accordance with Minnesota Rules, Chapter 4725.
 1. Furnish and install 1 1/4 inch PVC stilling tube extended to 2 feet above pump bowls. Cap the end of the stilling tube and drill holes in cap and sides to allow water movement. Tie off as required.

- D. Well Pump and Motor Repair:
 1. This section applies if directed by Owner/Engineer.
 2. Complete pump and motor rehabilitation utilizing the allowance.
 3. Provide a detailed breakdown for the shop hours worked including a description of the work, and copy employee time sheets.

- E. New Pump and Motor:
 1. This section applies if directed by Owner/Engineer.
 2. See Section 33 28 20.

- F. Cleaning of Well:
 1. This section applies, if directed by Owner/Engineer after initial video logging to conduct cleaning operations.
 2. Mobilize/demobilize a well rig capable of drilling any sloughed rock in the well bore, bailing the accumulated materials in the bottom of well and accomplishing the brushing operations.
 - a. Provide watertight dumpster to remove wastewater and material from site.
 - b. Discharge all water and material from drilling and development operations into dumpster as needed.
 3. Clean Casing with Wire Brush:
 - a. Simultaneously remove rust and debris from casing while brush is operating.
 - b. Thoroughly clean entire casing.
 4. Bail and remove waste material after cleaning.

- G. Repeat televising operations of cleaned well:
 1. Settle well by flushing with potable water for 48 hours, prior to televising
 2. Use color camera with articulating head to record condition of entire well.
 - a. Provide written log of televising
 - b. Provide two (2) DVD video logs. One to Owner and one to Engineer.

3.03 TESTING

- A. Plumbness and Alignment Test:
 1. Conduct testing on the in-place well in accordance with AWWA A100, Appendix D.
 2. Provide a written report to the Owner for records.

- B. Performance Test
 1. Field test pump performance at two (2) operating points selected by Engineer.
 2. Measure and record the following data at static level and each operating point:
 - a. Static water level
 - b. Pumping water level
 - c. Static discharge pressure
 - d. Pumping discharge pressure
 - e. Flow rate
 - f. Non-running voltage (3 legs)
 - g. Running voltage (3 legs)
 - h. Running amps (3 legs)
 3. Initial performance test by pumping to distribution system.
 4. Water to be pumped to waste for final performance test through hydrant at facility.

5. Provide discharge pipe from hydrant to waterway to prevent property damage.
6. Disperse water to prevent erosion and wash sand and iron deposits from surfaces.
7. Repair damage resulting from testing at no cost to Owner.
8. Water meter, gauges, and water level detection device at facility may be used for testing.
9. Modify or replace pump as necessary to meet Specifications.

3.04 DISINFECTION

- A. Clean and disinfect all tools and equipment placed in the well with a 50 ppm chlorine solution.
- B. Pump well until 3 volumes of water are removed or until water clears.
- C. Add chlorine to the well in an amount sufficient to produce a 50 ppm solution in all parts of the well.
- D. Ensure that chlorine solution contacts all well surfaces above the static level.
- E. Hold chlorine solution in well for 2 hours minimum.
- F. Completely flush solution from well.

3.05 SITE CLEAN-UP

- A. Remove all debris from Site.
- B. Restore to original condition.
- C. Remove and dispose of all cuttings.

3.06 CLOSEOUT

- A. Provide 3 copies of a standard well plan (for both wells) indicating all materials replaced or reused in the well rehabilitation project.
- B. Provide equipment/material information and quantities for all equipment/material placed back into service in the wells. Include equipment installation data.
- C. Provide test results.

END OF SECTION

SECTION 33 28 20

SUBMERSIBLE WELL PUMP AND MOTOR

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Well pump and appurtenances.
 - 2. Submersible motor (variable speed inverter duty).

- B. Furnish and install well pump and motor only if called for by Engineer. See Section 33 21 11.

1.02 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Water lubricated.
 - 2. Maximum no-load pump speed: 3600 rpm.

- B. Performance Requirements:
 - 1. Well #1:
 - a. Provide 260 gpm against a total dynamic head of 220 feet.
 - b. Minimum pump efficiency at 254 gpm: 71.6 percent.
 - c. Minimum shut-off head: 335 feet.
 - d. Provide for minimum hydraulic turbulence at design condition.
 - 2. Well #2:
 - a. Provide 275 gpm against a total dynamic head of 214 feet.
 - b. Minimum pump efficiency at 265 gpm: 72.4 percent.
 - c. minimum shut-off head: 335 feet.
 - d. provide for minimum hydraulic turbulence at design condition.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer.
 - 2. Size and model number.
 - 3. Component pump materials.
 - 4. Motor specifications.

- B. Shop Drawings:
 - 1. Schematic drawing.
 - 2. Dimensions.

- C. Factory Certified Performance Tests:
 - 1. Head capacity curve.
 - 2. Horsepower curve.
 - 3. Wire to water efficiency, including all friction and shaft losses.

- D. Operation and maintenance instructions.

1.04 SITE CONDITIONS

- A. Well Construction:
 - 1. Well #1:
 - a. 10 inches casing to 161 feet.

- b. Open formation:
 - 1) Screened from 161 to 190 feet.
 - 2) Open hole from 190 to 235 feet.
 - c. Static Water Level: 40 feet.
 - d. Confirm depths during installation.
2. Well #2:
- a. 10 inches casing to 185 feet.
 - b. Open formation:
 - 1) Screened from 185 feet to 207 feet.
 - 2) Open hole from 207 to 242 feet.
 - c. Static Water Level: 41 feet.
 - d. confirm depths during installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
- 1. Pump:
 - a. Goulds.
 - b. Grundfos.
 - c. Pre-Approved Equal.
 - 2. Motor:
 - a. SME.
 - b. Hitachi.
 - c. Pre-Approved Equal.
 - 3. "Or equal" models submitted and approved in accordance with Section 01 25 13.

2.02 EQUIPMENT

- A. Pump:
- 1. Bowl Assembly:
 - a. Assembly:
 - 1) Provide bronze sleeve type bushings for bowls and cases to support and guide shaft.
 - 2) Provide a belled suction inlet.
 - 3) Provide a sand collar to protect suction bearing.
 - 4) Select intermediate stages to provide maximum efficiency with the lowest possible number of stages.
 - 5) Bowl assembly shall not overload furnished motor under any conditions.
 - 6) Securely fasten impeller to bowl shaft with taper collets.
 - 7) Minimum bowl shaft diameter: 1.5-inch.
 - b. Components:
 - 1) Pump bowls: Close-grained cast iron, ASTM A48, Class 30.
 - 2) Bowl water passages: Porcelain enamel coated.
 - 3) Bushings: Bronze, sleeve-type.
 - 4) Bushing material: Bronze ASTM B505, alloy 836.
 - 5) Sand collars: Rubber or bronze, ASTM B505, alloy 836.
 - 6) Impellers: Bronze ASTM B584, alloy 836; totally enclosed; dynamically balanced.
 - 7) Taper collets: ASTM A582, Grade 416 stainless steel.
 - 8) Bowl shaft: High chrome stainless steel, ASTM A276, Grade 410.
 - 2. Suction Adaptor:
 - a. Close-grained cast iron.
 - b. Function:
 - 1) Suction inlet.
 - 2) Lower bearing housing.
 - 3) Motor adaptor piece.
 - c. Includes stainless steel strainer.
 - d. Provide minimum net inlet area of 5 times the impeller inlet area.

- e. Provide coupling connection between motor and bowl assembly.
 - 1) 416 stainless steel.
 - 2) Key or spline to pump shaft.
 - 3) Capable of withstanding maximum torque generated by motor plus added safety factor.
 - 3. Discharge Pipe:
 - a. Steel, ASTM A53, A120.
 - b. Diameter: 6 inches (match existing).
 - c. Weight: AWWA E101, Section 4.5.
 - d. Pipe threads: ANSI standard taper.
 - e. Threaded sleeve couplings.
 - 4. Submersible Cable:
 - a. Provide steel guard to protect cable through bowl assembly.
 - b. Provide stainless steel cable straps at maximum 20-foot centers to support cable along riser pipe.
 - c. Provide 3 conductors and insulate for continuous immersion.
- B. Surface Discharge Elbow and Base:
- 1. Base:
 - a. Provide threaded connection for terminal box.
 - b. Provide threaded openings for:
 - 1) Drawdown equipment.
- C. Motor:
- 1. Requirements:
 - a. Vertical, submersible.
 - b. 2-pole induction type for continuous under-water operation.
 - c. Rated for 20 hp.
 - d. Maximum number load speed: 3600 rpm.
 - e. Normal starting torque.
 - f. Low starting current.
 - g. Service factor: 1.15.
 - h. Water-filled.
 - i. Provide mechanical seal.
 - 2. Characteristics:
 - a. 3-phase, 60 cycle.
 - b. 240 volt AC.
 - 3. Thrust Bearing:
 - a. Capable of carrying weight of all rotating parts plus hydraulic thrust.
 - b. Integral part of the driver.
 - c. Rated for 5-year continuous operation.
- D. Well Vent:
- 1. Galvanized pipe.
 - 2. Galvanized vent caps with integral corrosion resistant 24-mesh screen.

2.03 SOURCE QUALITY CONTROL

- A. Pump: Provide factory-certified performance (head and horsepower) curves for the specific unit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install foot valve in vertical pump discharge pipe below static level.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services:
 - 1. Supervise pump and motor installation.
 - 2. Inspect and approve final installation.
 - 3. Perform all necessary calibration and adjustments in accordance with manufacturer's recommendations.
 - 4. Coordinate startup with installation of related equipment. See Section 01 75 00.
 - 5. Perform field pumping test:
 - a. Provide all required equipment.
 - b. Conduct test in presence of Owner and Engineer.
 - c. Operate pump at a minimum of 3 different rates as determined by Engineer.
 - 6. Adjust, modify, or replace pump as necessary to conform to specified performance.

3.03 DISINFECTION

- A. Apply a chlorine solution to completed well and pumping equipment.
- B. Obtain a minimum 50 ppm concentration in all parts of well.

END OF SECTION

SECTION 33 31 00

SANITARY SEWER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Gravity sanitary sewer pipe.
 - 2. Sanitary manholes and appurtenances.
 - 3. Service connections.
 - 4. Service pipe.
 - 5. Riser pipe.
 - 6. Manhole rehabilitation.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 01 30 - Television Inspection of Sewers

1.02 MEASUREMENT AND PAYMENT

- A. Method of Measurement:
 - 1. Where not noted in Drawings as part of lump sum bid item:
 - a. Sewer Pipe:
 - 1) Measure by distance in linear feet.
 - 2) Measure along longitudinal axis from manhole centers with no deduction for fittings.
 - 3) Measure each pipe size, class, and depth zone separately.
 - b. Manholes:
 - 1) Measure by height in linear feet to the nearest 0.1-foot.
 - 2) Measure from lowest invert to bottom of the casting.
 - 3) Measure each size and type separately.
 - 4) Unit includes granular foundation, base, precast barrel and cone sections, steps, and adjusting rings.
 - c. Manhole Drop Section:
 - 1) Measure by each.
 - 2) Unit includes fittings, drop pipe, anchors, collar, and core drilling of existing manhole.
 - d. Manhole Connections:
 - 1) Measure connections to an existing manhole as a unit.
 - 2) Unit includes cutting and patching of manhole wall and base, and construction of a new invert.
 - 3) Connections to existing manholes shall be core drilled.
 - e. Service Wye: Measure fittings of each size and type as a unit.
 - f. Connect to Existing Sanitary Sewer Service: Measure fittings of each size and type as a unit.
 - g. Connect to Existing Sanitary Sewer System: Measure fittings of each size and type as a unit.
 - h. Service Pipe:
 - 1) Measure by distance in linear feet of each size.
 - 2) Measure horizontally from center of main wye to end of pipe.
 - i. Sanitary Service Cleanout:
 - 1) Measure pipe and fittings of each size and type as a unit.
 - 2) Unit includes wye, riser pipe, and assorted fittings, crushed rock bedding, and rubberized magnetic cover.
 - j. Riser Pipe: Riser pipe shall be considered incidental to construction of service pipe.
 - k. Manhole Seals: Measure by each as an individual unit.
 - l. Casting Assembly (Adjustment rings, frame, and lid):
 - 1) Measure each as a Unit.
 - 2) Includes adjustment rings, frame, and lid with labor necessary for installation.

- m. Casting Assembly Special #1:
 - 1) Measure each as a Unit.
 - 2) Unit includes adjustment, frame, and lid with labor necessary for installation.
 - n. Construct Bulkhead:
 - 1) Measure each as a Unit.
 - 2) Unit includes all fittings, material, labor, and other accessories required to bulkhead sanitary sewer.
 - o. Insulation: Measure by area in square yards.
 - p. Manhole Rehabilitation: Measure by linear foot measured from the manhole invert to the top of the manhole casting.
- B. Basis of Payment:
- 1. Payment for acceptable quantities of sanitary sewer items shall be at the Contract Unit Price as listed on the Bid Form.
 - 2. All associated Work items shall be considered incidental.
 - 3. Maintaining sanitary sewer service during construction shall be considered incidental.
 - 4. Televising:
 - a. Post manhole rehab (pre-lining) and Post manhole lining videos shall be considered incidental.
 - b. Cleaning and televising of sanitary sewer main post installation shall be considered incidental.
 - 5. Provide Sanitary Sewer Manhole Repair at all specified locations as shown on Drawings, including:
 - a. Cleaning the interior of manholes of loose concrete, mineral deposits, grease and debris.
 - b. Grouting all leaking or structurally damaged areas.
 - c. Surface preparation including removal of organic and inorganic materials, surface repair and repair of structure defects, sealing and coating application from the manhole invert to the top of the manhole casting, and inspections and reports as outlined in Submittals in this Section.
 - d. Applying coating to manhole interiors including benches and manhole invert.
 - e. Removal of steps at specified locations.
 - 6. Where noted in Drawings as part of the following lump sum bid items:
 - a. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1) Cleveland Lift Station.
 - 2) Metering Manhole (Alternate 5).
 - 3) Primary Pond Control Structure (Alternate 6).

1.03 REFERENCES

- A. ANSI:
 - 1. A21.4 - Standard for Cement - Mortar Lining for Ductile Iron Pipe and Fittings
 - 2. A21.11 - Standard for Rubber - Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - 3. A21.51 - Standard for Ductile Iron Pipe Centrifugally Cast
 - 4. A21.53 - Standard for Ductile Iron Compact Fittings, 3-inch through 16-inch
- B. ASTM:
 - 1. A48 - Specification for Gray Iron Castings
 - 2. A74 - Specification for Cast Iron Soil Pipe and Fittings
 - 3. C76 - Specification for Reinforced Concrete Pipe
 - 4. C361 - Specification for Reinforced Concrete Low Head Pressure Pipe
 - 5. C425 - Specification for Compression Joints for VCP and Fittings
 - 6. C478 - Specification for Precast Reinforced Concrete Manhole
 - 7. C564 - Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
 - 8. D2321 - Recommended Practice for Installation of Flexible Thermo-plastic Sewer Pipe
 - 9. D3034 - Specification for PVC Sewer Pipe and Fittings
 - 10. F477 - Elastomeric Seals for Joining Plastic Pipe
 - 11. F714 - Specification for PE Sewer Pipe and Fittings

1.04 SUBMITTALS

- A. Submit Shop Drawings for each manhole.
- B. Quality Assurance/Control Submittals:
 - 1. Submit Certificates of Compliance from manufacturers certifying that materials meet reference specifications listed in Article 1.02.
 - 2. Submit record of service connections weekly to Engineer.
- C. Manhole Rehabilitation Submittals:
 - 1. All materials and procedures required to establish compliance with the specifications shall be submitted to the Owner/Engineer for review/approval. Submittals shall include at least the following:
 - a. Technical Data Sheet on each product used.
 - b. Safety Data Sheet (SDS) for each product used.
 - c. ASTM References.
 - d. CIGMAT Evaluation.
 - e. Descriptive literature, bulletins and or catalogs of materials.
 - f. Work procedures including flow diversion plan, method of repair, etc.
 - g. Material and method for repair of leaks or cracks in manholes
 - h. Final installation report on completed manholes.

1.05 QUALITY ASSURANCE FOR MANHOLE REHABILITATION

- A. The manufacturer and/or applicator of the spray liner system of manholes shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for manholes. Applicator shall be completely trained in leak repair, surface preparation and corrosion materials application on manholes. Corrosion materials/products shall be suitable for installation in a severe hydrogen sulfide environment without any deterioration to the liner.
- B. The applicator shall be trained and certified by the manufacturer for the handling, mixing, application and inspection of the liner system as described herein.
- C. To ensure total unity responsibility, all materials and installation thereof shall be furnished and coordinated with/by one supplier/applicator who turnkeys the work and assumes full responsibility for the entire operation.

1.06 HANDLING AND DELIVERY OF MATERIALS

- A. Inspect pipe and materials during unloading process and notify Engineer of cracked, flawed or otherwise defective material.
- B. Deliver materials in the original manufacturer's sealed containers; identify each container with material name, date of manufacturer and lot number. Accept delivery of material only in an undamaged condition; immediately remove damaged and otherwise unsuitable material from the Project site when so determined.
- C. Store materials to prevent damage to containers; protect and heat or cool material storage location to maintain temperature ranges recommended by coating manufacturer.

1.07 STAKING

- A. Engineer shall provide necessary staking for all Work under this Section.

1.08 MAINTAINING SEWER SYSTEM

- A. Maintain flow in sanitary sewers on continuous basis while construction is underway.

- B. Plug sewers with inflatable plug. Provide pumps, portable generators, hoses, and related items appurtenant to the Work.
- C. Sewer service lines to individual users may be disconnected for a period not to exceed 8 hours.

1.09 SPRAY LINING WARRANTIES

- A. Contractor shall provide a written warranty and bond against defects in materials for a period of one year from the date of Substantial Completion. Provide a written warranty and bond against defects in application for a period of 10 years when material is applied at minimum specified thickness or greater.
 - 1. Material defects, if any, will result in replacement of materials after examination by the applicator and determination of defects.
 - a. Notify manufacturer within 30 days of application.
 - 2. Defects may include holidays, runs or sags the result of improper mixing or application methods, or other surface imperfections that would affect the integrity of the coating.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Provide the following:

Material	Class	Joint
PVC	SDR 26 SDR 35 ASTM D3034 ASTM F477	Elastomeric Gasket Water Stop Gasket
PVC	C900, DR18	Push-On
HDPE	SDR 17	Butt-Fusion

- B. Provide pipe and fittings of each material type from same manufacturer.
 - 1. Sanitary sewer main and sewer services to be of same material.
- C. Service Pipe Couplings:
 - 1. Dissimilar Pipe Material Connection:
 - a. Fernco, Inc., 1-piece eccentric series (banded), or approved equal.
 - 2. Sheer Guard Coupling, Coupling Supports by Indiana Seal, or approved equal PVC to PVC Connection:
 - a. Use PVC fitting required to match pipe dimensions and create a water-tight seal.
 - 3. All connections to existing sanitary sewer services shall include a shielded coupling to maintain rigidity and proper alignment.
 - 4. See detail in the drawings.
- D. Color: Green for PVC, Black with Green Stripes for HDPE

2.02 PRECAST CONCRETE MANHOLES, WETWELL AND VAULTS

- A. Precast Sections:
 - 1. Sanitary sewer manholes shall be Precast Mechanical Joint Sewer Manhole conforming to MnDOT Standard Plate No. 4007C with Type A gasket.
 - 2. Cone: Eccentric.
 - 3. Pipe Joints: Gasketed, water-tight.
- B. Precast Sections (Lump Sum Bid Items only):
 - 1. Design and fabricate reinforced concrete manholes to conform to ASTM C 478.
 - 2. Integrally cast base with extensions.
 - 3. Pipe Joints: Gasketed, water-tight, ASTM C443.
 - 4. All cover sections shall be H20 rated.

- C. Covers and Frames:
 - 1. Shall be Neenah R-1642 with solid lid or approved equal.
 - 2. Lid shall have concealed pick holes and be labeled "SANITARY SEWER".
- D. Covers and Frames (Lump Sum Bid Items only):
 - 1. See Section 08 31 00 for covers.
 - 2. See Section 05 50 00 for details on grating for Primary Pond Control Structure (Alternate 6).
- E. Steps (Lump Sum Bid Items only):
 - 1. Cast aluminum by Modern Metals Foundry (A-12).
 - 2. Polypropylene coated steel by MA Industries.
 - 3. Or approved equal.
- F. External Seals: Infi-shield, Inc., or approved equal.
- G. Adjusting Rings:
 - 1. Injection molded High Density Polyethylene (HDPE).
 - 2. Ladtech or approved equal.
 - a. Provide adjustment rings in various sizes as required to meet adjustments.
 - b. Provide slope rings to match grade of finished road surface.

2.03 MANHOLE REHABILITATION (SPRAY LINING)

- A. Coatings that apply only to discharge manhole SN-23:
 - 1. Sherwin Williams Coatings
 - a. 1st coat as Macropoxy 5000 epoxy primer/sealer applied at 1 – 1.5 mils thickness. Fill all bugholes and voids with Steel Seam FT910 or Duraplate 2300.
 - b. 2nd coat as Polycote 115 polyurethane applied at 40 – 80 mils thickness.
 - 2. Tnemec Coatings
 - a. 1st coat as Series 218 MortarClad epoxy modified cementitious mortar applied at 1/16 inch thickness.
 - b. 2nd coat as Series G435 Perma-Glaze modified polyamine epoxy applied at 40 to 80 mils thickness.
 - 3. Acceptable manufacturers for the coating systems include:
 - a. Sherwin Williams
Local location
Tel: 800.524.5979
 - b. Tnemec
123 West 23 Ave
North Kansas City, MO 64116
Tel: 816.483.3400
 - c. Or approved equal.
- B. Coatings that apply to all other sanitary sewer manholes:
 - 1. Polyurethane Coatings: High performance, 2-part, 100 percent solids polyurethane coating.
 - a. Zebron7 300 Series, No. 386 or Engineer approved equal.
 - 2. Geopolymer Coatings: Quick setting, high strength, acid resistant cementitious material.
 - a. Strong-Seal MS-2C, Quadex GeoKrete, Milliken GeoSpray AMS or Engineer approved equal.
 - 3. Polyuria System Coatings: Multi-component stress skin panel liner system.
 - a. SpectraShield or Engineer approved equal.

4. Underlayment (Surface Patch): Lean concrete mix, unless otherwise recommended by the coating manufacturer.
 5. Acceptable manufacturers for the coating systems include:
 - a. Polyurethane Coating:
 - 1) Zebron Corporation
PO Box 2874
Newport Beach, CA 92659
Tel: 800.824.4214
 - b. Geopolymer Coating:
 - 1) The Strong Company, Inc.
4505 Emmett Sanders Road
Pine Bluff, AK 71601
Tel: 800.982.8009
 - 2) Quadex Lining Systems:
9155 Wallisville Road
Houston, TX 77029
Tel: 713.204.7996
 - 3) Milliken & Company:
PO Box 1926
Spartanburg, SC 29304
Tel: 864.503.2020
 - c. Polyuria System Coating:
 - 1) CCI Spectrum, Inc.
4527 Sunbeam Road
Jacksonville, FL 32257
Tel: 800.284.2030
 - d. Or approved equal.
- C. Eliminate Water Intrusion At All Void Spaces:
1. The materials used shall be designed, manufactured, and intended for manhole, sewer structure and pipe rehabilitation, and the specific application in which they are used.
 2. The materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer's identification and printed instructions.
 3. All material shall be stored and handled in accordance with recommendation of the manufacturer and the American Concrete Institute.
 4. Final reaction produces stable, nonbiodegradable, flexible gel, impermeable to water at pressures up to 15 psi.
 5. Use gel control agent to control curing time.
 6. Use root inhibitor (50 percent active dichlobenil) when roots are present in manholes.
- D. Infiltration Control:
1. Fast setting fiber reinforced, cementitious product without calcium chloride and is formulated as a water stop.
 2. Set time: 60 sec.
 3. Product expands when setting.
 4. Compressive Strength (ASTM C 109)
 - a. 60 min: 400 psi
 - b. 24 hour: 1,000 psi
 5. Strong-Seal Strong-Plug or Engineer approved equal.
- E. Invert Repair and Structural Patching:
1. Quick setting, high strength, fiber reinforced, acid resistant cementitious material designed to fill large voids in manholes.
 2. Shrinkage (ASTM C596)
 - a. 28 day R.H.: 0 percent
 3. Compressive Strength (ASTM C 109)
 - a. 6 hr: 1,400 psi
 4. Bond Strength (ASTM C321)
 - a. 28 day: 1,600 psi

5. Strong-Seal QSR or Engineer approved equal.

2.04 INSULATION

- A. Rigid, extruded polystyrene board insulation.
- B. Thermal Resistance (R): 5.0.
- C. Thickness: 2 inch.
- D. Board Size: 48 inch by 96 inch.
- E. Compressive Strength: Minimum 25 psi.
- F. Water Absorption in accordance with ASTM D2842: 0.1 percent by volume, maximum.
- G. Edges: Square.

2.05 CASTING ASSEMBLY SPECIAL #1

- A. Type: Ford A1, McDonald 74M1A with 74M1L8, or approved equal.
- B. Standard pentagon bolt furnished with locking lids.
- C. Frame and lid shall be cast iron per ASTM A48, Class 25, or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Line and Grade: Provide means for accurately transferring line and grade from ground surface stakes to working point in trench.
- B. Water Stops: Provide in manholes as required to prevent infiltration into system.
- C. Minimize the length of time sewage is diverted. Do not begin diversion of sewage without the Owner's approval. Do not begin diversion of sewage until all equipment and materials necessary for the installation of the temporary facility are on site.
 1. Surface preparation shall be performed consistent with the manufacturers' recommendations.
 2. Provide watertight manhole connections for all repairs. Block all pipes to prevent materials from entering sewer.
 3. Clean interior surfaces of manhole of debris, dirt, oil, grease, remains of old coating materials, and any other extraneous organic and inorganic materials.
 - a. Remove oil and grease prior to mechanical cleaning.
 - b. Prevent contaminates the result of the cleaning process, from falling onto wet, newly-coated surfaces.
 4. High pressure water blasting with a minimum of 3,500 psi shall be used on all interior surfaces to remove loose mortar, concrete and debris. If oil or grease are present, an approved detergent or muriatic acid shall be used integrally with the pressure wash.
 5. Handle cleaning water in closed discharge hoses to prevent water and residue from causing damage. Do not discharge debris through sanitary sewer.
 6. All active leaks in the manhole walls, invert and bench area shall be sealed using pressurized urethane grout. Surfaces must be re-cleaned after every grout application.
 7. When moisture is present, review guidelines for application of coating to damp surfaces; do not apply coatings over surfaces that exhibit pooling or standing water.

8. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be coated prior to surface preparation and coating.
 - a. Remove items if necessary for complete coating of the items and adjacent surfaces, including any steps on the walls of the structure.
 9. Concrete Surfaces: Clean concrete in accordance with ASTM D4258, and as specified herein.
 - a. Ensure that newly placed concrete has been allowed to cure based on coating manufacturer's recommendations.
 - b. Examine new and existing concrete surfaces for sharp edges, ridges and depressions.
 - c. Remove fins and other protrusions by grinding.
 - d. Fill surface voids exhibiting 1/2 inch or more of exposed aggregate, with underlayment material compatible with the coating material, and finish flush with surrounding surface.
 - e. Repair static structural cracks by filling voids, and reestablishing design slopes.
 10. Coat all exposed steel with bonding compound.
 11. Material identified in Infiltration Control will be used following grouting or in areas actively leaking.
 12. Voids in manhole wall, pipe intrusions, bench and bench replacement and any locations greater than 3 inches in depth from final liner coating inside wall will be filled using material identified in Invert Repair and Structural Patching in accordance with manufacturer recommendations.
- D. Provide a video inspection of each manhole following all cleaning and surface preparation activities and submit to the Engineer for review prior to starting all lining operations.

3.02 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
1. Comply with ASTM D2321 for PVC installation.
 2. Inspect pipe for defects and cracks while suspended before lowering into trench.
 3. Place pipe bell at upstream end of pipe length.
 4. Install pipe from lower to higher invert elevation at a uniform slope between manholes.
 5. Place plug in end of incomplete piping at end of day and when Work stops.
 6. Provide watertight plugs at future connection plugs.
 7. When water is present in trench, seals are to remain in-place while trench is pumped completely dry.
 8. See Section 31 23 33 for pipe foundation and backfill.
 9. Maximum Allowable Deviation From Staked Grade:
 - a. Alignment: 0.30 feet.
 - b. Elevation: 0.02 percent.
- B. Manhole Installation:
1. Place precast manhole base on compacted granular subgrade.
 2. Locate steps within 1 inch of vertical alignment and within 1 inch of required vertical spacing.
 3. Provide monolithic base for drop manholes.
 4. Maximum Allowable Deviation From Staked Grade:
 - a. Alignment: 0.30 feet.
 - b. Elevation: 0.03 feet.
 5. Install external joint wraps.
 6. Install adjustment rings.
- C. Service Pipe:
1. Extend pipe to utility easement line unless otherwise noted on the Drawings.
 2. Install pipe at minimum 1 percent to maximum 2 percent grade.
 3. Place gasketed plug at end of pipe.
 4. Maintain a record of each service connection as follows to be submitted to Engineer at the end of each week:
 - a. Type of service connection.
 - b. Distance from downstream manhole.
 - c. Length of riser.

- D. Riser Pipe:
1. Extend riser from service connection at 45-degree angle above horizontal to a point 11 feet below street grade.
 2. Install riser pipe against undisturbed trench wall.
 3. Place concrete collar around service connection as shown on Drawings.
- E. Spray Liner Installation:
1. Perform manhole coating installation in accordance with manufacturer recommendations for coating identified in Materials of this Section.
 2. General: Apply Coatings in strict accordance with manufacturer's instructions.
 - a. Use techniques best suited for substrate and type of material being applied.
 - b. Provide adequate ventilation to prevent the build-up of fumes or objectionable odors during application.
 - c. Maintain proper personnel equipment including respirators which are mandatory for applicators engaged in spray-on coating.
 - d. Protect adjacent areas against damage from coating operation.
 - e. Provide coating systems which are compatible with substrates indicated.
 3. Application:
 - a. Apply materials at not less than manufacturer's recommended spreading rate, to establish a total coating thickness as indicated, or, if not indicated as recommended by the manufacturer.
 - 1) Total Coating Thickness:
 - a) Polyurethane Liner:
 - (1) Thickness not less than 125 mils DFT, applied in one or more passes.
 - b) Geopolymer Liner:
 - (1) Minimum thickness of 1 inch and a maximum thickness of 3 inches.
 - (2) Areas with concrete degradation necessitating a thickness greater than 3 inches to yield an even coating surface shall be repaired first using high strength cement based, fiber reinforced shrinkage resistant mortar mixture as recommended by the manhole coating manufacturer.
 - c) Polyuria System Liner:
 - (1) New Portland cement structures shall have endured a minimum of 28 days since manufacture prior to commencing installation of the liner system.
 - (2) Total final thickness of multi-component liner system shall be a minimum of 500 mils.
 - (3) Spray equipment shall be specifically designed to accurately ratio and apply the liner system.
 - b. Apply first-coat of material to surfaces that have been cleaned, pretreated or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
 - c. Prepare surfaces between each subsequent coat in accordance with manufacturer's directions.
 - d. Apply additional coats until final coat is of uniform finish, color, appearance, and overall specified thickness has been achieved.
 4. Ensure that edges, corners, crevices, and similar features receive a coating thickness equivalent to that of flat surfaces.
 5. Provide a final finish free of holidays, voids, sags, and other surface imperfections.

3.03 FIELD QUALITY CONTROL

- A. Spray Lining:
1. Field quality control shall be paid for by the Contractor.
 2. Testing: The applicator shall conduct the following field tests and inspections:
 - a. Polyurethane and Polyuria Coating
 - 1) Materials Testing:
 - a) Verify thickness of coating during application for each manhole of applied coating or part thereof.

- 2) Holiday Testing:
 - a) Conduct holiday testing on the completed coating after cure or 24 hours, whichever is less, using a high voltage spark test in accordance with NACE Standard SP0188.
 - b) Do not conduct testing until coating is at 75 percent or greater of its fully cured hardness value prior to holiday testing.
 - c) Conduct tests for holiday detection on minimum specified coating thickness.
 - d) Plainly mark holidays immediately after detection and repair in accordance with manufacturer's recommendations.
 - e) Perform holiday testing in a manner to prevent or reduce damage to coating.
 - 3) If test results show coating does not comply with requirements, remove and replace or repair the coating as recommended in writing by coating manufacturer and make further repairs after retesting until coating application passes.
- b. Geopolymer Coating:
- 1) Manhole liner thickness shall be verified with a depth gauge at two locations in each manhole and photo documented. Depth verification photos shall be submitted to the Engineer with QA/QC documentation.
 - 2) Manholes shall be free of leaks. The Contractor shall test each manhole using vacuum testing at 5-in Hg for 1 minute.
 - 3) Final material compression testing of one block collected at each manhole will be performed in accordance with ASTM C 109/C 109M.
 - a) Samples shall have the same number as the manhole number shown in the plans.
 - b) Contractor shall provide photos of samples after testing, with samples numbered to match manholes numbers shown in the plans.
3. Final Coating Inspection: Arrange for coating manufacturer's technical personnel to inspect coating application on completion.
- a. Repair imperfections by touching up surfaces or cutting in and applying new coating where necessary, so that touched-up or repaired surfaces are indistinguishable from surrounding surfaces, insofar as practicable.
 - b. Post liner installation videos shall be provided to the Engineer within 7 days of liner installation.
4. Prepare test and inspection reports.
- B. Remove all dirt and foreign material from pipe interior prior to testing.
- C. Gravity Sewer Pipe:
1. Pipe Diameter 27 Inches and Smaller: Air test.
 2. Pipe Diameter Larger Than 27 Inches: Infiltration test.
- D. Perform the following tests upon completion of sewer construction and prior to any external plumbing connections:
1. Infiltration Test:
 - a. Manholes shall be watertight, with no leakage permitted.
 - b. Place 90-degree V-notch weirs in locations directed by Engineer to measure leakage in sewer lines.
 - c. Allowable leakage rate shall be 100 gallons/day/inch diameter/mile of sewer between any adjacent manholes.
 - d. Provide corrective measures for lines exceeding the allowable leakage rate.
 2. Air Test:
 - a. Place inflatable sewer stoppers in manhole at each end of reach to be tested.
 - b. Connect 1 end of an air hose to plug used for air inlet.
 - c. Connect other end of hose to portable air control equipment.
 - d. This equipment consists of valves and pressure gages used to control the rate air flows to the test section and to monitor air pressure inside the pipe.
 - e. Connect an air hose between compressor (or other source of compressed air) and control equipment.
 - f. Add air to pipe section. Monitor air pressure so pressure inside pipe does not exceed 5.0 psig.

- g. When pressure reaches 4.0 psig, stop air supply so internal pressure is maintained for 2 minutes.
 - h. These 2 minutes allow time for air temperature to come to equilibrium with the pipe walls.
 - i. During this time check plugs with soap solution to detect any plug leakage. If plugs are found to leak, bleed off air, tighten plugs, and begin again by supplying air.
 - j. After temperature has been allowed to stabilize for 2 minutes, disconnect air supply and allow pressure to decrease to 3.5 psig.
 - k. At 3.5 psig, start stopwatch to determine time required for pressure to drop to 2.5 psig.
 - l. Provide corrective measures for any line not meeting requirements.
 - m. Test results are usually better if sewer pipe walls are damp at time of testing.
 - n. Time shall be equal to or greater than the allowable time shown in table at end of this Section.
3. Deflection Test:
- a. Perform on PVC pipe at least 30 days after trench backfill has been placed.
 - b. Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
 - c. Mandrel diameter: Minimum 95 percent of the base inside diameter of the pipe as follows:

Nominal Size (in.)	Base I.D.	5% Deflection Mandrel
4	3.874	3.68
6	5.742	5.46
8	7.665	7.28
10	9.563	9.08
12	11.360	10.79
15	13.897	13.20
18	16.975	16.13
21	20.004	19.01
24	22.481	21.36
27	25.326	24.06
30	28.639	27.21
33	32.224	30.61
36	35.808	34.02
42	40.401	38.38
48	46.094	43.79

- d. The line will be considered acceptable if mandrel can progress through line without binding.
- e. Provide corrective measures for lines not meeting these requirements.

Time Required for a 0.5 PSIG Pressure Drop for Size and Length of Pipe Indicated

1 Pipe Diameter (inches)	2 Minimum Time (minutes:seconds)	3 Length for Minimum Time (feet)	4 Time for Longer Length (seconds)	Specified Minimum for Length (L) Shown (minutes:seconds)								
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet	
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	115:23
42	19:74	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04	157:04
48	22:67	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09	205:09

- E. All service connections shall be visually confirmed in addition to the required testing above by the Engineer or Owner prior to backfilling.

3.04 RESTORATION

- A. Contractor shall clean all remaining debris from manhole and work site and dispose of all debris in accordance with Owner's requirements.
- B. Re-establish service as soon as practical and before any adverse effect is experienced by residents.

END OF SECTION

SECTION 33 34 00

SEWAGE FORCE MAINS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes installation of sewage force main.
- B. Related Sections:
 - 1. Section 31 23 16 - Structure Excavations and Backfills
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 33 31 00 - Sanitary Sewer Systems
 - 4. Section 40 23 10 - Process Water & Waste Piping and Fittings
 - 5. Section 40 23 60 - Wastewater Process Pipe Testing
- C. Method of Measurement:
 - 1. Force Main:
 - a. Measure by length in feet of each diameter along pipe centerline.
 - b. No deduction for fittings.
 - c. Any deviations from the proposed distances shown on the Drawings shall be approved by the Engineer.
 - 2. Tracer Wire:
 - a. Incidental to force main.
 - b. Unit includes all fittings, connectors, PVC tracer wire holders, material, labor, and other accessories required.
 - 3. Magnesium Grounding Anode Rod:
 - a. Incidental to sanitary force main or tracer box.
 - b. Unit includes all fittings, material, labor, and other accessories required for connections.
 - 4. Fittings:
 - a. Incidental to force main.
 - b. Unit includes material, labor, and other accessories required for pipe bends.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of force mains shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ANSI:
 - 1. A21.4 - Standard for Cement - Mortar Lining for Ductile Iron Pipe and Fittings
 - 2. A21.11 - Standard for Rubber - Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 - 3. A21.51 - Standard for Ductile Iron Pipe, Centrifugally Cast
 - 4. A21.53 - Standard for Ductile Iron Compact Fittings
 - 5. D1248 - Polyethylene Plastics Extrusion Materials for Wire and Cable
 - 6. D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- B. ASTM:
 - 1. D2241 - Specification for PVC Pressure-Rated Pipe

1.03 QUALITY ASSURANCE

- A. Provide certificates from manufacturers certifying that the following materials meet the referenced requirements.

1.04 DELIVERY OF MATERIALS

- A. Inspect all pipe and materials during the unloading process.
- B. Notify Engineer of any cracked, flawed, or otherwise defective material.
- C. Remove all materials found to be unsatisfactory by Engineer from the Site.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Ductile Iron Pipe
 - 1. AWWA C151:
 - a. Below ground application shall be ANSI/AWWA thickness Class 52 (minimum), unless noted otherwise in Drawings.
 - b. The weight, class or nominal thickness, manufacturer's mark, casting period, and the letters "DI" or "ductile" shall be cast or stamped on the pipe or fitting.
 - c. Gaskets shall be full faced or ring gasket capable of 250 psi static pressure and 150 psi operation pressure.
 - 2. Joints:
 - a. Below ground application shall be mechanical type joints in accordance with ANSI/AWWA C111/A21.11.
 - 3. Fittings:
 - a. Fittings shall be restrained ductile iron
 - 1) Type: EBAA Iron MegaLug Series 1100 and 1700, Ford Uni-Flange Series 1400 and 1450, or equal.
 - 2) Minimum Working Pressure:
 - a) 4-inch thru 16-inch: 350 PSI.
 - b) 18-inch thru 36-inch: 250 PSI.
 - 3) Minimum safety factor at full rated pressure: 2:1.
 - b. Material of Construction: Compact Ductile iron.
 - c. Conform to the latest revision of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53
 - d. Gaskets shall be full faced or ring gasket capable of 250 psi static pressure and 150 psi operation pressure.
 - e. Fittings shall have the pressure rating, nominal diameters, manufacturer identification, number of degrees or fraction of a circle and the letters "DI" or "ductile" cast upon them.
 - f. Below ground application fittings and accessories shall be furnished with mechanical type joints in accordance with ANSI/AWWA C111/A21.11, unless noted otherwise in Drawings.
 - 4. Coatings:
 - a. Interior Coatings
 - 1) Buried application shall be cement-mortar lining in accordance with ANSI/AWWA C104/A21.4.
 - b. Exterior Coatings
 - 1) Buried application shall be asphaltic outside coating in accordance with ANSI/AWWA 151/A21.51
 - 5. Encasement
 - a. Polyethylene Sheet: AWWA C105 Low Density.
 - b. Thickness: 8 mil.
 - c. Taped.
- B. HDPE Pipe:
 - 1. AWWA C906.
 - 2. IPS: DR 11 - 200 psi water pressure.
 - 3. Heat fused joints.
 - 4. NSF: Standard No. 14 and No. 61 (by size and order).
 - 5. PPI Designation: PE 4710.

6. Cell Classification: ASTM D3350, PE 445574C.
 7. Color: Black with green stripes.
 8. Continuously mark pipe with the following information:
 - a. Size and dimensions.
 - b. Name of manufacturer.
 - c. Cell class.
 - d. ASTM basis.
 - e. Pipe test category.
 - f. Plant identification.
 - g. Production data.
 - h. Operator number.
 - i. Resin supplier code.
 9. Any section of pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above, may be cut out and butt-fused in accordance with the procedures herein.
 10. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from the construction site.
 11. Pipe Adaptors:
 - a. Mechanical joint, fully restrained.
 - b. ASTM D3261.
 - c. Same resin type and cell classification as pipe.
 - d. Driscopipe, or equal.
- C. Fusible Polyvinylchloride Pressure Pipe for Wastewater
1. AWWA C905.
 2. DIPS: DR 18 – 235 psi water pressure
 3. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
 4. Fusible polyvinylchloride pipe shall be green in color for wastewater use.
 5. Pipe shall be marked as follows:
 - a. Nominal pipe size
 - b. PVC
 - c. Dimension Ratio, Standard Dimension Ratio, or Schedule
 - d. AWWA pressure class
 - e. AWWA standard designation number
 - f. Extrusion production-record code
 - g. Trademark or trade name
 - h. Cell Classification 12454 and/or PVC material code 1120 may also be included
 6. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
 7. Any section of pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site. However, a defective portion of pipe, as defined above, may be cut out and butt-fused in accordance with the procedures herein.
 8. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from the construction site.
 9. Fusion Joints:
 - a. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier's written guidelines for this procedure.
 10. Connections and Fittings for Pressure Applications:
 - a. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

- b. Ductile Iron Mechanical and Flanged Fittings:
 - 1) Acceptable fitting for use with FPVC pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C153/A21.53.
 - c. Connection to FPVC pipe may be made using a restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
 - d. Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.
 - e. Ductile iron fittings and glands must be installed per the manufacturer's guidelines.
 - f. PVC gasketed, Push-on Fittings:
 - 1) Acceptable fitting for use with FPVC pipe shall include standard PVC pressure fittings conforming to AWWA C905.
- D. Restrained Joint PVC Pressure Pipe:
1. AWWA C900.
 2. DR 18 - 235 psi water pressure
 3. Pipe shall be green in color for wastewater use.
 4. Pipe shall be marked as follows:
 - a. Pipe Manufacturer
 - b. Nominal pipe size
 - c. PVC
 - d. Dimension Ratio, Standard Dimension Ratio, or Schedule
 - e. AWWA pressure class
 - f. AWWA standard designation number
 - g. Extrusion Production-Record Code
 - h. Trademark or trade name
 - i. Cell Classification 12454 and/or PVC material code 1120 may also be included
 5. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
 6. Any section of pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater than 10 percent of the wall thickness, shall not be used and must be removed from the site.
 7. Any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing and/or handling shall not be used and shall be removed from the construction site.
 8. Joints:
 - a. Pipes shall be assembled in the field with coupled restrained joint.
 - b. Restrained joints shall be achieved by utilizing precision-machined grooves on the pipe spigot ends and in the coupling. Splines shall be inserted through entry holes in the coupling, resulting in a circumferential restrained joint that locks the pipe and coupling together.
 - c. Restrained joint must be bi-directional and shall contain no metal in the joint.
 - d. Joints shall meet the requirements of ASTM D3139.
 - e. Gaskets in the coupling shall meet the requirements of ASTM F477 and provide a hydraulic pressure seal.
 - f. Refer to manufacture specification to determine allowable longitudinal bend radius.
 9. Contractor shall review and submit pipe and joint manufacturers recommended installation procedures.
 10. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C900 for pressure pipe applications.
 11. Pipe Dimension: Pipe supplied under this specification shall have an actual inside diameter not less than the diameters of pipe shown in the Contract Documents.
 12. Fittings:
 - a. Provide fabricated fittings fully pressure rated to match the pipe pressure rating. All fittings shall be fabricated by the manufacturer. No Contractor fabricated fittings shall be used.
 - b. The manufacturer of the restrained joint PVC pipe shall supply all PVC fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the Drawings and specified herein.
 - c. Gaskets shall meet ASTM F477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
 13. Certa-Lok as manufactured by CertainTeed, Napco, or approved equal.

- E. Or approved Equal Restrained Joint Pipe.
- F. Provide all pipe and fittings of each material type from the same manufacturer.
- G. Provide anchor bolts and nuts as Cor-Blue, as manufactured by Birmingham Fastener, or equals.

2.02 TRACER WIRE AND CONNECTIONS

- A. Tracer wire for open cut shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break load, with minimum 30 mil HDPE insulation thickness.
- B. Connectors:
 - 1. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
 - 2. Non locking friction fit, twist on, or taped connectors are prohibited.
- C. Termination/Access:
 - 1. All tracer wire termination points must utilize an approved tracer wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
 - 2. All grade level/in-ground access boxes shall be appropriately identified with sewer or water cast into the cap and be color coded.
 - 3. A minimum of 2 feet of excess/slack wire is required in all tracer wire access boxes after meeting final elevation.
 - 4. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
- D. Grounding:
 - 1. Tracer wire must be properly grounded at all dead ends/stubs and locations where PVC or HDPE main line connects to DIP or cast iron pipe.
 - 2. Grounding of tracer wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
 - 3. When grounding the tracer wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the tracer wire, at the maximum possible distance.
 - 4. When grounding the tracer wire in areas where the tracer wire is continuous and neither the main line tracer wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the tracer wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to tracer wire with a mainline to lateral lug connector.
 - 5. Where the anode wire will be connected to a tracer wire access box, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

- A. Inspect pipe for defects and cracks while suspended.
- B. Remove all dirt and foreign material from pipe interior prior to lowering into trench.
- C. Install pipe at the elevations and grades indicated by Drawings and field stakes.
- D. Pipe Foundation and Backfill Procedures: See Section 31 23 33.
- E. Remove all dirt and foreign material from the pipe interior prior to testing.
- F. Provide temporary sanitary sewer service per Section 01 51 00.

3.02 FITTING INSTALLATION

- A. Anchor fittings by means of restrained joint devices installed according to manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of force main construction and prior to connection to lift station.
 - 1. Pressure Test:
 - a. Subject the entire length of force main to hydrostatic pressure test of 150 psi for a period of 2 hour.
 - b. Measure pressure at lowest pipe elevation.
 - c. Maintain constant pressure throughout test period.
 - d. Provide pumps, gages, connections and other necessary apparatus.
 - e. Do not allow pressure to vary more than 3.0 percent during the test.
 - f. Do not allow pressure to vary more than 1.0 percent or 1.0 psig, whichever is greater, during the last hour of the test.
 - 2. Leakage Test:
 - a. Measure water volume required to maintain test pressure.
 - b. Allowable leakage shall be determined by the formula:
$$L = \frac{SD\sqrt{P}}{133,200}$$

L = Allowable Leakage in Gallons

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Test Pressure in Pounds/Square Inch
- B. Provide corrective measures for any line exceeding allowable leakage.

END OF SECTION

SECTION 33 41 00

STORM SEWER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Storm sewer pipe.
 - 2. Manholes and appurtenances.
 - 3. Catch basins and appurtenances.
 - 4. Aprons.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 31 37 00 - Riprap

- C. Method of Measurement:
 - 1. Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure from structure centers and pipe ends not including end sections.
 - c. Measure each pipe size and class separately.
 - 2. Manholes:
 - a. Measure by height in linear feet to the nearest 0.1 foot.
 - b. Measure from the lowest invert to the top of the casting.
 - c. Measure each size and type separately.
 - 3. Catch Basins:
 - a. Measure by height in linear feet to the nearest 0.1 foot.
 - b. Measure from the lowest invert to the top of the casting.
 - c. Measure each size and type separately.
 - 4. Castings: Measure each type installed as a unit.
 - 5. Aprons: Measure each size and type installed as a unit.
 - 6. Connect to Existing Storm Sewer:
 - a. Measure by each as a unit.
 - b. Unit includes all materials and labor to construct a water tight connection to the existing system being connected to.
 - 7. Construct Bulkhead:
 - a. Measure each as a unit.
 - b. Unit includes all fittings, material, labor, and other accessories required to bulkhead storm sewer.

- D. Basis of Payment:
 - 1. Payment for acceptable quantities of storm sewer items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 2. Contractor shall maintain flow and drainage from existing piping systems and from adjacent overland flow during construction of the Project. Incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. A48 - Specification for Gray Iron Castings
 - 2. C76 - Specification for Reinforced Concrete Pipe
 - 3. C361 - Specification for Reinforced Concrete Low Head Pressure Pipe
 - 4. C443 - Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
 - 5. C478 - Specification for Precast Reinforced Concrete Manhole

6. D3212 – Standard specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
7. D2321 - Recommended Practice for Installation of Flexible Thermo-Plastic Sewer Pipe
8. F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
9. F667 - Standard Specifications for Large Diameter Corrugated Polyethylene Pipe and Fittings

- B. MnDOT
1. 2501 Pipe Culverts
 2. 2503 Pipe Sewers
 3. 2506 Manholes and Catch Basins

1.03 SUBMITTALS

- A. Submit Certification of Compliance as required under Article 1.04.
- B. Provide Shop Drawings for each structure.
- C. Submit list of pipe and fitting materials to be provided.

1.04 QUALITY ASSURANCE

- A. Provide certificate from manufacturer certifying that the following materials meet the respective requirements listed in Article 1.02.

1.05 DELIVERY OF MATERIALS

- A. Inspect all pipe and materials during the unloading process.
- B. Notify Engineer of any cracked, flawed or otherwise defective material.
- C. Remove all materials found to be unsatisfactory by Engineer from the Site.

PART 2 PRODUCTS

2.01 PIPE

- A. Reinforced Concrete:
 1. Class:
 - a. 12 inch to 15 inch Diameter use Class V.
 - b. 18 inch to 30 inch Diameter use Class III.
 2. Formed rubber gasket per ASTM C443.
- B. High Density Polyethylene (HDPE):
 1. Dual wall corrugated.
 2. Bell and spigot push-on type joints.
 3. Watertight joints.
- C. Polyvinyl Chloride (PVC): At locations noted as water main grade.
 1. Polyvinyl Chloride Pipe (4 inch thru 12 inch): AWWA C900
 2. Polyvinyl Chloride Pipe (14 inch thru 48 inch): AWWA C905
 3. Dimension Ratio (DR): 18
 4. Joints: Push-On
- D. Provide all pipe from the same manufacturer.

2.02 MANHOLES AND CATCH BASINS

- A. See Drawings for diameter.
- B. Provide gasket joint.
- C. Provide base, cone section or cover slab as shown on Drawing details.
- D. Covers and Frames: As indicated on the Drawings.
- E. At locations where connecting to storm sewer noted as water main grade, connections at manhole or catch basin shall be water-tight and air-tight. Connection to be with a prefabricated boot or grout ring.

2.03 APRONS

- A. Provide the same strength class as the pipe.
- B. Provide galvanized trash guards on all aprons.

2.04 MORTAR

- A. Underground Utility Mortar, as manufactured by TCC Materials or equal.
- B. Mix and install per manufacturer's instructions.

2.05 ADJUSTING RINGS

- A. Injection molded High Density Polyethylene (HDPE).
- B. Ladtech or approved equal.
 - 1. Provide adjustment rings in various sizes as required to meet adjustments.
 - 2. Provide slope rings to match grade of finished road surface.

PART 3 EXECUTION

3.01 PREPARATION

- A. Line and Grade:
 - 1. Conform to lines, elevations, and grades shown on the Drawings.
 - 2. Provide means for accurately transferring line and grade from ground surface stakes to the working point in the trench.

3.02 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 - 1. Inspect pipe for defects and cracks while suspended before lowering into the trench.
 - 2. Comply with ASTM D2321 for HDPE installation.
 - a. See Drawings for bedding details.
 - 3. Place pipe bell at upstream end of pipe length.
 - 4. Install pipe from lower to higher invert elevation.
 - 5. See Section 31 23 33 for pipe foundation and backfill procedures.
- B. Manhole and Catch Basin Installation:
 - 1. Place precast base on compacted granular subgrade.
 - 2. Install in accordance with drawing details.
 - 3. Locate steps within 1 inch of vertical alignment and within 1 inch of required vertical spacing.

4. Install concrete adjusting rings to provide final horizontal and vertical adjustment within tolerances.
5. Maximum horizontal tolerance: 3 inches in any direction.
6. Construct watertight to prevent groundwater infiltration.
7. Install manholes and catch basins in accordance with the above items, Drawings, and MnDOT 2506.

C. Apron Installation: Tie aprons to next three pipe sections using galvanized "U" bolt fasteners.

3.03 FIELD QUALITY CONTROL

- A. Deflection Test:
1. Perform on HDPE pipe at least 30 days after trench backfill has been placed.
 2. Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
 3. Mandrel Diameter: 95 percent of nominal pipe size.
 4. The line will be considered acceptable if mandrel can progress through line without binding.
 5. Provide corrective measures for lines not meeting these requirements.

3.04 CLEANING

- A. Remove all dirt and foreign material from the pipe and structure interiors.

END OF SECTION

SECTION 33 46 30

SUBSURFACE DRAINS (MnDOT 2502)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes construction of subsurface drains and installing plant-fabricated pipe and appurtenant materials.
- B. Related Sections:
 - 1. Section 31 23 10 - Excavation and Embankment
 - 2. Section 31 23 33 - Trench Excavation and Backfill
 - 3. Section 33 41 00 - Storm Sewer Systems
- C. Method of Measurement:
 - 1. Subsurface Drains:
 - a. Measure by length in linear feet along pipe centerline including fittings.
 - b. Terminal points of measurement will be as follows:
 - 1) Pipe end at free outlets.
 - 2) Junction point with in-place pipe.
 - 3) Center of structures.
 - c. Measure each size and type of pipe separately.
 - d. Measure special end sections individually.
 - 2. Pipe Drain Clean Out:
 - a. Measure individually as a unit.
 - b. Unit includes rubberized magnetic cover, anode rod, all fittings and riser pipe between connection to subsurface drain and ground surface.
 - 3. Sump Pump Service Line:
 - a. Measure individually as a unit.
 - b. Unit includes all fittings, service pipe, and lawn sump catch basin between connection to subsurface drain and location as designated in the drawings.
 - c. Pipe and fittings shall be the same configuration as listed in the Drawings.
 - 4. Connect Subsurface Drain to Existing Structure (Core Drill):
 - a. Measure by each for core drilling existing structures to make a connection.
 - b. Unit includes all labor, equipment, and materials to complete the connection.
 - 5. Connect to Existing Pipe Drain (Sump Pump Service or Drain Tile)
 - a. Measure by each.
 - b. Unit includes all labor, equipment, and materials to complete the connection.
 - c. Existing sump service lines may be variable sizes, contractor to have fittings of multiple sizes onsite to make watertight connection.
- D. Basis of Payment:
 - 1. Price includes geotextile or other joint wrapping or sealing materials.
 - 2. Price includes granular materials.
 - 3. Payment for acceptable quantities of subsurface drain items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2502 - Subsurface Drains
 - 2. 3149 - Granular Material
 - 3. 3225 - Corrugated Aluminum Pipe
 - 4. 3226 - Corrugated Steel Pipe

5. 3229 - Polymeric Coated Corrugated Steel Pipe
6. 3236 - Reinforced Concrete Pipe
7. 3245 - Thermoplastic Pipe
8. 3278 - Corrugated Polyethylene Drainage Tubing
9. 3726 - Preformed Gasket Seals for Concrete Pipe
10. 3728 - Bituminous Mastic Joint Sealer for Pipe
11. 3733 - Geosynthetic Materials

1.03 SUBMITTALS

- A. Submit Certification of Compliance as required under Article 1.04.

1.04 QUALITY ASSURANCE

- A. Provide certificate from manufacturer certifying that pipe, appurtenances, and accessories meet the respective requirements listed in Part 2 of this Section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe:
 1. Thermoplastic (TP): MnDOT 3245.
 - a. Factory seamed geotextile wrap.
 - b. Bottom half perforated.
 2. Corrugated Polyethylene Drainage Tubing (PE): MnDOT 3278.
 - a. Factory seamed geotextile wrap.
 - b. Bottom half perforated.
 3. Polyvinyl Chloride Pipe (PVC):
 - a. SDR 35 PVC, bottom half perforated.
 - b. Type 1 Knit Sock.
- B. Fittings: Same material as pipes.
- C. Pipe Drain Clean Out: Same material as pipes.
- D. Lawn Sump Catch Basin:
 1. Tuf-Tite, Inc Model 2HDS-1 with "Green" cover.
 2. Polyloc (3017-12)
 3. Or Approved Equal
- E. Granular Materials:
 1. Coarse Filter Aggregate: MnDOT 3149.2.H
 2. Replacement Backfill: MnDOT 3149.2.B.

2.02 ACCESSORIES

- A. Pipe Joint Sealer Materials:
 1. Material for type specified shall be in accordance with the respective MnDOT section as follows:
 - a. Preformed Rubber, Type A: MnDOT 3726.
 - b. Preformed Rubber, Type B: MnDOT 3726.
 - c. Bituminous Mastic: MnDOT 3728.
- B. Geotextile (Type 1): MnDOT 3733.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Trench Excavation: See Section 31 23 33.
 - 1. Contractor shall place the pipe drains after the subgrade has been prepared. The trench shall be dug by a machine capable of cutting the trench and shaping the trench bottom. Plowing may be permitted if contractor can demonstrate proper depth and installation is achieved. The trenching equipment shall be operated so that the excavated material does not fall back into the trench. Top of pipe shall be below bottom of subgrade. Trench width shall be 12 inches with the pipe being centered therein as shown on the detail Drawings.

- B. Laying Drains:
 - 1. Foundation:
 - a. Shape foundation to fit lower 1/3 of pipe circumference.
 - b. Bed perforated pipe and tile drains on Filter Aggregate.
 - c. Place bedding from 2 inches below pipe bottom to 6 inches above pipe.
 - 2. Placement:
 - a. Place pipe to line and grade shown on the Drawings.
 - b. Provide uniform bearing under pipe.
 - c. Place perforations down.
 - d. Place concrete and clay pipe with bell ends upgrade.
 - e. Close upgrade end of all pipe with suitable plug.
 - 3. Joints:
 - a. Join pipe sections separately with appropriate bands or fittings.
 - b. Cement solvent type joints.
 - c. Seal concrete pipe joints with elastic material or cover with geotextile.
 - d. Joint openings between clay or concrete tile shall not exceed 1/4 inch.
 - e. Provide secure connection through concrete headwall or structure wall.
 - 4. Backfill:
 - a. Backfill drains immediately after installation and jointing.
 - b. Extend filter aggregate to 6 inches over top of perforated pipe.
 - c. Compact backfill to meet requirements for adjacent soils.
 - 5. Lawn Sump Catch Basins:
 - a. Install as shown on Drawings.
 - b. Connect to existing sump services where present.
 - c. Verify that sump pump riser remains plum and properly aligned during backfill.
 - d. All joints shall be cement-solvent type joints.

3.02 CLEANING

- A. Prior to final acceptance, remove silt and debris or other obstructions from drains.

END OF SECTION

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SECTION 34 41 20

TRAFFIC SIGNS AND DEVICES (MNDOT 2564)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Providing sign panels, posts and other devices for traffic control and street identification.
 - 2. Relocating in-place sign panels and posts.
 - 3. Removing and salvaging in-place sign panels, posts and mounting hardware.
- B. Related Sections:
 - 1. Section 01 55 25 - Maintenance of Traffic
- C. Method of Measurement:
 - 1. Measure Type C Sign Panels by area in square feet based on the nominal panel dimensions.
 - 2. Measure furnishing and installing of street name signs (Sign Panel - Type Special) by area in square feet based on the nominal panel dimensions at each installation, including post, bracket, mounting hardware.
 - 3. Measure installing of salvaged street sign by each installed (Install Salvaged Sign):
 - a. Unit includes salvaging posts, hardware, and storing unit until placement.
 - b. All Install Salvaged Sign items to be installed using new hardware on new posts.
 - 4. Consider posts and hardware required to mount each sign panel, and providing fabrication stickers, as incidental to Sign Panels - Type C, Sign Panels - Type Special, or Install Salvaged Sign.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of traffic signs and devices shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2104 - Removing Pavement and Miscellaneous Structures
 - 2. 2564 - Traffic Signs and Devices
 - 3. 3352 - Signs
 - 4. 3401 - Flanged Channel Sign Posts
 - 5. 3402 - Square Tubular Sign Posts
- B. MnDOT Standard Signs Manual
- C. Minnesota Manual on Uniform Traffic Control Devices (MMUTCD)
- D. Minnesota Traffic Engineering Manual

PART 2 PRODUCTS

2.01 MATERIALS

- A. Sign Panels:
 - 1. Provide in accordance with the latest MnDOT Standard Signs Manual, the Minnesota Traffic Engineering Manual, the MMUTCD, the Plans, MnDOT 2564.
 - 2. Sign base material aluminum conforming to the material requirements of MnDOT 3352.

- B. Traffic Sign Posts:
1. Provide 3.0 pounds per foot galvanized flanged channel sign posts conforming to MnDOT 3401 or square tubular sign posts and bases conforming to MnDOT 3402.
 2. Provide quantity and type of sign posts and base assemblies at each installation in accordance with the Drawings.
 3. Provide sign structural components for mounting sign panels (including posts, base assemblies, knee braces, etc.) in accordance with the applicable provisions of the Plans, the Minnesota Traffic Engineering Manual and with the details shown on the Drawings.
 4. Determine length of sign posts in accordance with the following sign panel mounting height guidelines provided in these Special Provisions and with the details shown on the Drawings.
 5. Where Type C Signs are to be installed on street name sign posts, permanent barricades, or on traffic signal poles, mounting hardware required to mount sign panels shall be approved by Engineer prior to installation.

- C. Fabrication Stickers:
1. Screen a fabrication sticker and affix to backside of each new sign panel in lower right-hand corner (when facing the back of the sign).
 2. Provide full size mock-up (minimum 1-1/2 inch by 3 inches) of sticker to Engineer for written approval prior to producing any stickers for the Project.
 3. Produce fabrication sticker in accordance with the following:
 - a. Colors shall be black legend on white reflectorized background.
 - b. Month and year of fabrication of the sign panel shall be punched out prior to installation of sticker on sign panel.
 - c. Fabrication sticker shall be similar to example shown below, unless otherwise approved by Engineer.

Sign Company Name
and Address Here

Month	1	2	3	4	5	6	7	8	9	10	11	12	
Year	05	06	07	08	09								

- D. Street Name Signs:
1. Post:
 - a. Provide round galvanized steel pipe as follows:
 - 1) 2-3/8-inch outside diameter.
 - 2) 0.080-inch minimum wall thickness.
 - b. Provide 2-inch x 2-inch 12 gauge prepunched galvanized steel square tubular sign posts conforming to MnDOT 3402 within MnDOT right of way.
 2. Mounting Hardware:
 - a. Provide galvanized steel assembly units as follows:
 - 1) Post cap with allen set screws or lock screws.
 - 2) Bracket assembly shall be Lyle E-450 or approved equal as approved by Engineer prior to furnish and install.
 - 3) Ornamental top nut.
 3. Square Tube Post Base Assembly:
 - a. Provide base assembly in conformance with MnDOT 3402, MnDOT's Approved Products List, and the details in the Drawings.
 - 1) Fin Base (in soil)
 - 2) Shear Bolt Base (mounted on top of fin base in soil or mounted directly to concrete surface)
- E. Delineators: Reflectors shall be reflective sheeting conforming to the requirements of MnDOT 3352.
- F. Permanent Barricades: Furnish and install in accordance with MnDOT Standard Plate No. 8002G.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Traffic Signs:
 - 1. Mount all sign panels on flanged channel sign posts, or as otherwise shown in the Plans.
 - 2. Install posts vertically and plumb.
 - 3. Install signs in the locations shown approximately on the Plans.
 - 4. Exact locations will be determined in the field by Engineer.
 - 5. Install each Type C sign panel to meet the height requirements specified in the MMUTCD and the MnDOT Traffic Engineering Manual.
 - 6. Mounting holes in sign panels shall be punched in accordance with the details of the MnDOT Standard Signs Manual, and in accordance with the Plans. However, the number of posts shown on the signing charts in the Plans shall govern the punch code used for each sign panel.
 - 7. If difficulty is encountered in driving a stub post to the embedment depth required, the post shall be removed and a hole drilled to the required embedment depth. Any post bent or damaged during such post driving operations shall be removed from the site and replaced at no expense to the Owner.
 - 8. After installation of the sign post in the drilled hole, void areas shall be filled with backfill material which shall be selected earth or sand and free from rocks and excessive organic material. Upon placement, backfill material shall be moistened and thoroughly compacted.

- B. Street Name Signs:
 - 1. Top mount signs with a bracket assembly (Lyle E-450 or approved equal).
 - 2. Install posts 30 inches below ground level in concrete footings.
 - 3. Provide 8-foot clearance between ground level and lowest sign panel.
 - 4. Install posts vertically and plumb in the locations shown approximately in the Drawings, or at locations as directed by Engineer.
 - 5. Exact locations will be determined in the field by Engineer.
 - 6. Where Type C Sign panels are to be installed on street name sign posts, provide minimum 12-inch clearance between top of Type C Sign panel and bottom of street name sign panel.

3.02 SALVAGE AND INSTALL SIGN PANELS

- A. Salvage in-place sign panels, and remove and dispose of posts and mounting hardware as directed by Engineer.

- B. Install salvaged sign panels with new posts and mounting hardware at the locations shown in the Plans.

- C. Do not remove any in-place signs unless either construction deems it necessary and/or as approved or directed by Engineer.

- D. Should signs need to be removed prior to them being ready to be installed at their new locations, relocate and mount signs temporarily to the satisfaction of the Engineer.

- E. If a sign panel or post is lost or damaged during salvaging and reinstallation, replace the lost or damaged sign panel and/or post with a new sign panel and/or post (which shall be in accordance with the MnDOT Standard Signs Manual for that particular sign, or as directed by the Engineer), at no expense to Owner.

- F. Any damaged in-place sign panel and/or post shall be brought to the attention of the Engineer prior to removal so that replacement by Contractor will not have to be made.

- G. Installation of salvaged sign panels and posts shall be in accordance with Paragraph 3.01.A. of these Special Provisions.

- H. Inplace nuts, bolts and washers shall be removed in such a manner so as not to damage sign panels. If Contractor damages a sign panel, a deduction of the salvage value of the sign panel will be made.

- I. Deliver salvaged items to the proper agencies (City Public Works) as directed by Engineer (note: notify agency at least 3 working days prior to delivering materials).
- J. Where it is necessary to remove "Stop" or prohibition signs on roads open to traffic prior to installation of new signs, provide either qualified flagpersons or relocate or remount temporary signs as necessary, prior to leaving the area.
- K. Materials deemed non-salvageable by the Engineer shall be removed completely and disposed of outside of right-of-way in any manner that the Contractor may elect subject to the provisions of MnDOT 2104.3.D.3.
- L. A visual inspection shall be made at the job site prior to salvage and again at the storage site by Engineer or Engineer's representative and any damage to the salvaged materials during the salvage and hauling operations shall be repaired or replaced at no expense to Owner.

END OF SECTION

SECTION 40 05 59

HYDRAULIC GATES AND STOP PLATES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installation of:
 - 1. Slide gates.
 - 2. Appurtenances.

1.02 REFERENCES

- A. American Water Works Association (AWWA)
 - 1. C561 – Fabricated Stainless Steel Slide Gates, latest edition.
 - 2. C562 – Fabricated Aluminum Slide Gates, latest edition.

1.03 SYSTEM DESCRIPTION

- A. Contractor shall furnish, install and place in satisfactory operation reinforced aluminum slide gates as shown on the Drawings and specified herein.
- B. Gates shall include the following types:
 - 1. Channel-mounted, upward-opening slide gates.
- C. Gates shall be self-contained type.
- D. Gates shall have rising stems.
- E. Gates shall include a hand crank actuator.

1.04 SUBMITTALS

- A. Vendor and manufacturer information:
 - 1. Name, address, toll-free phone number and email address of manufacturers.
 - 2. Name, address and phone number of local service representative.
- B. Shop drawings:
 - 1. Shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - 2. Size, Model Number and Serial Number of each component.
 - 3. Detailed specifications, dimensions and drawings for equipment.
 - a. Full specifications for each assembly with complete bill of materials showing materials of construction, part numbers, etc.
 - 4. Typical installation guides.
- C. Operation and maintenance manuals:
 - 1. Operation and maintenance data in accordance with Section 01 78 23 - Operation and Maintenance Data.
 - 2. Parts list and list of recommended spare parts.
 - 3. Printed warranty in accordance with Section 01 78 37 – Product Warranties.

1.05 RELATED SECTIONS

- A. Section 01 25 13 - Product Substitution Procedures
- B. Section 01 33 00 - Submittal Procedures
- C. Section 01 78 23 - Operation and Maintenance Data

D. Section 01 78 37 - Product Warranties

1.06 QUALITY ASSURANCE

- A. Gates shall be shop inspected, tested for operation and leakage, and adjusted before shipping. There shall be no assembling or adjusting on the job site other than for the lifting mechanism.
- B. The gate's sealing system will have been tested through a cycle test in an abrasive environment and should show that the leakage requirements are obtained after 25,000 cycles with a minimum deterioration.

1.07 MEASUREMENT AND PAYMENT

- A. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Primary Pond Control Structure (Alternate 6)

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Products specified in this Section shall be manufactured by:
 - 1. Whipps,
 - 2. RW Gates,
 - 3. Rodney Hunt,
 - 4. Fontaine,
 - 5. Or-equal.
- B. Refer to Section 01 25 13 for information pertaining to alternate products.
- C. Plan layouts, weights, and pertinent specification language used in the design have been based upon Whipps. Modifications required for RW Gates, Rodney Hunt, Fontaine, or "or-equal" manufacturer's equipment may be necessary and shall be included in the Contractor's Bid price as applicable.
- D. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. These specifications shall be considered as minimum requirements. The Contractor or Equipment Supplier shall add such additional features as are necessary for satisfactory operation and functioning of the aluminum slide gates and equipment.

2.03 PRODUCTS

- A. Aluminum Slide Gates
 - 1. Design Requirements
 - a. Leakage Requirements:
 - 1) Leakage shall not exceed 0.1 gpm per foot of seating perimeter at design seating head.
 - 2) Leakage shall not exceed 0.1 gpm per foot of seating perimeter at design unseating head.
 - b. All components of the gate shall be designed to withstand the maximum head indicated on the Drawings in the seating and unseating directions. The design stresses shall not exceed the lesser of 40 percent of the yield strength, or 25 percent of the ultimate strength of the materials.
 - 2. Materials of Construction
 - a. Frame, guides, yoke and invert member - ASTM B-209, aluminum alloy minimum 6061-T6.

- b. Seals and stem guide liner - ASTM D-4020, Ultra high molecular weight polyethylene (UHMWPE)
 - c. Compression cord (if required) - ASTM D-2000 M6BG 708, A14, B14, E014, E034, nitrile, or EPDM.
 - d. Bottom seal - ASTM D-2000 Grade 2 BC-510, EPDM or neoprene
 - e. Slide - ASTM B-209, aluminum alloy 5083-H32 or aluminum alloy 6061-T6.
 - f. Operating stem: 304 stainless steel.
 - g. Stem extension: 304 stainless steel
 - h. Pedestal, stem guides, and all bracket: 304 stainless steel
 - i. Crank operator: Tenzaloy aluminum or cast aluminum.
 - j. Stem cover: Clear fracture resistant butyrate or polycarbonate ASTM D707.
 - k. Input shaft, interconnecting shafts and shaft supports: 304 or 410 stainless steel.
3. Frame
- a. Gate frame shall be made of extruded aluminum welded to form a rigid one-piece frame. The minimum guide weight is 3 lbs/ft. Guide shall have a minimum thickness of 1/4-inch. Frame shall be suitable for embedding in a channel.
 - b. The frame guides shall extend to accommodate the entire height of the slide when the slide is in the fully opened position on upward opening slide gates or downward opening weir gates.
 - c. The side seals shall be self-adjusting UHMWPE. Upward-opening gates shall be provided with a flush bottom invert seal mounted inside the frame and upward-opening gates with top closure shall have self-adjusting UHMWPE seals along the top.
 - d. All seats and seals shall be field replaceable and shall be mechanically held in place with stainless steel attachment bolts.
 - e. On self-contained gates, a yoke shall be provided across the top of the frame guides. The yoke shall be formed by two structural members affixed to the top of the guides to provide a one-piece rigid frame. The yoke shall be designed to allow removal of the slide.
4. Slide
- a. The slide shall consist of flat plate, reinforced with structural or formed members, to limit deflection to 1/360 of gate width or 1/16-inch, whichever is less.
 - b. The portion of the slide that engages the frame shall have a minimum thickness of 1/2-inch.
5. Operating Stems and Guides
- a. Stems shall be a minimum diameter of 1.5-inches and shall be adequate to safely withstand the thrust and torsion forces created by movement of the gate slide when subjected to the operating head shown on the Drawings. The threaded portion of the stem shall have machine rolled threads of the full depth ACME-type with a 16 microinch finish or better. The number of threads per inch shall be such as to work most effectively with the operating mechanism. Stem connection to slide shall use a minimum of two stainless steel bolts.
 - b. Where stems are furnished in more than one piece, the different sections shall be joined together by solid couplings. Couplings shall be threaded and keyed, bored and bolted, or welded and bolted construction, and shall be greater than the strength of the stem.
 - c. The operating stem shall be designed for a tensile strength to withstand a minimum 200-lb effort on the crank or a 250-lb effort on a wrench nut and shall be designed for a critical buckling compressive load assuming a minimum 80-lb effort on the crank or a 100-ft-lb torque on a wrench nut. The critical buckling load shall be determined using the Euler column formula as follows:
 - $$P = C_p^2 EA / (L/r)^2$$
 - P = axial load on the stem
 - $C_p = 2$
 - E = modulus of elasticity
 - L = length or span between supports
 - r = radius of gyration
 - A = area of stem
 - d. The guides shall be of such length as to properly retain and support the slide in the full open position.

6. Manual Actuator:
 - a. Cranks shall be removable and fitted with a corrosion resistant rotating handle.
 - b. Actuators shall be designed to operate the gate by using a maximum effort of 40-lb and able to withstand, without damage, an effort of 80-lb.
 - c. Geared actuators shall be supplied where necessary to meet lifting effort requirements.
 - d. All bearings and gears shall be totally enclosed in weathertight housing.
 - e. The direction of rotation to open the gate shall be indicated on the crank or lift mechanism.
 - f. Limit nuts shall be adjustable, internally threaded bronze stop collars with a stainless steel set screw.
 - g. Rising stem gates shall be provided with a clear butyrate stem cover. The stem cover shall have a cap and condensation vents and a clear mylar position indicating tape.

2.04 ANCHOR BOLTS AND HARDWARE

- A. Anchor bolts, washers, hex nuts, and all other fastener hardware shall be 316 stainless steel. Anchor bolts shall have a minimum diameter of 1/2-inch.
- B. Locate all anchors with templates furnished by equipment manufacturer.

2.05 DELIVERY, STORAGE, AND HANDLING

- A. Gates shall be shipped completely assembled and protected against shipment damage.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's recommendations and as shown on Drawings.
- B. Equipment manufacturer to furnish necessary anchor bolts, nuts, washers, gaskets and anchor bolt templates.
- C. Install all anchors in accordance with certified prints supplied by equipment manufacturer.
- D. Contractor to field apply bituminous paint to all aluminum surfaces in contact with concrete.

3.02 FIELD QUALITY CONTROL

- A. Inspect all material and equipment as it is received to determine damage and missing parts. Repair or replace damaged items in accordance with manufacturer's instructions.
- B. All guides and grooves shall be shipped with protective tape or other acceptable means to protect against intrusion of grout during installation.
- C. During mounting of gate, avoid warping the frame and maintain clearance between seating faces. Prior to grouting, protect slide and seal surfaces with a filler material which is easily stripped. Cover faces of guides with a strippable tape.
- D. Once assembly is ready for service, operate each gate through several cycles -"open, close, open" or "close, open, close" while witnessed by Engineer.

3.03 SERVICE AND START-UP

- A. Manufacturer's Field Services and Testing:
 1. Inspect and approve final installation.
 2. Perform all necessary calibration and adjustments in accordance with manufacturer's standard recommended start-up report form.
 3. Coordinate start-up with installation of related equipment.

- B. Demonstration
 - 1. Provide 4 hours actual operator training at Owner's convenience after equipment is operational. Owner will videotape training.

END OF SECTION

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SECTION 40 23 00

PROCESS PIPING GENERAL PROVISIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. General provisions relating to process piping, valves, and related accessories.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 51 00 - Temporary Utilities
 - 3. Section 01 60 00 - Product Requirements
 - 4. Section 01 75 00 - Starting and Adjusting.
 - 5. Section 01 78 23 - Operation and Maintenance Data
 - 6. Section 01 78 37 - Product Warranties
 - 7. Section 09 91 50 - Shop Painting
 - 8. Section 09 97 20 - Coating Systems for Wastewater Facilities
 - 9. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 - 10. Section 31 23 33 - Trench Excavation and Backfill
 - 11. Section 40 23 10 - Process Water and Waste Piping and Fittings
 - 12. Section 40 23 20 - Process Valves and Operators
 - 13. Section 40 23 30 - Process Specialties
 - 14. Section 40 23 40 - Process Piping Hangers and Supports
 - 15. Section 40 23 50 - Water Process Piping Testing, Adjusting, and Disinfection
 - 16. Section 40 23 60 - Wastewater Process Piping Testing

1.02 REFERENCES

- A. American Society of Mechanical Engineers (ASME)
 - 1. ASME B31.1.0 ASME code or pressure piping.
- B. American Society for Testing and Materials (ASTM):
 - 1. A53-90b - Specification for pipe, steel, black and hot dipped zinc coated welded and seamless.
 - 2. A126-93 - Specification for gray iron castings for valves, flanges and pipe fittings.
 - 3. A240.83 - Specification for heat-resisting chromium and chromium-nickel stainless-steel plate, sheet and strip for pressure vessels.
 - 4. A351 - Specification for Castings, Austenitic, for Pressure Containing Parts.
 - 5. A380 - Specification for Corrosion Protection, Acid Pickling.
 - 6. A403 - Specification for Wrought Austenitic Stainless-steel Piping Fittings.
 - 7. A480 - Specification for Stainless-steel Finish.
 - 8. A530-88 - Specification for General Requirements for specialized carbon and alloy steel pipe.
 - 9. A536 - Specification for Ductile Iron Castings.
 - 10. A743 - Specification for Castings, Iron-Chromium-Nickel, for General Applications.
 - 11. A744 - Specification for Castings, Iron-Chromium-Nickel for Severe Service.
 - 12. D1785-93 - Specification for polyvinyl chloride (PVC) Schedule 04/80/120 (for pressure piping applications).
 - 13. D2464-93 - Specification for threaded poly (vinyl chloride) (PVC) plastic pipe fittings, Schedule 80.
 - 14. D2467-93 - Specification for socket type poly (vinyl chloride) (PVC) plastic pipe fittings.
 - 15. D2997-90 - Specification for centrifugally cast (fiberglass) reinforced thermosetting resin pipe.
 - 16. D3034-93 - Specification for type PSM poly (vinyl chloride) (PVC) sewer pipe and fittings.
 - 17. D3350-93 - Specification for polyethylene plastic pipe and fittings material.

- C. American Water Works Association (AWWA)
 - 1. C104 - American National standard for cement - mortar lining for ductile iron pipe and fittings for water.
 - 2. C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - 3. C110 - American National Standard for ductile iron and gray iron fittings, 3-inch through 48-inch for water and other liquids.
 - 4. C111 - American National Standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.
 - 5. C115 - American National Standard for flanged ductile iron pipe with threaded flanges.
 - 6. C150 - American National Standard for flanged ductile iron pipe with threaded flanges.
 - 7. C151 - American National Standard for ductile iron pipe, centrifugally cast-in-metal molds or sand line molds, for water and other liquids.
 - 8. C153 - American National Standard for Ductile Iron Compact Fittings for Water Service.
 - 9. C200 - Standard for steel water pipe 6-inch or larger.
 - 10. C203 - Standard for coal-tar protective coatings and linings for steel water pipelines - enamel and tape - hot applied.
 - 11. C206 - Field welding of steel water pipe.
 - 12. C207 - Standard for steel pipe flanges for waterworks service - sizes 4-inch through 144-inch.
 - 13. C508 - Standard for swing check valves for waterworks service, 2-inch through 24-inch NPS.
 - 14. C509 - Standard for resilient-seated gate valves for water supply and service.
 - 15. C510 - Standard for double check valve backflow prevention assembly.
 - 16. C517 - Standard for Resilient-Seated Cast-Iron Eccentric Plug Valves.
 - 17. C600 - Installation of ductile-iron water mains and their appurtenances.
 - 18. C606 - Standard for grooved and shouldered joints.
 - 19. C651 - Standard for disinfecting water mains.

- D. American National Standards Institute (ANSI)
 - 1. B-16.1 - Specification for Pipe Flanges.
 - 2. B-16.5 - Specification for Pipe Flanges

1.03 SYSTEM DESCRIPTION

- A. Piping System:
 - 1. Provide a complete and fully operational process piping system inclusive of all appurtenances not specifically shown or covered by the Contract Documents but required for complete operation of the process system.
 - 2. Assume full responsibility for any additional costs that may result from unauthorized deviations from the Contract Documents.

1.04 SUBMITTALS

- A. Vendor and manufacturer information:
 - 1. Name, address, toll-free phone number and email address of manufacturers.
 - 2. Name, address and phone number of local service representative.

- B. Shop Drawings:
 - 1. Shop Drawings in accordance with Section 01 33 00.
 - 2. Size, Model Number and Serial Number of each component.
 - 3. Typical installation guides.
 - 4. Installation, inspection and start-up report in accordance with Section 01 75 00.
 - 5. Detailed care and storage instructions.
 - 6. Exterior yard piping drawings (minimum scale 1-inch equals 10-feet) with information including:
 - a. Dimensions of piping lengths.
 - b. Centerline elevations of piping crossings.
 - c. Acknowledgement of bury depth requirements.
 - d. Details of fittings, tapping locations, thrust blocks, restrained joint segments, harness joint segments, hydrants, and related appurtenances.
 - e. Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.

- f. Line slopes and vents.
 - g. Identify insulation system proposed and provide manufacturer information for system.
 - 7. Interior piping drawings (minimum scale 1/8-inch equals 1-foot) with information including:
 - a. Dimensions of piping from column lines or wall surfaces.
 - b. Centerline dimensions of piping.
 - c. Centerline elevation and size intersecting ductwork conduit/conduit racks, or other potential interferences requiring coordination.
 - d. Locations of valves and valve actuator type.
 - e. Details of fittings, tapping locations, equipment connections, flexible expansion joints, connections to equipment, and related appertences.
 - f. Acknowledgement of valve, equipment and instrument tag numbers.
 - g. Provisions for expansion and contraction.
 - h. Line slopes and are release vents.
 - i. Piping supports and hangers:
 - 1) Location and style of all pipe hangers, supports and anchors.
 - 2) Length of pipe and pipe spools for exposed piping.
 - 3) Detailed piping layout for connection to existing and proposed pipe and equipment.
 - 4) Process pipe coating color and labeling.
 - j. Identify insulation system proposed and provide manufacturer information for system.
 - 8. Schedule of interconnections to existing piping and method of connection.
- C. Test Reports:
- 1. Copies of field-installed piping pressure test results on all piping systems.
 - 2. Reports defining results of testing and corrective action taken.
 - 3. Notification of time and date of piping pressure tests.
- D. Operation and Maintenance Manuals
- 1. Operation and maintenance data in accordance with Section 01 78 23.
 - 2. Parts list and list of recommended spare parts.
 - 3. Printed warranty shall be provided within 10 days of commencement of the warranty period.

1.05 QUALITY ASSURANCE

- A. The physical and chemical properties of all materials, design, performance characteristics and methods of construction and installation of all process items shall be in accordance with applicable current editions of the following standards, references, and guidelines.
 - 1. American Water Works Association (AWWA)
 - 2. American Society for Testing and Materials (ASTM)
 - 3. American Society of Mechanical Engineers (ASME)
 - 4. American National Standards Institute (ANSI)
 - 5. Occupational Safety and Health Act (OSHA)
 - 6. National Electrical Manufacturers Association (NEMA)
 - 7. Institute of Electrical and Electronic Engineers (IEEE)
 - 8. Underwriters Laboratories, Inc. (UL)
 - 9. The Chlorine Institute
 - 10. Pipe Fabrication Institute
- B. All materials, equipment and their installation shall comply with the applicable sections of the following current codes:
 - 1. Minnesota Rules, Chapter 4720.
 - 2. Recommended Standards for Water Works ("10 State Standards"), Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.
- C. Provide Certificates of Compliance from the manufacturer certifying that the particular product meets the respective requirements for that item.
- D. All welding shall be performed by ASME certified welders. Submit copies of the welder's certification to the Engineer prior to any welds made.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Delivery, storage, and handling in accordance with Section 01 60 00.
- B. Inspection:
 - 1. Inspect all pipe and products as it is received to determine damage and/or missing parts.
 - 2. Notify Engineer of any missing, damaged, or defective products.
 - 3. Remove all products found to be defective by the Engineer from the site.
 - 4. Repair or replace damaged items in accordance with the manufacturer's instructions.
- C. Handling and Storage:
 - 1. Handling and storage of products shall be in accordance with Section 22 of AWWA C600.
- D. Scheduling
 - 1. Schedule all process work in phases to accommodate the Owner's occupancy and treatment requirements.
 - 2. Refer to Section 01 51 00 in advance of any service interruption, disruption to construction activities, or to the existing process system operation. Do not proceed until the Owner has granted approval.
- E. Provide storage and handling requirements for materials as recommended by equipment manufacturer and supplier in accordance with Section 01 78 23.

1.07 WARRANTY

- A. Manufacturer agrees to repair or replace components that fail(s) in material or workmanship within specified warranty period as referred to in Section 01 78 37 Product Warranties.
- B. Refer to Section 01 78 37 Product Warranties for additional requirements.

1.08 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to Division 40 items as part of lump sum and unit bid items. Refer to individual specification sections and Drawings for measurement and payment. No separate consideration or payment will be made for work hereunder.

1.09 SCHEDULING

- A. Schedule all process work in phases to accommodate the Owner's occupancy and treatment requirements.
- B. Inform the Owner and Engineer at least 48 hours in advance of any service interruption, disruption to construction activities, or to the existing process system operation. Do not proceed until the Owner has granted approval.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. Process Piping Materials
 - 1. Materials used shall be in accordance with the requirements for class and size as specified or shown on the Drawings.

2. All portions of the process piping system shall be capable of handling stresses that may occur during fabrication, installation, pressure testing and intermittent or continuous operation.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. In accordance with Manufacturer's recommendations and as shown on Drawings.
2. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.
3. Examination
 - a. Determine locations and dimensions of existing structures, piping, and equipment associated with or potentially interfering with the proper fabrication and installation of proposed work.
 - b. Coordinate final length and location of required pipe connections to all process equipment to meet the recommendations and requirements of the equipment manufacturer subject to approval of the Engineer.
 - c. No work shall be installed that directly connects to equipment until such time as complete Shop Drawings of said equipment have been reviewed by the Engineer.
 - d. Determine and be responsible for the proper locations and character of all hangers, chases, sleeves and other openings in the construction required for all process piping work.
 - e. Refer to other drawings for exact locations of partitions, walls, doors, equipment, etc.
4. Connections with Existing Piping
 - a. Where connection between new and existing work is made, use suitable and proper fittings to suit conditions encountered.
 - b. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
 - c. Where connection involves potable water systems, provide disinfection methods as prescribed in these Specifications.

B. Above Ground Piping and Accessories

1. Exposed Process Piping, Valves, Supports, and Accessories.
 - a. Provide piping systems in accordance with the manufacturer's instructions and recommendations.
 - b. Provide ductwork, piping, electrical connections, valves, and appurtenances recommended by the manufacturer for proper operation to complete the operation.
 - c. Install all process piping systems to facilitate accessibility for maintenance and/or replacement.
 - d. Protect all work from subsequent construction activity.
 - e. In place components will be salvaged at the discretion of the Owner.
 - 1) Remove and deliver salvaged items as directed by Owner.
 - 2) Non-salvaged items will become property of the Contractor and promptly removed from the Site.
2. Grooved Joint Installation.
 - a. Couplings and fittings shall be installed in accordance with manufacturer's latest installation instructions.
 - b. Gaskets shall be verified as suitable for the intended service.
 - c. The grooved coupling manufacturer's factory-trained representative shall provide on-site training in grooved product installation and the proper use of grooving tools.
 - d. The representative shall periodically visit the job site to ensure best practices are being followed.
3. Split-Sleeve Coupling
 - a. Couplings shall be installed in accordance with manufacturer's latest installation instructions.
 - b. Each coupling shall be thoroughly cleaned prior to installation. (Particular attention shall be given to the gasket sealing surfaces.)
 - c. In no case shall the deflection in the joint between the pipe ends exceed the maximum deflection for the coupling as recommended by the manufacturer.
4. Refer to Individual Specification Sections for additional requirements.

- C. Below Ground Piping and Accessories
 - 1. Underground Pipe Trenches.
 - a. Excavate, backfill, and compact pipe trenches in accordance with Section 31 23 33 Trench Excavation and Backfill.
 - b. Underground pipe shall have a minimum of 8 feet of cover unless otherwise specifically noted.
 - 1) Pipe buried less than 8 feet shall be insulated as referred to in the Drawings.
 - 2. Refer to Individual Specification Sections for additional requirements.

3.02 FIELD QUALITY CONTROL

- A. Protection
 - 1. Where new facilities have been physically connected to existing facilities, Contractor shall, at all times when pipe installation is not in progress, and at times when directed by the Engineer, keep pipeline openings, tightly closed with preformed stoppers, caps, plugs, sealed plywood, sheet metal bulkheads, sandbags, or other means acceptable to the Engineer. Closures shall be suitable to prevent entrance of animals, foreign materials, and extraneous water (storm water, ground water, dewater discharges, and other sources) into the system. Engineer may direct Contractor to secure various openings and to resecure previously closed openings, all at no additional cost to the Owner.
 - 2. Protect underground and overhead utility like structures from damage. Provide temporary support, adequate protection and maintenance of all structures, surface and subsurface drains, sewers, and other obstructions encountered. Repair or replace any damage to the above.
- B. Refer to Sections 40 23 50 and 40 23 60 for additional requirements.

END OF SECTION

SECTION 40 23 10

PROCESS WATER AND WASTE PIPING AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installation of Process Water and Waste Piping and Fittings.

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 1. A21.4 - Standard for Cement - Mortar Lining for Ductile Iron Pipe and Fittings
 2. A21.11 - Standard for Rubber - Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 3. A21.51 - Standard for Ductile Iron Pipe, Centrifugally Cast
 4. A21.53 - Standard for Ductile Iron Compact Fittings
- B. American Society for Testing and Materials (ASTM):
 1. D1785 - Specification for PVC Pipe, Schedules 40, 80, and 120
 2. D2464 - Specification for Threaded PVC Pipe Fittings, Schedule 80
 3. D2467 - Specification for PVC Pipe Fittings, Schedule 80
 4. D2564 - Specification for Solvent Cements for PVC Piping Systems
- C. American Water Works Association (AWWA):
 1. C104 - American National Standard for Cement - Mortar Lining for Ductile Iron Pipe & Fittings for Water
 2. C110 - Standard for Ductile Iron and Gray Iron Fittings for Water
 3. C111 - Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
 4. C115 - Standard for Flanged Ductile Iron Pipe and Ductile Iron or Gray Iron Threaded Flanges
 5. C150 - Standard for Thickness Design of Ductile Iron Pipe
 6. C151 - Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
 7. C606 - Standard for Grooved and Shouldered Joints

1.03 SUBMITTALS

- A. Refer to Section 40 23 00 for requirements.

1.04 RELATED SECTIONS

- A. Refer to the following specification sections for additional requirements:
 1. Section 01 25 13 - Product Substitution Procedures
 2. Section 01 33 00 - Submittal Procedures
 3. Section 09 91 50 - Shop Painting
 4. Section 09 97 20 - Coating Systems for Wastewater Facilities
 5. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 6. Section 40 23 00 - Process Piping General Provisions
 7. Section 40 23 20 - Process Valves and Operators
 8. Section 40 23 30 - Process Specialties
 9. Section 40 23 40 - Process Piping Hangers and Supports
 10. Section 40 23 50 - Water Process Piping Testing, Adjusting, and Disinfection
 11. Section 40 23 60 - Wastewater Process Pipe Testing

1.05 QUALITY ASSURANCE

- A. Refer to Section 40 23 00 for requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 40 23 00 for requirements.

1.07 WARRANTY

- A. Refer to Section 40 23 00 for requirements.

1.08 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 - 1. Method of Measurement:
 - a. Pipe:
 - 1) Measure by distance in linear feet.
 - 2) Measure along longitudinal axis from manhole centers or 8-inches beyond structure interior face with no deduction for fittings.
 - 3) Measure each pipe size, class, and depth zone separately.
 - b. Fittings:
 - 1) Measure each size and type individually as a unit.
 - 2) Unit includes granular bedding, gaskets, glands, retainers, and hardware.
 - 3) Measure each size, class, and depth zone separately.
 - 2. Basis of Payment
 - a. Payment for acceptable quantities of process water and waste piping and fittings items shall be at the Contract Unit Price as listed on the Bid Form.
 - b. All associated Work items shall be considered incidental.
- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Primary Pond Control Structure (Alternate 6)
 - d. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Ductile-Iron Pipe specified in this Section shall be manufactured by:
 - 1. U.S. Pipe
 - 2. American Cast Iron Pipe Co.
 - 3. Approved equals per Article 6.05 of the General Conditions
- B. Polyvinyl Chloride Pipe specified in this Section shall be manufactured by:
 - 1. U.S. Plastic
 - 2. Spears
 - 3. Approved equals per Article 6.05 of the General Conditions
- C. Reference Section 01 25 13 for information pertaining to procedures for non-Basis of Bid substitutions or "or equal" items.
- D. Plan layouts, weights, and pertinent specification language used in the design have been based upon U.S. Pipe, Felker Brothers, and Spears equipment. Modifications required for American Cast Iron Pipe Co., U.S. Plastic or equal manufacturer's equipment may be necessary and shall be included in the Contractor's bid prices as applicable.
- E. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. Refer to Specification Sections 09 91 50, 09 97 20 and Section 09 97 21 for coating requirements for piping.

2.03 PRODUCTS

- A. Ductile-Iron Schedules:
 - 1. Location: RWW piping, Metering Manhole (Alternate 5) piping, Primary Pond Control Structure (Alternate 6) piping, Well #1 (shall be NSF 61 certified), and Well #2 (shall be NSF 61 certified).
 - 2. General
 - a. AWWA C151.
 - b. Pipe Thickness
 - 1) Above ground applications:
 - a) Shall be ANSI/AWWA thickness Class 53 (minimum), unless noted otherwise in Drawings.
 - 2) Below ground applications:
 - a) Shall be ANSI/AWWA thickness Class 52 (minimum), unless noted otherwise in Drawings.
 - c. The weight, class or nominal thickness, manufacturer's mark, casting period, and the letters "DI" or "ductile" shall be cast or stamped on the pipe or fitting.
 - d. Gaskets shall be full faced or ring gasket capable of 250 psi static pressure and 150 psi operation pressure.
 - e. Flanges shall conform to ANSI B16.1 Class 125. Flanges shall be ductile iron, solid and of the high hub design. Open back flanges will not be accepted.
 - f. Joints:
 - 1) Above ground applications:
 - a) Flanged: AWWA C115.
 - b) Rigid grooved: AWWA C606.
 - 2) Transition from below ground to above ground:
 - a) Provide flanged by mechanical type joint pipe at transition between underground and above ground.
 - b) Flange type joints shall not be buried, unless noted otherwise in drawings.
 - 3) Below ground applications:
 - a) Mechanical type joints in accordance with ANSI/AWWA C111/A21.11.
 - g. Fittings:
 - 1) General:
 - a) Fittings shall be restrained ductile iron
 - b) Material of Construction: Compact Ductile iron.
 - c) Conform to the latest revision of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.
 - d) Flanges shall conform to ANSI B16.1 Class 125. Flanges shall be ductile iron, solid and of the high hub design. Open back flanges will not be accepted.
 - e) Gaskets shall be full faced or ring gasket capable of 250 psi static pressure and 150 psi operation pressure.
 - f) Fittings shall have the pressure rating, nominal diameters, manufacturer identification, number of degrees or fraction of a circle and the letters "DI" or "ductile" cast upon them.
 - 2) Above ground applications:
 - a) Fittings and accessories shall be furnished with flange or restrained groove type joints in accordance with ANSI/AWWA C111/A21.11, unless noted otherwise in Drawings.
 - 3) Below ground applications:
 - a) Fittings and accessories shall be furnished with mechanical type joints in accordance with ANSI/AWWA C111/A21.11, unless noted otherwise in Drawings.

3. Ductile Iron Coatings
 - a. Interior Coating
 - 1) Buried:
 - a) Cement-mortar lining in accordance with ANSI/AWWA C104/A21.4.
 - 2) Non-Buried:
 - a) Cement-mortar lining in accordance with ANSI/AWWA C104/A21.4.
 - b. Exterior Coating:
 - 1) Buried:
 - a) Asphaltic outside coating is accordance with ANSI/AWWA 151/A21.51
 - 2) Non-Buried:
 - a) 2-component shop prime.
 - b) Final coat per Section 09 97 20 or 09 97 21.
- B. Polyvinyl Chloride Schedules:
1. Location: DR piping
 2. Polyvinyl Chloride, Schedule 40
 - a. Above and below ground applications:
 - 1) ASTM D1784, ASTM D1785, and ASTM D2466.
 - 2) Class 123454-B.
 - 3) Fittings shall conform to the requirements of:
 - a) ASTM D2466 for socket type.
 - 4) Fabricate socket type connections with a solvent cement conforming to ASTM D2564.
 3. Or Equal piping for drain piping applications.
- C. Retainer glands
1. Furnish retainer glands for all buried pipe connections to fittings and valves, and where otherwise indicated.
 2. Material: 4140 grade alloy steel and heat treated to a Rockwall C 45/53 case hardness.
 3. Retainer glands shall be Clow F1058, Tyler Union equivalent, or equal.
- D. Polyethylene encasement
1. For ductile iron pipe, fittings and accessories
 2. Polyethylene Sheet
 3. Thickness: 8-mil

2.04 ANCHOR BOLTS AND HARDWARE

- A. Contractor shall provide anchor bolts, hex nuts, and all other fastener hardware and shall be 316 stainless-steel.
1. Type 316 stainless-steel bolts shall conform to:
 - a. ASTM F593.
 - b. ANSI B18.2.1.
 2. Type 316 stainless-steel nuts shall conform to:
 - a. ASTM F594.
 - b. ANSI B18.2.2.
- B. Locate all anchors and fasteners with templates furnished by equipment manufacturer as applicable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with Manufacturer's recommendations and as shown on Drawings.
- B. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.

- C. Manufacturer's authorized representative shall supervise critical installation procedures as necessary, inspect final installation, perform any necessary calibration and adjustment, and start up the equipment. A copy of the startup report shall be included in the O&M manual.
- D. Install vertical piping runs plumb and horizontal runs parallel with structure wall unless otherwise noted on the Drawings.
- E. Alignment for piping smaller than 4 inches may not be shown on Drawings. Install with clearance and allowance for:
 - 1. Expansion and contraction.
 - 2. Operation and access to equipment, doors, windows, hoists, and moving equipment.
 - 3. Headroom and walking space for working areas and aisles.
 - 4. System drainage and air removal.
- F. Gravity Pipe Installation:
 - 1. Comply with ASTM D2321 for installation.
 - 2. Inspect pipe for defects and cracks while suspended before lowering into trench.
 - 3. Place pipe bell at upstream end of pipe length.
 - 4. Install pipe from lower to higher invert elevation at a uniform slope between manholes.
 - 5. Place plug in end of incomplete piping at end of day and when Work stops.
 - 6. Provide watertight plugs at future connection plugs.
 - 7. When water is present in trench, seals are to remain in-place while trench is pumped completely dry.
 - 8. Maximum Allowable Deviation from Staked Grade:
 - a. Alignment: 0.30 feet.
 - b. Elevation: 0.02 percent.
- G. Provide full force gaskets on all systems.
- H. Fit flange joints so contact faces bear uniformly on gasket. Ensure uniform bolt stress when tightened.
- I. Bolts shall not extend more than 0.5-inch beyond the nut for all applications.
- J. Provide hangers and supports in accordance with Section 40 23 40.
- K. Buried Pipe Encasement
 - 1. Wrap all buried pipe and fittings
 - 2. Clean all surfaces of pipe and appurtenances prior to wrapping.
 - 3. Provide sufficient slack to prevent damage during backfill.
 - 4. Provide minimum 6-inch overlap at joints.
 - 5. Secure overlap and joints with compatible adhesive tape.
 - 6. Repair damaged wrap with tape or polyethylene patch.
- L. Thrust Restraint:
 - 1. All joints shall be restrained.
 - 2. Install thrust restraints at all bends, tees and plugs.
 - 3. Concrete Blocking:
 - a. Place between the fitting and undisturbed trench wall.
 - b. Minimum thickness: 12 inches.

c. Minimum area in square feet shall be in accordance with the following:

Pipe	Tee or Plug	1/2 Bend	1/32 and 1/8 Bend	1/16 Bend
6-inch	2.9	3.1	1.6	0.8
8-inch	3.7	5.3	2.9	1.4
10-inch	5.7	8.1	4.4	2.2
12-inch	8.1	13.4	6.6	3.2
16-inch	15.1	21.4	11.6	5.9
20-inch	23.2	30.2	18.1	9.3
24-inch	33.6	48.5	26.1	13.3

d. Size blocking based on the larger main.

e. Verify that bolt are accessible after concrete is poured.

4. Restrained Joints:

a. Submit method and type to engineer for approval.

b. Install in accordance with "Thrust Restraint Design for Ductile Iron Pipe" published by the Ductile Iron Pipe Research Association.

M. Examination

1. See Section 40 23 00.

3.02 FIELD QUALITY CONTROL

A. See Section 40 23 50 Water Process Piping Testing, Adjusting, and Disinfection.

B. See Section 40 23 60 Wastewater Process Pipe Testing.

END OF SECTION

SECTION 40 23 20

PROCESS VALVES AND OPERATORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installation of Process Valves and Operators.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 1. C508 - Swing-Check Valves for Waterworks Service, 2-Inch Through 24-Inch
 2. C509 - Standard for Resilient-Seated Gate Valves for Water Supply Service
 3. C511 - Reduced-Pressure Principle Backflow Prevention Assembly
 4. C512 - Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service

1.03 SUBMITTALS

- A. Refer to Section 40 23 00 for requirements.

1.04 RELATED SECTIONS

- A. Refer to the following specification sections for additional requirements:
 1. Section 01 25 13 - Product Substitution
 2. Section 01 33 00 - Submittal Procedures
 3. Section 01 78 23 - Operation and Maintenance Data
 4. Section 09 91 50 - Shop Painting
 5. Section 09 97 20 - Coatings for Wastewater Facilities
 6. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 7. Section 31 23 33 - Trench Excavation and Backfill
 8. Section 40 23 00 - Process Piping General Provisions
 9. Section 40 23 10 - Process Water and Waste Piping and Fittings
 10. Section 40 23 30 - Process Specialties
 11. Section 40 23 40 - Process Piping Hangers and Supports
 12. Section 40 23 50 - Water Process Piping Testing, Adjusting, and Disinfection
 13. Section 40 23 60 - Wastewater Process Pipe Testing

1.05 QUALITY ASSURANCE

- A. Refer to Section 40 23 00 for requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 40 23 00 for requirements.

1.07 WARRANTY

- A. Refer to Section 40 23 00 and Section 01 78 37 for requirements.

1.08 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 1. Method of Measurement:
 - a. Specialties:
 - 1) Measure each size and type individually as a unit.

- 2) Unit includes granular bedding, gaskets, glands, retainers, hardware. Miscellaneous accessories required by manufacturer for satisfactory installation and operation.
- 3) Measure each size, class, and depth zone separately.
- 2. Basis of Payment
 - a. Payment for acceptable quantities of process specialties items shall be at the Contract Unit Price as listed on the Bid Form.
 - b. All associated Work items shall be considered incidental.
- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to individual component sections for Approved manufacturers.
- B. Reference Section 01 25 13 for information pertaining to procedures for non-Basis of Bid substitutions or "or equal" items.
- C. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. These specifications shall be considered as minimum requirements. The Contractor or Equipment Supplier shall add such additional features as are necessary for satisfactory operation and functioning of pumping equipment.
- B. Provide valves of the same size, joint type, and body material as the corresponding piping, unless otherwise indicated.

2.03 PRODUCTS

- A. Above Ground Applications
 - 1. Isolation Valves (Cleveland Lift Station Valve Vault and Metering Manhole (Alternate 5))
 - a. Plug Valve, liquid medium (3-inch through 72-inch)
 - 1) Performance Requirements:
 - a) Non-lubricated, Eccentric Type:
 - (1) Plugs: Resilient-faced.
 - (2) Rectangular or round port design.
 - (3) Port areas in Full-open Position:
 - (a) Valves up to 20 Inches: 100 percent of adjacent pipe diameter.
 - (b) 20 Inches and Larger: 70 percent of adjacent pipe diameter.
 - (c) For all flow control valves on pump suction piping regardless of diameter, minimum 100 percent of full pipe area.
 - (d) No cavities.
 - (4) Replaceable, sleeve-type in upper and lower trunions.
 - (5) Corrosion-resistant with low coefficient of friction.
 - b) Adjustable Packing on Non-submerged Valves:
 - (1) Accessible without removing the actuator.
 - (2) Spacer design to allow inspection for leaking.
 - c) Pressure Ratings for Valves:
 - (1) Up to 12 Inches: 175 psi.
 - (2) 14 Inches Through 36 Inches: 150 psi.

- (3) 42 Inches and Larger: 125 psi.
 - 2) Joint:
 - a) Flanged, unless otherwise noted on Drawings.
 - 3) Materials:
 - a) Valve Body:
 - (1) Cast iron, ASTM A126, Class B.
 - (2) Flanges: Cast iron, ANSI B16.1, Class 125.
 - b) Valve Shaft Seals:
 - (1) Multiple V-ring or U-cup/O-ring type.
 - c) Plugs:
 - (1) Resilient-faced.
 - (2) Cast iron, ASTM A126, Class B.
 - (3) Eccentrically offset seating surface.
 - (4) One-piece with integral shafts.
 - (5) Encapsulate entire face with Buna-N rubber.
 - (6) Valve Seat Mating Surface:
 - (7) Solid, one-piece 304 stainless steel ring or welded nickel seat.
 - (8) Precision machine to be drop tight in either flow direction.
 - 4) Accessories:
 - a) Operators
 - (1) Operating Nut: 2-inch square. Extend operator to location shown in Drawings.
 - (2) Close clockwise.
 - b) Mechanical Brake:
 - (1) Provide, as required, to maintain and lock the plug in any intermediate position.
 - 5) Approved Manufacturers:
 - a) DeZurik,
 - b) Keystone,
 - c) Clow,
 - d) or equal.
- 2. Rubber Flapper Swing Check Valve (Cleveland Lift Station Valve Vault)
 - a. Joint: Flanged.
 - b. Body: Ductile Iron ASTM A536.
 - c. Rubber Flapper:
 - 1) Steel disk encapsulated with Acrylonitrile-Butadiene (NBR), Chloroprene (CR), Terpolymer of Ethylene Propylene and A Diene (EPDM), or Fluoro Rubber (FKM).
 - 2) The flapper is captured between the body and valve cover to permit the disc to flex open and closed.
 - 3) An integral "o-ring" shall be molded onto the face of the rubber flapper for positive sealing.
 - 4) Removable access plate to allow for cleaning and removal of flapper without removal of valve from piping.
 - d. Maximum Working Pressure: 175 psi.
 - e. Valve shall be internally and externally factory coated with minimum 8 mil DFT of 2-part epoxy for corrosion protection.
 - f. Approved Manufacturer/Model:
 - 1) DeZurik,
 - 2) Or Equal
- 3. Duckbill Check Valves (Cleveland Lift Station Wet Well)
 - a. Products specified in this section shall be manufactured by:
 - 1) Proco,
 - 2) Red Valve,
 - 3) Or Equal.
 - b. Designed to easily slip over an existing pipe.
 - c. Affixed with heavy-duty stainless-steel clamp.
 - d. Can be installed in a vertical application.
- 4. Gate Valves (for Well #1 and Well #2)
 - a. AWWA C509.
 - b. Non-rising stem.
 - c. Open left.

- d. Operator: Handwheel.
 - 1) Cast iron.
 - 2) Furnish with 2-inch AWWA nut.
 - 3) Maximum diameter: 12 inches.
 - 4) Capable of throttling the valve in any position and holding under all operating conditions.
 - 5) Worm screw or traveling nut type.
 - 6) Totally enclosed, operating in a lubricant.
 - 7) Include exterior position indicator.
- e. Stem Seal: Replaceable O-rings.
- 5. Swing-Check Valves (for Well #1 and Well #2)
 - a. AWWA C508.
 - b. Joint: Flanged.
 - c. Air-cushioned.
 - d. Manufacturer/Model:
 - 1) Golden Anderson Figure No. 250-D.
 - 2) APCO Series 250.
 - 3) Approved equal.
- 6. Air Relief Valves (for Well #1 and Well #2)
 - a. AWWA C512.
 - b. Body, Cover, and Baffle: Cast or ductile iron.
 - c. Fasteners, Internal Linkage, Internal Parts, Float, and Float Guide: Stainless steel.
 - d. Elastomers: Buna-N.
 - e. Provide with inlet shut-off ball valve.
 - f. Extend discharge lines to 18 inches above floor.
 - g. Provide pipe saddle as required to allow adequate thread depth.
 - h. Venting Rates: Within manufacturer's recommendations.
 - i. Air Release Valves:
 - 1) Size valves based on flow rates and pressures.
 - 2) Acceptable Manufacturers/Models:
 - a) APCO Series 200.
 - b) Val-Matic Models 38, 45, and 50.
 - c) Approved equal.

B. Accessories

- 1. Manual Operators:
 - a. Performance Requirements:
 - 1) 2-inch operating nut or pinned connection designed for use with valve extension stem.
 - 2) Externally adjustable open and close stops.
 - 3) Waterproof.
 - 4) Capable of throttling the valve in any position and holding under all operating conditions.
 - 5) Worm screw or traveling nut type.
 - 6) Totally enclosed, operating in a lubricant.
 - 7) Above Ground:
 - a) External valve position indicator.
 - b) Furnish appropriate mounting position for operator based on valve orientation.
 - b. General Materials:
 - 1) Body: Cast iron.
 - 2) Bearings: Bronze.
 - 3) Gear: Cast iron.
- 2. Floor Boxes
 - a. Performance Requirements:
 - 1) Cast in slab with removable lid to allow access to extension stem.
 - 2) Removable lid capable of being drilled and tapped.
 - 3) Furnish with "SEWER" lettering.
 - b. Materials:
 - 1) Cast Iron, 5-1/4-inch shaft.
 - c. Neenah R7506-C Series, East Jordan Iron Works equivalent, or equal, unless otherwise noted on plans.

3. Valve Extension Stem
 - a. Performance Requirements:
 - 1) Provide as shown in Drawings for in-plant valves.
 - 2) Top nut, extension, bottom coupling: ductile iron grade 65-45-12.
 - 3) Provide 2 inch square top wrench nut.
 - a) Pin to extension rod using stainless steel coil pins.
 - 4) Provide bottom coupling to attach to buried valve operator as recommended by valve manufacturer.
 - a) Provide mechanical restraint to attach bottom coupling to valve operator.
 - b. Materials:
 - 1) Provide 316 stainless steel for extensions stems.
4. Adjustable Stem Guides
 - a. Performance Requirements:
 - 1) Provide for in-plant valves as shown in Drawings.
 - 2) Adjustable range: 2-inch through 36-inch from wall.
 - b. Provide stem guides for all valve extension stems longer than 6 feet and as required based on length of extension stem.
 - 1) Maximum allowable spacing between stem guides is 8 feet.
 - c. Materials:
 - 1) Provide 316 stainless steel for stem guides.

2.04 ANCHOR BOLTS AND HARDWARE

- A. Contractor shall provide anchor bolts, hex nuts, and all other fastener hardware and shall be 316 stainless-steel.
 1. Type 316 stainless-steel bolts shall conform to:
 - a. ASTM F593.
 2. Type 316 Stainless-steel nuts shall conform to:
 - a. ASTM F594.
- B. Locate all anchors and fasteners with templates furnished by equipment manufacturer as applicable.

2.05 SPARE PARTS AND SPECIAL TOOLS

- A. Supply all special tools and the following spare parts for each type of pump:
 1. Ten (10) sets of replacement operator O-rings for each type of operator provided.
 2. Five (5) sets of replacement operator retaining pins for each type of operator provided.
 3. Five (5) sets of replacement drive shaft seals for each type of operator provided.
 4. One (1) 5.0 ounce tube of manufacturer recommended gasket sealant.
 5. Three (3) 14.5 ounce tubes of manufacturer recommended lithium based grease for actuator.
 6. 1 year of Manufacturer recommended:
 - a. Grease,
 - b. Oil,
 - c. Coolant, and/or
 - d. Any other applicable lubricant or other maintenance related consumable provided for pump operation.
 7. SDS for any applicable products provided with equipment or as spare parts.
 8. Recommended spare parts necessary to maintain each piece of equipment in service for a period of two years.
 9. Provide special tools required for normal repair, parts replacement and maintenance of the equipment that are available only through the manufacturer.

2.06 FINISHES

- A. Colors: See Section 09 97 20 or 09 97 21 for colors.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with Manufacturer's recommendations and as shown on Drawings.
- B. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.
- C. Manufacturer's authorized representative shall supervise critical installation procedures as necessary, inspect final installation, perform any necessary calibration and adjustment, and start up the equipment. A copy of the startup report shall be included in the O&M manual.
- D. Install all anchors in accordance with certified prints supplied by equipment manufacturer.
- E. Installation shall include furnishing manufacturer recommended grade(s) of required oil and grease for initial operation.
- F. See Section 40 23 00.

3.02 FIELD QUALITY CONTROL

- A. Examination
 - 1. See Sections 40 23 60 and 40 23 50.
 - 2. After installation, operate each valve to ensure proper function.

END OF SECTION

SECTION 40 23 30

PROCESS SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installation of Process Specialties.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 1. C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
 2. C1173 - Standard specification for flexible transition couplings for underground piping systems
 3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005
 4. E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2000
- B. National Fire Protection Association (NFPA):
 1. 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006
- C. Underwriters Laboratories (UL):
 1. 723 - Standard for Test for Surface Burning Characteristics of Building Materials, 2003

1.03 SUBMITTALS

- A. Refer to Section 40 23 00 Process Piping General Provisions for requirements.

1.04 RELATED SECTIONS:

- A. Refer to the following specification sections for additional requirements:
 1. Section 01 25 13 - Product Substitution
 2. Section 01 33 00 - Submittal Procedures
 3. Section 01 78 23 - Operation and Maintenance Data
 4. Section 09 97 20 - Coatings for Wastewater Facilities
 5. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 6. Section 40 23 00 - Process Piping General Provisions
 7. Section 40 23 10 - Process Water and Waste Piping and Fittings
 8. Section 40 23 20 - Process Valves and Operators
 9. Section 40 23 40 - Process Piping Hangers and Supports
 10. Section 40 23 50 - Water Process Piping Testing, Adjusting, and Disinfection
 11. Section 40 23 60 - Wastewater Process Pipe Testing

1.05 QUALITY ASSURANCE

- A. Refer to Section 40 23 00 for requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 40 23 00 for requirements.

1.07 WARRANTY

- A. Refer to Section 01 78 37 for requirements.

1.08 MEASUREMENT AND PAYMENT

- A. Where not noted in Drawings as part of lump sum bid item:
 - 1. Method of Measurement:
 - a. Specialties:
 - 1) Measure each size and type individually as a unit.
 - 2) Unit includes granular bedding, gaskets, glands, retainers, hardware. Miscellaneous accessories required by manufacturer for satisfactory installation and operation.
 - 3) Measure each size, class, and depth zone separately.
 - 2. Basis of Payment
 - a. Payment for acceptable quantities of process specialties items shall be at the Contract Unit Price as listed on the Bid Form.
 - b. All associated Work items shall be considered incidental.
- B. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Primary Pond Control Structure (Alternate 6)
 - d. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to individual component sections for Approved manufacturers.
- B. Reference Section 01 25 13 for information pertaining to procedures for non-Basis of Bid substitutions or "or equal" items.
- C. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 PRODUCTS

- A. Coupling, Restrained (3-inch through 48-inch)
 - 1. Restrained.
 - 2. Sleeve type.
 - 3. Material: ASTM A536 qualified ductile iron.
 - 4. Conform to AWWA C219
 - 5. Finish: Provide fusion bonded epoxy per AWWA C153 (ANSI A21.53).
 - 6. Furnish for suitability to pipe being coupled.
 - a. Size.
 - b. Material.
 - c. Pressure.
 - d. Service of pipe.
 - 7. Acceptable Manufacturers/Models:
 - a. Smith Blair, Pipe-Lock,
 - b. or equal.
- B. Diaphragm Seal Isolators (1/4-inch to 1-inch)
 - 1. Provide on all pressure gauges unless noted otherwise in Drawings.
 - 2. Material:
 - a. Top housing: 316L stainless steel.
 - 1) Bottom housing: 316L stainless steel.
 - b. Gasket: PTFE.
 - c. Bolt/Clamp rings: carbon steel.

- d. Hardware: Zinc plated alloy steel.
 - 3. Glycerin filled, for pressure applications. Provide manufacturer recommended fill fluid for vacuum applications.
 - 4. Provide flushing port.
 - 5. Designed for continuous duty if instrument is removed.
 - 6. Maximum working pressure: 2,500 psi
 - 7. Joint:
 - a. Threaded with flushing port.
 - b. Coordinate size with pressure gauge and adjacent piping.
 - 8. Acceptable Manufacturers/Models:
 - a. Ashcroft, model 201,
 - b. or equal.
- C. Dismantling Joint, Restrained (3-inch through 24-inch)
- 1. Restrained.
 - 2. Provide dismantling joint at all flow meters, and as shown in Drawings.
 - 3. Material: ASTM A536 qualified ductile iron.
 - 4. Dismantling type with integral restraint.
 - 5. Joint: Flange, conforming to AWWA C207 Class D
 - 6. Finish: Provide fusion bonded epoxy per AWWA C153 (ANSI A21.53).
 - 7. Furnish for suitability to pipe being coupled.
 - a. Size.
 - b. Material.
 - c. Pressure.
 - d. Service of pipe.
 - 8. Acceptable Manufacturers/Models:
 - a. Dresser, Style 131,
 - b. Smith Blair, Type 973,
 - c. or equal.
- D. Flanged Adapter, Restrained (3-inch through 36-inch)
- 1. Restrained.
 - 2. Material: ASTM A536 qualified ductile iron.
 - 3. Joint: Flange, conforming to AWWA C207 Class D
 - 4. Finish: Provide fusion bonded epoxy per AWWA C153 (ANSI A21.53).
 - 5. Furnish for suitability to pipe being coupled.
 - a. Size.
 - b. Material.
 - c. Pressure.
 - d. Service of pipe.
 - 6. Acceptable Manufacturers/Models:
 - a. EBBA Iron Series 2100 Megaflange,
 - 1) Applicable pipe materials: Ductile iron, steel, PVC, HDPE.
 - b. Smith Blair, Type 911,
 - 1) Applicable pipe materials: Ductile iron, steel.
 - c. or equal.
- E. Joint Restraint, Mechanical (3-inch through 36-inch)
- 1. Restrained.
 - 2. Ductile-Iron Pipe
 - a. Restraint devices shall meet or exceed the performance specifications of:
 - 1) ISO 9001 or later certification, or poured in a foundry located in the U.S.A.
 - 2) AWWA C153 (ANSI-A21.53).
 - 3) AWWA C111 (ANSI-A21.11).
 - b. Material:
 - 1) Body: ASTM A536 qualified ductile iron.
 - 2) Gland: Ductile iron conforming to the applicable provisions of AWWA C111 (ANSI-A21.11) and ASTM A536.
 - 3) Wedges: Ductile Iron heat treated to minimum hardness of 370 BHN.

- c. Furnish for suitability to pipe being coupled.
 - 1) Size.
 - 2) Material.
 - 3) Pressure.
 - 4) Service of pipe.
 - d. Acceptable Manufacturers:
 - 1) EBBA Iron MEGA Lug 1100, 1100SD, 1100SDB,
 - 2) Ford Uniflange 1400 series,
 - 3) Griffin Wedge Action,
 - 4) Romac Roma Grip! DI Pipe,
 - 5) Sigma One LOKI SLDE,
 - 6) Smith-Blair Cam-Lock 111,
 - 7) Star Pipe Products Stargrip 3000 series, or
 - 8) or equal.
- F. Pressure Gauge (1/4-inch)
- 1. Provide in locations as shown in Drawings.
 - a. Gauges shall be located upstream and downstream of each pump.
 - b. Downstream gauge shall be located in piping between pump housing and valves.
 - c. Upstream gauge shall be located in piping immediately upstream of pump housing.
 - d. Gauges shall not be inserted directly into pump housing.
 - e. Gauge connections shall include tee fitting and ball valve for purging air from pressure gauge.
 - f. Provide 1/4-inch NPT piping. Furnish fittings, transitions, and nipples between piping connections and pressure gauge. Install with as few fittings and transitions as practical.
 - 2. Provide weatherproof case design.
 - 3. Pressure gage:
 - a. Size: 4-1/2 inch dial.
 - b. Discharge Range: 0 to 200 percent of normal operating pressure, minimum 0 to 40 psi.
 - c. Suction Range: -10 to 200 percent of normal operating pressure, minimum -10 to 40 psi.
 - d. Graduation: as appropriate for range.
 - e. Accuracy: 1/2 percent.
 - f. Movement: Heavy-duty stainless steel.
 - g. Case: Fiberglass Reinforced Polypropylene.
 - h. Wetted Materials: Stainless Steel.
 - i. Mounting: Direct (stem).
 - j. Connection: 1/4-inch NPT, bottom.
 - k. Glycerin - filled, no exceptions.
 - 4. Acceptable Manufacturers/Models:
 - a. Ashcroft,
 - b. Weksler,
 - c. or equal.
- G. Pressure Gauges and Cocks (for Well #1 and Well #2)
- 1. Pressure Gauge:
 - a. Size: 4-1/2 inch dial.
 - b. Range: 0-160 psi, unless shown on Drawings.
 - c. Graduation: 2 psi.
 - d. Accuracy: 1/2 percent.
 - e. Movement: Heavy-duty stainless steel.
 - f. Case: Fiberglass Reinforced Polypropylene.
 - g. Mounting: Direct (stem).
 - h. Connection: 1/4-inch NPT, bottom.
 - i. Glycerin - filled.
 - j. Manufacturer: Weksler AY04 or approved equal.
 - 2. Isolation Cock:
 - a. Ball valve.
 - b. Suitable to 200 psi.
 - c. 1/4-inch NPT male and female connections.

- H. Sample Taps (for Well #1 and Well #2)
 - 1. Furnish and install smooth nosed sample taps as shown on the Drawings.

- I. Saddle Tap, Stainless-Steel Body (4-inch through 12-inch)
 - 1. Furnish only as shown in Drawings or approved by Engineer on 4-inch through 12-inch piping.
 - 2. Type: Band.
 - 3. 304 stainless-steel body.
 - 4. Bales, nuts and washers shall be 304 stainless steel.
 - 5. Nitrile gasket.
 - 6. Install saddle taps after pipe has been field coated.
 - 7. Acceptable Manufacturers:
 - a. Smith Blair,
 - b. Romac,
 - c. or equal.

- J. Transition Sleeve, Restrained (4-inch to 16-inch)
 - 1. Restrained.
 - 2. Furnish mechanical joint transition sleeves for joining pipes with different outside diameters or where required for assembly.
 - 3. Use gaskets sized for the specific pipe outside diameter.
 - 4. Material: ASTM A536 qualified ductile iron.
 - 5. Finish: Provide fusion bonded epoxy per AWWA C153 (ANSI A21.53).
 - 6. Furnish for suitability to pipe being coupled.
 - a. Size.
 - b. Material.
 - c. Pressure.
 - d. Service of pipe.
 - 7. Acceptable Manufacturer:
 - a. Clow,
 - b. American,
 - c. Romac,
 - d. or equal.

- K. Polyethylene encasement
 - 1. For ductile iron fittings and accessories
 - 2. For buried applications only
 - 3. Polyethylene Sheet
 - 4. Thickness: 8-mil

2.03 ANCHOR BOLTS AND HARDWARE

- A. Contractor shall provide anchor bolts, hex nuts, and all other fastener hardware and shall be 316 stainless steel.
 - 1. Type 316 stainless steel bolts shall conform to:
 - a. ASTM F593.
 - b. ANSI B18.2.1.
 - 2. Type 316 Stainless steel nuts shall conform to:
 - a. ASTM F594.
 - b. ANSI B18.2.2.

- B. Locate all anchors and fasteners with templates furnished by equipment manufacturer as applicable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with Manufacturer's recommendations and as shown on Drawings.

- B. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.
- C. Manufacturer's authorized representative shall supervise critical installation procedures as necessary, inspect final installation, perform any necessary calibration and adjustment, and start up the equipment. A copy of the startup report shall be included in the O&M manual.
- D. General:
 - 1. Install all items in accordance with manufacturer's recommendations.
 - 2. Install items only where indicated on the Drawings.
 - 3. Installation at other location only with prior approved by the Engineer.
 - 4. Provide full force gaskets on all systems.
 - 5. Bolts shall not extend more than 0.5-inch beyond the nut for all applications.
- E. Buried Pipe Encasement
 - 1. Wrap all buried pipe and fittings
 - 2. Clean all surfaces of pipe and appurtenances prior to wrapping.
 - 3. Provide sufficient slack to prevent damage during backfill.
 - 4. Provide minimum 6-inch overlap at joints.
 - 5. Secure overlap and joints with compatible adhesive tape.
 - 6. Repair damaged wrap with tape or polyethylene patch.
- F. Thrust Restraint:
 - 1. All joints shall be restrained.
 - 2. Install thrust restraints at all bends, tees and plugs.
 - 3. Concrete Blocking:
 - a. Place between the fitting and undisturbed trench wall.
 - b. Minimum thickness: 12 inches.
 - c. Minimum area in square feet shall be in accordance with the following:

Pipe	Tee or Plug	1/2 Bend	1/32 and 1/8 Bend	1/16 Bend
6-inch	2.9	3.1	1.6	0.8
8-inch	3.7	5.3	2.9	1.4
10-inch	5.7	8.1	4.4	2.2
12-inch	8.1	13.4	6.6	3.2
16-inch	15.1	21.4	11.6	5.9
20-inch	23.2	30.2	18.1	9.3
24-inch	33.6	48.5	26.1	13.3

- d. Size blocking based on the larger main.
 - e. Verify that bolt are accessible after concrete is poured.
 - 4. Restrained Joints:
 - a. Submit method and type to Engineer for approval.
- G. Examination
 - 1. See Section 40 23 00.

3.02 FIELD QUALITY CONTROL

- A. See Specification Section 40 23 50 Water Process Piping Testing, Adjusting, and Disinfection.
- B. See Specification Section 40 23 60 Wastewater Process Pipe Testing.

END OF SECTION

SECTION 40 23 40

PROCESS PIPING HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installation of Process Piping Hangers and Supports.

1.02 REFERENCES

- A. Manufacturer's Standardization Society (MSS):
 1. SP-58 - Pipe Hangers and Supports - Materials, Design, and Manufacture.
 2. SP-69 - Pipe Hangers and Supports - Selection and Application.
 3. SP-89 - Pipe Hangers and Supports - Fabrication and Installation.
- B. American National Standards Institute (ANSI):
 1. Code for Pressure Piping B31.1.0.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
 1. Support piping systems in all conditions of testing and operation.
 2. Provide supports that will not become disengaged by movement of the supported pipes.
 3. Support System Factor of Safety: 3 based on supported pipe filled with water.
 4. Provide means of vertical adjustment after installation.
 5. Provide suitable linkage to permit swing at hanger locations where lateral or axial movement is anticipated.
 6. Do not support piping from wood or metal truss roof systems unless systems have been specifically designed for such loading.
 7. Size hangers to accommodate pipe covering and jacketing on insulated pipe.
 8. Provide support to resist flotation of empty pipe when located in submerged areas.
 9. Do not install support attachments for loadings over 50 pounds to the underside of hollow core precast planks without the specified approval of the Engineer and precast plank supplier.
- B. Performance Requirements:
 1. Support systems shall prevent movement of the piping in any direction due to pressure, temperature, flow, or water hammer except at properly located expansion joints and fittings.
 2. Support piping in a manner to prevent undue strain on equipment, valves, and fittings.

1.04 SUBMITTALS

- A. Refer to Section 40 23 00 for requirements.
- B. Additional Requirements as applicable:
 1. Provide Shop Drawings for all specially designed hanger assemblies and fabrications.
 2. Provide calculations indicating the load at each support location.
 - a. Submitted load data used to determine location suitability for attachment of supports to new and existing structures.
 3. Provide Shop Drawings indicating the location of each proposed device at each support location.
 4. Provide calculations for sizing of field-fabricated support members.
 5. Shop Drawings shall be prepared by a professional engineer registered in the State of Minnesota.
- C. Attachment to Proposed Plant-Precast Structural Concrete.
 1. Coordinate proposed attachment method with Plant-Precast Structural Concrete manufacturer. Refer to Subparagraph 2.03.A.c.

2. Indicate items in Paragraph 1.04.B in Process Piping Hangers and Support submittal as well as Plant-Precast Structural Concrete submittal.

1.05 RELATED SECTIONS:

- A. Refer to the following specification sections for additional requirements:
 1. Section 01 25 13 - Product Substitution Procedures
 2. Section 01 33 00 - Submittal Procedures
 3. Section 09 97 20 - Coating Systems for Wastewater Facilities
 4. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 5. Section 40 23 00 - Process Piping General Provisions
 6. Section 40 23 10 - Process Water and Waste Piping and Fittings
 7. Section 40 23 30 - Process Specialties

1.06 QUALITY ASSURANCE

- A. Refer to Section 40 23 00 for requirements.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 40 23 00 for requirements.

1.08 WARRANTY

- A. Refer to Section 40 23 00 for requirements.

1.09 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 1. Cleveland Lift Station
 2. Metering Manhole (Alternate 5)
 3. Well Removals and Installs

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to individual component sections for Approved manufacturers.
- B. Reference Section 01 25 13 for information pertaining to procedures for non-Basis of Bid substitutions or "or equal" items.
- C. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. Materials of Construction:
 1. Where shown within the Cleveland Lift Station wet well
 - a. 316 stainless steel.
 2. Where shown anywhere else
 - a. Galvanized steel, hot-dipped after fabrication.
 - b. 304 stainless steel.

2.03 PRODUCTS

- A. Provide the units indicated for the following applications:
 - 1. Adjustable saddle supports for piping on structural slabs 3-inches and larger:
 - a. Anvil Figures 259, 264, and 265.
 - b. Refer to Drawing details.
 - c. Approved Manufacturers:
 - 1) Cooper,
 - 2) PHD,
 - 3) or equal.
 - 2. Vertical pipe support for piping 2-inches through 24-inches:
 - a. Socket clamps are used for the support of vertical piping.
 - b. Provide riser clamp where shown in the Drawings.
 - c. Refer to Drawing details.
 - d. Conform to Federal Specification A-A-1192A (Type 42), ANSI/MSS SP-69 and MSS SP-58 (Type 42).
 - e. Approved Manufacturers/Models:
 - 1) Anvil Figure 40,
 - 2) or equal.

2.04 ANCHOR BOLTS AND HARDWARE

- A. Contractor shall provide anchor bolts, hex nuts, and all other fastener hardware and shall be 316 stainless steel.
 - 1. Type 316 stainless steel bolts shall conform to:
 - a. ASTM F593.
 - b. ANSI B18.2.1.
 - 2. Type 316 Stainless steel nuts shall conform to:
 - a. ASTM F594.
 - b. ANSI B18.2.2.
- B. Locate all anchors and fasteners with templates furnished by equipment manufacturer as applicable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with Manufacturer's recommendations and as shown on Drawings.
- B. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.
- C. General
 - 1. Install all units in accordance with manufacturer's instructions.
 - 2. Locate units so that finished piping will not interfere with:
 - a. Open accesses.
 - b. Walkways and platforms.
 - c. Future maintenance of equipment.
 - 3. Group parallel runs of horizontal piping together on trapeze-type hangers where possible.
 - 4. Install supports to provide specified slope when indicated.
 - 5. Provide units of the same type and style for adjacent similar piping.
 - 6. Install supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors.
 - 7. Install supports to facilitate the movement of expansion joints, loops, bends, and similar items.

- D. Pipe Support Spacing:
1. Locate units and accessories in accordance with minimum defined in MSS SP-58 and 69.
 2. Provide a minimum of 1 support for each length of pipe and at each change of direction or elevation.
 3. Provide additional supports within 3 feet of each joint for every valve, fitting, flow meter, flexible coupling, and all non-rigid joints.
 4. Locate supports in accordance with maximum allowable spacing shown on the schedules at the end of this section.
- E. Building Attachments:
1. Locate attachments to ensure that the total and point loads from the supports do not exceed the design capacity of the supporting structure.
 2. Where it is necessary to anchor supports to hardened concrete or completed masonry, use either:
 - a. Epoxy type adhesive anchors.
 - b. Expansion type anchors.
 3. For precast concrete plank, drill through concrete plank from below and provide through bolts with square steel plate and nuts.
 - a. Plate shall bear directly upon the top surface of the precast concrete plank.
 - b. Apply all toppings and insulations after installation of support plate assembly.
 - c. Coordinate loading with precast manufacturer for new planks.
 4. Attach to structural steel members with beam clamps.
 5. Do not support piping from other piping.
 6. Prevent contact between dissimilar metals.
 - a. Where a concrete or metal pipe support is used, place a 1/8-inch thick Teflon, neoprene rubber, or plastic strip under piping at point of bearing.
 - b. Cut to fit entire area of contact between pipe and support.
 7. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, plastic coated, or by other recognized industry methods.
 - a. Electrician's tape is **not** an acceptable isolation method.
- F. Maximum allowable spacing of pipe supports:
1. Ductile Iron Pipe:

Pipe Size, Inches	Maximum Span, Feet
4 and less	6
6 thru 12	8
14 and greater	16
 2. PVC Pipe, Schedule 40 and 80:

Pipe Size, Inches	Maximum Span, Feet
1-1/4 and less	4
1-1/2 thru 3	5
4 and greater	6
- G. Sequencing and Scheduling
1. Proceed with the installation of support equipment only after the respective building structural work has been completed and approved and any associated concrete support structure has reached its 28-day compressive strength.
- H. Examination
1. See Section 40 23 00.

3.02 FINISHES

- A. Refer to Specification Section 09 97 20 or 09 97 21.
- B. **All exposed non-stainless-steel components shall be painted after installation.**

- C. Do not field paint aluminum or stainless-steel unless otherwise noted in Section 09 97 20 and 09 97 21.

END OF SECTION

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SECTION 40 23 50

WATER PROCESS PIPING TEST, ADJUSTING, AND DISINFECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hydrostatic leak testing of water piping.
 - 2. Process equipment testing and adjusting of water piping.
 - 3. Process system disinfection of water piping.

- B. Related Sections:
 - 1. Section 09 97 21 - Coating Systems for Water Treatment Facilities
 - 2. Section 40 23 00 - Process Piping General Provisions
 - 3. Section 40 23 10 - Process Water and Waste Piping and Fittings
 - 4. Section 40 23 30 - Process Specialties
 - 5. Section 40 23 50 - Process Piping Hangers and Supports

1.02 REFERENCES

- A. AWWA:
 - 1. C651 - Disinfecting Water Mains
 - 2. C653 - Disinfection of Water Treatment Plants

1.03 SUBMITTALS

- A. Submit copies of the following test results:
 - 1. Field quality control.
 - 2. Start-up.
 - 3. Disinfection.

1.04 SCHEDULING AND SEQUENCING

- A. Perform leakage testing prior to the application of coatings or insulation on the piping.

1.05 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - 1. Well Removals and Installs

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Isolate all piping and equipment from potable water systems.

- B. Remove foreign materials from the piping and equipment by means of flushing or other appropriate methods.
- C. Install taps in pipe as required to expel air prior to hydrostatic testing.

3.02 FIELD QUALITY CONTROL

- A. Leakage Testing:
 - 1. Perform hydrostatic leakage testing on all process piping and equipment as follows:
 - a. Test pressure:
 - 1) Ductile iron pipe: 100 psi.
 - b. Test duration: 1 hour.
 - c. Allowable pressure drop: None.
 - 2. If pressure drop is detected, determine and correct source of leakage.
 - 3. Re-test until satisfactory results are obtained.
- B. Manufacturer's Field Service:
 - 1. Inspect, calibrate, and adjust process equipment and systems prior to start-up.
 - 2. Supervise placement of equipment and systems into operation.
 - 3. Perform final inspection and adjustment to ensure proper operation of the system.

3.03 DISINFECTION

- A. Perform disinfection of all process piping and equipment in accordance with the following:
 - 1. AWWA C651.
 - 2. AWWA C653.
- B. Hold chlorine solution in pipe for a minimum of 24 hours.
 - 1. Initial Dosage: 50 ppm minimum.
 - 2. Residual Dosage After Hold Period: 10 ppm minimum.
- C. Operate all valves and other equipment during disinfection to ensure complete coverage.
- D. Flush system with potable water within 24 hours after disinfection is completed.
 - 1. After flushing, obtain one set of 2 samples taken a minimum of 24 hours apart.
- E. Perform coliform and chlorine residual tests on each sample.
- F. Rechlorinate if any samples test positive for coliform.
- G. After satisfactory test results are achieved, the piping may be connected to the potable water system.

END OF SECTION

SECTION 40 23 60

WASTEWATER PROCESS PIPE TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes to Process Pipe Testing for Wastewater.

1.02 REFERENCES

- A. American Water Works Association (AWWA):
 - 1. C600 - Installation of Ductile-Iron Mains and Their Appurtenances

1.03 SYSTEM DESCRIPTION

- A. Coordinate with Engineer during testing for pipe service prior to testing.
- B. Process Pipe Testing Schedule:
 - 1. Gravity-Rated Process Water and Waste Piping, Fittings, Valves, and Specialties.
 - a. Includes some or all items in piping schedules:
 - 1) Lift station drain piping.
 - 2) Upstream and downstream of new primary pond control structure (Alternate 6).
 - 2. Pressure-Rated Process Water and Waste Piping, Valves, Fittings, and Specialties.
 - a. Includes some or all items in piping schedules:
 - 1) Downstream of new lift station wet well.
 - 2) Upstream and downstream of new metering manhole (Alternate 5).

1.04 SUBMITTALS

- A. Refer to Section 40 23 00 for requirements.
- B. Test Results
 - 1. For each tested pipe segment, record the following for submittal to the Engineer.
 - a. Date and time of test.
 - b. Ambient air temperature at beginning and end of test.
 - c. Identification of pipe segment by process name and pipe location.
 - d. Pressure readings every 5 minutes for the duration of air test.
 - e. Identify corrective measures taken to remediate non-passing test results.

1.05 RELATED SECTIONS:

- A. Refer to the following specification sections for additional requirements:
 - 1. Section 09 97 20 - Coating Systems for Industrial Facilities
 - 2. Section 40 23 00 - Process Piping General Provisions
 - 3. Section 40 23 10 - Process Water and Waste Piping and Fittings
 - 4. Section 40 23 30 - Process Specialties
 - 5. Section 40 23 50 - Process Piping Hangers and Supports

1.06 QUALITY ASSURANCE

- A. Refer to Section 40 23 00 for requirements.

1.07 MEASUREMENT AND PAYMENT

- A. Where noted in Drawings as part of the following lump sum bid items:
 - 1. The work performed in accordance with this item is considered incidental to the work in lump sum bid items as noted in the Drawings:
 - a. Cleveland Lift Station
 - b. Metering Manhole (Alternate 5)
 - c. Primary Pond Control Structure (Alternate 6)

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 INSTALLATION

- A. Preparation
 - 1. Isolate all piping and equipment to be tested from other systems.
 - 2. Pressure gages shall be readable by the Engineer without the use of a ladder or accessing the excavation.
 - 3. Remove foreign materials from the piping and equipment by means of flushing or other appropriate methods.
 - 4. Install taps in pipe as required to expel air prior to hydrostatic testing.
 - 5. Contractor to provide fittings and accessories as needed for testing and isolation of piping.
- B. Sequencing and Scheduling
 - 1. Perform leakage testing prior to:
 - a. Application of coatings,
 - b. Encasement of piping joints, fittings, valves, or specialties in concrete or other materials.
 - 2. Install and provide temporary isolation of new piping such that pressure testing does not include joints, valves, fittings, or appurtenances of existing piping.

3.02 FIELD QUALITY CONTROL

- A. General Requirements
 - 1. Expel all air from pipe before beginning hydrostatic test. Install taps necessary to accomplish this and plug as approved by engineer.
 - 2. For each tested pipe segment, record the following for submittal to the Engineer.
 - a. Date and time of test.
 - b. Ambient air temperature at beginning and end of test.
 - c. Identification of pipe segment by process name and pipe location.
 - d. Pressure readings every 5 minutes for the duration of air test.
 - e. Identify corrective measures taken to remediate non-passing test results.
 - 3. Engineer will review pressure data, and examine exposed piping, fittings, valves, etc. Contractor shall repair any leaks.
 - 4. Provide corrective measures for any line exceeding allowable leakage.
- B. Gravity-Rated Process Piping, Fittings, Valves, and Specialties:
 - 1. Remove all dirt and foreign material from pipe interior prior to testing.
 - 2. Pipe Diameter 27 inches and smaller: Air test.
 - 3. Perform deflection testing in addition to air or infiltration testing if requested by Engineer.
 - 4. Perform the following tests upon completion of construction and prior to any external connections:
 - a. Air Test:
 - 1) Place inflatable plugs in piping at each end of reach to be tested.
 - 2) Connect end of an air hose to plug used for air inlet.
 - 3) Connect other end of hose to portable air control equipment.

- 4) This equipment consists of valves and pressure gages used to control the rate air flows to the test section and to monitor air pressure inside the pipe.
- 5) Connect an air hose between compressor (or other source of compressed air) and control equipment.
- 6) Add air to pipe section. Monitor air pressure so pressure inside pipe does not exceed 5.0 psig.
- 7) When pressure reaches 4.0 psig, stop air supply so internal pressure is maintained for 2 minutes.
- 8) These 2 minutes allow time for air temperature to come to equilibrium with the pipe walls.
- 9) During this time check plugs with soap solution to detect any plug leakage. If plugs are found to leak, bleed off air, tighten plugs, and begin again by supplying air.
- 10) After temperature has been allowed to stabilize for 2 minutes, disconnect air supply and allow pressure to decrease to 3.5 psig.
- 11) At 3.5 psig, start stopwatch to determine time required for pressure to drop to 2.5 psig.
- 12) Provide corrective measures for any line not meeting requirements.
- 13) Test results are usually better if pipe walls are damp at time of testing.
- 14) Time shall be equal to or greater than the allowable time shown in table at end of this Section.

b. Deflection Test.

1) Deflection Test:

- a) Perform on pipe at least 30 days after trench backfill has been placed.
- b) Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
- c) Mandrel diameter: Minimum 95 percent of the base inside diameter of the pipe as follows:

Nominal Size (in.)	Base I.D.	5% Deflection Mandrel
4	3.874	3.68
6	5.742	5.46
8	7.665	7.28
10	9.563	9.08
12	11.360	10.79
15	13.897	13.20
18	16.975	16.13
21	20.004	19.01
24	22.481	21.36
27	25.326	24.06
30	28.639	27.21
33	32.224	30.61
36	35.808	34.02
42	40.401	38.38
48	46.094	43.79

- d) The line will be considered acceptable if mandrel can progress through line without binding.
- e) Provide corrective measures for lines not meeting these requirements.

C. Pressure-Rated Process Piping, Fittings, Valves, and Specialties:

1. Remove all dirt and foreign material from pipe interior prior to testing.
2. Pipe Diameter all sizes: Hydraulic.
3. Perform the following tests upon completion of the system and prior to being placed into service:
 - a. Hydraulic Test:
 - 1) Perform pressure and leakage test in accordance with AWWA C600.
 - 2) Test Pressure: 150 psi.
 - 3) Test Duration: 2 hours.
 - 4) Gage Requirements:
 - a) Size: 4-1/2-inch dial.
 - b) Range: 0 to 200 psi.
 - c) Gradation: 2 psi.
 - d) Accuracy: 1/2 percent.

- 5) Do not allow pressure to vary more than 3.0 percent during the test.
- 6) Do not allow pressure to vary more than 1.0 percent or 1.0 psig, whichever is greater, during the last hour of the test.
- 7) Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{266,400}$$

L = Allowable Leakage in Gallons Per Hour

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Average Test Pressure During Test in Pounds/ Square Inch (Gage)

END OF SECTION

SECTION 40 90 00

WELL CONTROL SYSTEM MODIFICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control System Modifications.
- B. Control Devices.
- C. Low Temperature Alarm Thermostat.
- D. Pressure Switch.
- E. Proximity Switch.
- F. Installation, Identification, Testing and Commissioning.

1.02 REFERENCES

- A. National Fire Protection Association (NFPA), latest adopted version.
- B. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA ICS-2 Industrial Control Devices, Controllers, and Assemblies.
 - 2. NEMA 250 Enclosures for Electrical Equipment.
- C. Underwriters Laboratories (UL)
 - 1. UL 508 Industrial Control Equipment.

1.03 SCOPE

- A. Modifications shall be provided at Well #1 as follows:
 - 1. Provide modifications at Well #1 to allow Well #1 to be selected to operate based on system pressure. A selector switch and differential pressure switch shall be provided at Well #1 so that it is capable of operating based on pressure setpoints when Well #2 is out of service.
 - 2. Starting of Well #1 shall turn on temporary chemical feed systems. Shutdown of Well #1 shall turn off temporary chemical feed systems.
 - 3. Programming shall be provided to control the well as described in the functional description.
 - 4. Alarm notification shall be modified to include lighting of the existing exterior alarm light upon alarm condition and adding existing low temperature alarm thermostat.
 - 5. Add intrusion alarm, including door contacts and pushbutton/timer for security alarm disable function.
 - 6. Replace Low Temperature Alarm Thermostat.
- B. Modifications shall be provided at Well #2 as follows:
 - 1. Calibrate existing pressure transducer and add flow meter to allow well to be controlled based on either system pressure or flow.
 - 2. Add VFD to allow speed modulation so that well flow can be modulated to maintain a flow or pressure set point.
 - 3. Programming shall be provided to control the well as described in the functional description.
 - 4. Alarm notification shall be modified to include lighting of the existing exterior alarm light upon alarm condition and adding existing low temperature alarm thermostat.
 - 5. Add intrusion alarm, including door contacts and pushbutton/timer for security alarm disable function.
 - 6. Replace Low Temperature Alarm Thermostat.

- C. It is the intent of the Contract Documents that all equipment specified in this Section of the specifications be supplied by a single-source supplier ("Systems Integrator"). The supplier shall assume full responsibility along with the Contractor for furnishing, installing and start-up procedures so as to make the system operate per the intent of the Contract Documents.
- D. The work specified in this Section includes furnishing, installing, start-up, testing, and adjusting of all required equipment, including instruments, equipment, hardware, software, wiring, accessory equipment, and training to provide a completely operational process instrumentation and control system.
- E. It shall be the responsibility of the Contractor and supplier to examine all new and existing equipment that is transmitting a signal to, or receiving a signal from, equipment specified in this Section. The Contractor shall be responsible for providing signal converters, buffer amplifiers, and isolation devices to make signal levels, reference to ground, etc. compatible between devices specified in this Section and existing equipment or equipment specified in other Sections.
- F. The labor specified herein includes but is not limited to engineering software development, panel fabrication, equipment calibration and adjustment, testing, training, and documentation.
- G. This section includes coordination with the work of other sections and requires identification of exact interface requirements with motor and control devices provided under other portions of this specification. It shall be the responsibility of the Systems Integrator specified under this section to execute this coordination during the shop drawing submittal phase of the work.
- H. This section includes coordination with electrical contractor to ensure that the proper number and type of conductors are installed. It shall be the responsibility of the Systems Integrator to coordinate this work with the installing electrician.

1.04 SUBMITTALS

- A. Technical data in conformance with Division 1 and including:
 1. All equipment and components indicated on the Drawings and specified in Part 2 of this Section.
 2. Software packages including complete description of features and capabilities.
- B. Shop Drawings in conformance with Division 1 and including:
 1. Complete new drawings for all existing panels that are modified under this Contract. Re-draw existing circuitry based on field investigation by Systems Integrator. Drawings shall include all existing components and circuitry, and shall include all proposed components and circuitry.
 2. Overall system diagram showing all components, converters, cables, and connectors.
- C. Operational and Maintenance data in conformance with Division 1 and including:
 1. Panel equipment, field devices and instruments, including "as-built" system schematics.
 2. Thumb drive containing final PLC program, final operator interface application files and final distributed control software application files.
 3. Thumb drive containing final system record drawings, wiring diagrams and panel details. The drawings files shall be in AutoCAD format (.DWG files).
 4. Complete software documentation including programming information and operator's guides. Include hard copies of all operator interface unit and computer graphic screens.
 5. Point list of all PLC inputs/outputs. Identify point number (tag), point description, point type, range in engineering units (if analog point), PLC number, rack and slot number, and point address.
- D. Start-up report from system supplier per requirements of Division 1.
- E. Spare Equipment Lists- Provide a list of recommended spare parts and equipment that is considered spare parts and equipment that is considered crucial to the operation of the system.
- F. All submittals shall be bound in 3-ring binders with labeled tabs separating sections.

1.05 TESTING AGENCY CERTIFICATION

- A. All new panels and subpanels furnished under this Section shall be constructed in accordance with Underwriter's Laboratories (UL) Standard 508- "Industrial Control Equipment".

1.06 QUALITY ASSURANCE

- A. All materials, equipment, and parts shall be new and unused of current manufacture.
- B. System Integrator shall be responsible for providing all necessary accessories required for a complete and operational system.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.07 FUNCTIONAL DESCRIPTIONS

- A. Existing Control System shall be modified as follows:
 - 1. The existing Full Voltage Starter controlling well #2 shall be replaced with a VFD.
 - 2. A new flow meter shall be provided at Well #2:
 - a. The flowmeter system will include a 4-20 mAdc analog output signal for use by the control system for remote monitoring of flow. The 4-20 mAdc flow signal will be linear with flow from the associated pump. Confirm flow ranges for the pump(s) with the Owner and Engineer during construction. Input the 4-20 mAdc flow signal to the existing controller.
 - b. Controller shall totalize flow by monitoring the 4-20 mAdc output signal from the meter and shall make the information available on the HMI screens.
 - c. Allow the operator to choose to trend on each flow signal.
 - d. Provide HMI screens with the following:
 - 1) Display of all instantaneous flows (GPM).
 - 2) Display of daily totalized flows (thousands of gallons).
 - e. Flow meter signal shall be used to control the VFD as described herein.
 - 3. Well #1 Control:
 - a. Ability to control Well #1 shall be added so that the well maintains system pressure while Well #2 is out of service:
 - 1) A Selector switch shall be added to the existing control panel and differential pressure switch shall be added in the piping at Well #1. The switch shall allow operator to select when Well #1 is controlled independently of Well #2.
 - 2) Provide relaying in the existing panel for pump and chemical receptacle control.
 - a) Pressure switch shall allow adjustable pressure control, with a minimum range of 50-100psi and deadband of 5psi. Initial settings shall be for pump to turn on at 60 psi and off at 65 psi.
 - b) Temporary chemical feed is being provided during period when Well #2 is offline. Temporary chemical feed shall operate whenever Well #1 is running.
 - (1) Utilize auxiliary contact off motor starter to energize a receptacle whenever the well is running.
 - b. Intrusion Alarm:
 - 1) Proximity Switches shall be provided for the exterior doors.
 - 2) An unlabeled "Disable" pushbutton and amber pilot light shall be installed on the control panel.
 - 3) A time delay, initially set at 20 seconds, shall allow the operator to disable the intrusion alarm upon entering the facility by depressing the "Disable" pushbutton.
 - 4) The amber light will energize indicating the alarm is disabled.
 - 5) When the alarm is disabled, and the pushbutton is pressed, deactivate the amber pilot light, and start a 60-second countdown timer to allow operator to exit the building and close the doors. Arm the security system after the countdown timer expires.
 - 6) Security alarm shall be added to existing alarm notifications and callouts.

- c. Replace existing low temperature alarm thermostat.
 - 1) Low temperature alarm shall be added to existing alarm notifications and callouts.
 - d. Existing exterior alarm light does not function. Trouble shoot and repair alarm light so that it will illuminate under alarm conditions.
4. Well #2 Control:
- a. Existing controller shall be modified, or new controller provided, to control the well pump as follows:
 - 1) Well #2 starter shall be replaced with a VFD:
 - a) In "Hand", the well shall run.
 - b) In "Off", the well shall not run
 - c) In Auto, the well shall be controlled as follows:
 - (1) A Pressure-Flow Selector switch shall be provided on the control panel.
 - d) When "Pressure" is selected, the well shall turn on at an operator selectable "Pump Start" setpoint, initially set at 55 psi.
 - (1) Once running, the pump shall ramp to a preset minimum running speed, initially set at 40 percent.
 - (2) The pump speed shall be modulated to maintain an operator selectable pressure setpoint, initially set at 60 psi.
 - (3) If at minimum pumps speed, the pressure reaches the "Pump Stop" setpoint, initially set at 65 psi, the pump shall stop.
 - e) When "Flow" is selected, the well shall turn on at an operator selectable "Pump Start" setpoint, initially set at 275 gpm.
 - (1) Once running, the pump shall ramp to a preset minimum running speed, initially set at 30 percent.
 - (2) The pump speed shall be modulated to maintain an operator selectable flow setpoint, initially set at 275 gpm.
 - (3) If at minimum pump speed, the pressure reaches the "Pump Stop" setpoint, initially set at 65 psi the pump shall stop.
 - 2) Intrusion Alarm: Proximity Switches shall be provided for the exterior doors.
 - a) An unlabeled "Disable" pushbutton and amber pilot light shall be installed on the control panel.
 - b) A time delay, initially set at 20 seconds, shall allow the operator to disable the intrusion alarm upon entering the facility by depressing the "Disable" pushbutton.
 - c) The amber light will energize indicating the alarm is disabled.
 - d) When the alarm is disabled, and the pushbutton is pressed, deactivate the amber pilot light, and start a 60-second countdown timer to allow operator to exit the building and close the doors. Arm the security system after the countdown timer expires.
 - e) Security alarm shall be added to existing alarm notifications and callouts.
 - 3) Replace existing low temperature alarm thermostat.
 - a) Low temperature alarm shall be added to existing alarm notifications and callouts.
 - 4) Existing exterior alarm light does not function. Trouble shoot and repair alarm light so that it will illuminate under alarm conditions.

PART 2 PRODUCTS

2.01 INTEGRATOR

- A. Modifications to the existing control panels shall be by the panel manufacturer. Contact:
 - 1. Quality Flow Systems, Inc., Contact: Bill Toennes, 952.758.9445.

2.02 CONTROL PANEL FABRICATION (WELL #1)

- A. Enclosures for indoor control panels shall meet the following minimum requirements:
 - 1. NEMA 12 unless otherwise specified.
 - 2. Fabricate control panel of 12-gage carbon steel plate with all-welded construction throughout. Welds shall be ground smooth, corners shall be rounded, and weld spatter cleaned. Corner construction shall be minimum of 1/8 inch inside radius.

3. Sized as required.
 4. Surface of control panel shall be free from mars and defects. Finished panel surfaces shall be flat within 1/16 inch in 6'-0" and be smooth with rounded edges. Finished panel surfaces shall be 3/16" (5 mm) thick. Instrument cutouts and drilling shall be straight and true.
 5. All inside and exterior surfaces treated to prevent oxidation and painted. White on interior, manufacturer's standard color on exterior.
- B. All components labeled per shop drawings.
1. Engraved labels attached with screws.
- C. All wiring terminated on barrier-type terminal strips. Terminal strips shall be labeled with engraved plastic labels.
1. Labels shall be attached with two-part epoxy adhesive.
 2. 600 volt terminal strips.
 3. Ring or spade type clamp connectors.
 4. Wiring laced using plastic ties and plastic wiring troughs.
 5. Wiring held down with straps attached to enclosure with screws.
 6. Separate power, control and signal conductors.
 7. Power wiring: #14 AWG, stranded, 600V copper minimum.
 8. Control wiring: #18 AWG, stranded, 600V copper minimum.
 9. Signal wiring: shielded, 300V copper minimum. See Division 26.
 10. Connections to instruments via terminal strip or connectors. Soldering wired to terminal strips in not acceptable.
- D. Tag all wires at each end with wire number matching shop drawings.
- E. Terminals
1. NEMA-style, barrier type, 0.4-inch spacing, nominal.
 2. 600V RMS, 55 amp rating.
 3. UL listed.
 4. Allen-Bradley 1492-CA1 series, or equal.
 5. Terminals for larger power circuits shall be 600 VAC barrier-type, sized for the conductors.
- F. Control Devices: As specified below.
- G. Indicating Lights.
1. Sunlight visible, 30.5mm, high visibility LED.
 2. "Push-to-Test" type.
 3. Heavy-duty, oil-tight.
 4. NEMA 4 rating.
 5. Allen Bradley 800T, or equal.
 6. Colors.
 - a. Running: Green.
 - b. Off: Red.
 - c. Power on: White.
 - d. Alarm: Amber.
- H. Differential pressure switch
1. Pressure range: 50-100psi.
 2. General purpose enclosure.
 3. SPDT switch.
 4. Thumbscrew setpoint adjustment.
 5. UL Listed.
 6. Dwyer Series DA or equal.
- I. Other devices as necessary for a complete control panel installation.

2.03 CONTROL DEVICES

A. Pushbuttons and Selector Switches:

1. Selector, momentary pushbutton, or momentary selector as required. Positions as required for application.
2. 30.5mm, Heavy duty, oil-tight, contacts as required.
3. Contact rating shall conform to NEMA A-600.
4. Allen-Bradley 800T or equivalent.
5. Pushbutton Color:
 - a. Red: Stop.
 - b. Green: Run.
 - c. White: Power on.

B. Relays:

1. Plug-in type with dust cover, socket and locking spring when relay mounted horizontally.
2. Mechanical or LED to indicate energized state.
3. Coil: continuous operation at 120 VAC \pm 10 percent unless shown otherwise.
4. Contacts, 3 pole, double throw, minimum.
 - a. 10 amps, make-break, 120 VAC, resistive.
 - b. Insulation resistance: 1000 megohms at 500 VDC.
 - c. Dielectric: 2000 VAC, 60 Hz.
5. Operating time
 - a. 35 milliseconds (nominal) energization.
 - b. 100 milliseconds (nominal) de-energization.
6. Mechanical life: 10^6 operations.
7. Temperature: 0 to 70 degrees C.
8. Timing relays shall be of the same manufacturer and series as control relays. Provide electronic timers with range as indicated.

2.04 LOW TEMPERATURE ALARM THERMOSTAT

A. Normal environment:

1. Corrosion resistant enclosure with external bulb and SPDT contacts.
2. 40–100 degrees F adjustable range with calibrate scale in increments of 2-degree F.
3. Chromalox #WCRT-100, Honeywell T631A, or equal.

2.05 SWITCH – MAGNETIC PROXIMITY

A. Instruments:

1. Hermetically sealed switch.
2. Magnetic door position switch by Interlogix, 2500 series surface mounted industrial 3 inch wide gap or equal.

PART 3 EXECUTION

3.01 LABELING

- A. Label all field mounted control devices, instrumentation, switches, etc., with tag number and item description.
- B. Labels shall be engraved laminated plastic with 1/4-inch high lettering. Labels shall be attached with stainless steel screws to the device or nearby wall.

3.02 CALIBRATION, ADJUSTING AND TESTING

- A. Devices requiring field calibration shall be calibrated in the presence of the Engineer's representative and documented.

3.03 PROJECT MANAGEMENT

- A. Supplier shall provide engineering and administrative services necessary to fulfill the requirements of this specification.
- B. Supplier shall provide the services of an experienced project manager as the overall coordinator during the course of the project.

3.04 PROGRAMMING SERVICES

- A. Program the controllers as required by the functional descriptions.
- B. Supplier shall modify the existing SCADA system software at all existing locations as required to incorporate the new information from the new SCADA site(s). Graphic and control screens shall be added as well as trending and alarms to match existing sites.
- C. Provide additional programming during start-up, training, and call-back periods as specified.

3.05 INSTALLATION AND START-UP

- A. Supplier shall provide a skilled programmer/instrumentation engineer or technician who shall complete troubleshooting and start-up to place the entire system into satisfactory operation. The engineer or technician shall make the necessary inspection of the completed installation, make the necessary final field adjustments, and make program revisions as required for start-up.
- B. Conduct a 4-hour demonstration of all system features and functions to Owner and Engineer.
- C. Verify that all alarms and status points are successfully telemetered.
- D. Coordinate installation and start-up scheduling with Owner and Engineer.

3.06 ACCEPTANCE TESTING

- A. On-Site Testing and Commissioning:
 - 1. Provide services of a systems integrator technician to checkout, test, and commission the system at the Project Site.
 - 2. Place equipment into service and provide operation as specified.
 - 3. Provide actual activation of each control function and alarm in the system. If actual activation is not possible, the function shall be simulated.
 - 4. Record all Changes in the Control Systems:
 - a. Revise all wiring diagrams and schematic diagrams to show final installation.
 - b. Insert revised diagrams into each operation and maintenance manual in place of original diagrams
- B. After the installation is complete, and proper operation has been demonstrated, a 60-day acceptance test shall begin. The entire system shall be required to operate for 60 days with no malfunctions, field repairable malfunctions excepted. Any malfunction during the 60-day test which cannot be corrected within 24 hours by the supplier shall be considered a non-field repairable malfunction and after repairs are complete, the test shall be repeated.
- C. The acceptance test shall apply to all equipment furnished under this Section.

3.07 ON-SITE SERVICES

- A. In addition to other services specified, provide a competent programmer/instrumentation engineer or technician to perform the following services:
 - 1. Software revisions: Eight (8) hours on-site to make software revisions per Owner and Engineer direction.

2. Training: 4-hours on-site to train Owner's personnel on:
 - a. Operation and maintenance of all equipment furnished.
 - b. Training shall not include travel time to the site.
- B. All on-site services shall be at times approved by Owner.
- C. At project completion, supplier shall certify in Writing that all un-used service hours will be provided at Owner's request during the first three years of operation. The remaining service hours shall be fulfilled by either a software engineer or field service technician as required by the task required by the Owner.

END OF SECTION

SECTION 40 90 10

LIFT STATION CONTROLS AND DEVICES

PART 1 GENERAL

1.01 GENERAL

- A. This Section describes the requirements for lift station controls and devices.

1.02 REFERENCES

- A. National Fire Protection Association (NFPA), latest adopted version.
- B. National Electrical Manufacturers Association (NEMA)
 - 1. NEMA ICS-2 Industrial Control Devices, Controllers, and Assemblies.
 - 2. NEMA 250 Enclosures for Electrical Equipment.
- C. Underwriters Laboratories (UL)
 - 1. UL 83 Thermoplastic Insulated Wires and Cables.
 - 2. UL 508 Industrial Control Equipment.
 - 3. UL 698A Industrial Control Panels relating to Hazardous (Classified) Locations.
 - 4. UL 913 Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, Class II and III, Division 1, Hazardous (Classified) Locations.

1.03 SUMMARY OF WORK

- A. A complete control system shall be provided to operate the Lift Stations as specified in this section. The Work includes labor, material, equipment (control devices, instrumentation, control panel, etc.), software, programming, wiring, and supervision necessary to fabricate, install, start-up, and test a complete and operable control system.
- B. Work shall include modifications for two lift station sites and a metering manhole (Alternate 5) as follows.
 - 1. Main Lift Station:
 - a. The existing control panel shall be replaced. In addition to control functions as outlined herein, the new lift station control panel shall communicate alarm conditions via cellular an alarm monitor. The Lift Station Control Panel shall include:
 - 1) Pad mounted enclosure, as shown on the drawings.
 - 2) Controller, Operator interface, software and programming.
 - 3) Interlocked main/generator breakers and remote mounted generator receptacle.
 - 4) Power Factor Correction Capacitors for each pump.
 - 5) Control cabling and field wiring.
 - 6) Cellular Alarm Monitor.
 - a) Contractor shall coordinate cellular service with City and City's preferred provider.
 - 7) New Transducer and float switches shall be provided in the wet well.
 - 8) Magnetic door contacts and security alarm.
 - 2. Cleveland Lift Station:
 - a. The wet well and valve vault. Existing control panel and submersible pumps shall be disconnected and re-installed.
 - 1) New Transducer and float switches shall be provided in the wet well.
 - 2) New automatic transfer switch and standby generator.
 - 3) Relocate electrical service.
 - 4) Replace existing pump controller.
 - 5) Other modifications as shown on the one line diagram, to include:
 - a) Provide magnetic door contacts and security alarm.
 - b) Provide generator circuit breakers.

3. Metering Manhole (Alternate 5)
 - a. Work for new Metering Manhole near the Main Lift Station will be included as Alternate 5 listed under a separate lump sum bid item.
 - 1) New Magnetic Flow meter and flood switch mounted in new metering manhole. Mount transmitter inside control panel at lift station. (Part of Metering Manhole Alternate 5)
- C. Provide Operation and Maintenance Manuals (O&Ms). Include electronic and hard copies of the programs and program changes as specified herein.
- D. It is the intent of the Contract Documents that all equipment specified in this Section of the specifications be supplied by a single-source supplier ("Systems Integrator"). The supplier shall assume full responsibility along with the Contractor for furnishing, installing and start-up procedures to make the system operate per the intent of the Contract Documents.
- E. It shall be the responsibility of the Contractor to furnish a complete and fully operating system. The Contractor shall be responsible for all details which may be necessary to properly install, adjust and place in operation the complete installation.
- F. It shall be the responsibility of the Contractor and supplier to examine all new and existing equipment that is transmitting a signal to, or receiving a signal from, equipment specified in this Section. The Contractor shall be responsible for providing signal converters, buffer amplifiers, and isolation devices to make signal levels, reference to ground, etc. compatible between devices specified in this Section and existing equipment or equipment specified in other Sections.
- G. The labor specified herein includes but is not limited to engineering software development, panel fabrication and installation, equipment calibration and adjustment, testing, training, and documentation.
- H. This section includes coordination with electrical contractor to ensure that the proper number and type of conductors are installed. It shall be the responsibility of the Systems Integrator to coordinate this work with the installing electrician.

1.04 SUBMITTALS

- A. Technical data in conformance with Division 1 and including:
 1. All equipment and components indicated on the Drawings and specified in Part 2 of this Section.
 2. Software packages including complete description of features and capabilities.
- B. Shop Drawings in conformance with Division 1 and including:
 1. Panel Drawings including system schematic drawings, terminal numbering, wire numbering, component schematic drawings, dimension drawings, layout drawing and nameplate schedule.
 2. Overall system diagram showing all components, converters, cables, and connectors.
 3. Proposed operator interface unit graphic displays. Submit "rough" or hand-drawn copies prior to programming.
 4. Proposed report formats written specific to the project.
- C. Operational and Maintenance data in conformance with Division 1 and including:
 1. Panel equipment, field devices and instruments, including "as-built" system schematics.
 2. Electronic files on removable media containing final PLC program and final operator interface application files.
 3. Electronic files on removable media containing final system record drawings, wiring diagrams and panel details. The drawings files shall be in AutoCAD format (.DWG files).
 4. Complete software documentation including programming information and operator's guides. Include hard copies of all operator interface unit.
 5. All applicable software licenses registered to the Owner.
- D. Start-up report from system supplier per requirements of Division 1.

- E. Spare Equipment Lists: A list of required spare parts is provided in Section 2.
 - 1. Provide a list of recommended spare parts and equipment that is considered crucial to the operation of the system. Include list of prices for each item.
- F. All submittals shall be bound in 3-ring binders with labeled tabs separating sections.

1.05 FACTORY TESTING

- A. The Control System shall be assembled at the manufacture's facility and tested to the greatest extent possible. This test shall include simulation of all I/O points and demonstration of proper system operation. Document the results of this test in writing and submit to Engineer.
- B. The Engineer and Owner may witness the factory acceptance test. Schedule test date a minimum of two weeks in advance to allow attendance by the Engineer and the Owner.
- C. Correct any deficiencies identified during the test prior to shipping the control system to the job site.

1.06 QUALITY ASSURANCE

- A. All materials, equipment, and parts shall be new and unused of current manufacture.
- B. System Integrator shall be responsible for providing all necessary accessories required for a complete and operational system.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.
- E. Control panels shall be meet the requirements of UL-508A and shall be UL labeled or third party certified. Control panels with intrinsically safe circuits shall meet the requirements of UL-698A and shall be labeled as such. Panels shall be listed or third party certified when delivered to the job site. When the Owner accepts the panel(s), the Contractor certifies that the panels have retained their UL listing or third-party Certification.
- F. Modifications to the existing control panels shall be by the panel manufacturer. Contact:
 - 1. Quality Flow Systems, Inc., Contact: Bill Toennes, (952) 758-9445.

1.07 FUNCTIONAL DESCRIPTIONS LIFT STATION CONTROL PANELS

- A. Control shall be provided for two wet well pumps.
- B. An analog level sensor and two float switches shall be provided in the wet well.
- C. Normal control shall be provided by a primary controller, and a submersible level transducer. A Hand-off-Auto switch shall be mounted on the inner door.
 - 1. Auto Mode (H-O-A selector switch in Auto position):
 - a. The pumps shall be controlled based on the level in the wet well. On a rising level, the lead pump shall be started followed by the lag pump. Once started, pumps shall be stopped at a single low level setpoint. Five (5) setpoints shall be provided based on wet well configuration and shall be coordinated with the Owner, Integrator and Engineer during shop drawing submittals:
 - 1) High Level (set slightly below the High Alarm float switch)
 - 2) Lag Pump Start.
 - 3) Lead Pump Start.
 - 4) Pump Stop.
 - 5) Low Level (Set slightly above the Low Level Alarm float switch).

- b. The pumps shall automatically alternate lead duty every cycle. Manual alternation shall be selectable via the operator interface.
 - c. An adjustable 0 to 3 minute timer in the PLC shall delay the starting of the lag pump.
 - d. A time delay of 0-60 seconds, initially set at 5 seconds, shall be included for each setpoint.
 - 2. Hand Mode (H-O-A selector switch in Hand position): The pump will run. The Hand position shall be wired directly to the motor starter, bypassing all interlocks with the exception of motor overload or any other alarm that would void the pump manufacturer's warranty.
 - 3. Off Mode (H-O-A selector switch in Off position): The pump will not run.
 - 4. If the lead pump fails, the lag pump shall be started automatically.
- D. In addition to high and low level alarms, the float switches shall also be utilized to provide backup control. Controls relays and timers independent of the PLC shall provide control logic:
 - 1. A High wet well alarm shall be initiated and the lead and lag pumps shall be started based on float LSH-1. The lag pump shall start after adjustable 0-60 second time delay, initially set for 30 seconds. (An adjustable 0 to 60 second time delay, initially set for 10 seconds, shall delay the initiation of the High level alarm and backup float mode).
 - 2. Pumps shall operate until the low level alarm float LSL-1 is reached and both pumps shall stop. When the pump station is under primary control (not backup), the LSL-1 float shall stop the pumps and send a low level alarm. The LSL-1 float shall not initiate a low level alarm when under backup control.
 - 3. Once initiated, pumps shall remain under backup control mode until the alarm is reset either via telemetry or via a reset pushbutton mounted on the inner door.
- E. A thermostat inside the enclosure shall provide a low temperature alarm.
- F. Pump Runtime:
 - 1. In addition to the physical run time meters, record pump runtime separately for each pump within the controller
 - 2. Record separately the "both" pumps running runtime within the controller.
- G. Pump Starts:
 - 1. Record the total number of starts for each pump in the controller.
 - 2. Provide accumulated total start cycles, (resettable by administrator), and 24 hour cycles.
 - 3. Provide an average runtime per start for each pump.
- H. Temperature sensors supplied with the pump shall initiate a pump overtemperature alarm and stop the pump upon an over temperature condition. Pump shall be locked out until manually reset. Temperature monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the over temperature circuitry when the circuit breaker is in the off position.
- I. Seal chamber moisture sensors supplied with the pump shall initiate a pump seal chamber moisture alarm upon detection of moisture in the seal chamber. Moisture monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. A moisture alarm bypass switch shall be provided inside the control panel's inner door to allow disconnecting the moisture alarm from any alarm horn, exterior alarm light, and telemetry. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the moisture sensor circuitry when the circuit breaker is in the off position.
- J. Motor chamber moisture sensors (if supplied with the pump) shall initiate a motor chamber moisture alarm and stop the pump upon detection of moisture in the pump motor. Pump shall be locked out until manually reset. Moisture monitoring units shall be furnished by the pump supplier for installation in the lift station control panel. Provide an auxiliary contact on the associated pump circuit breaker (and slave relays as required) to disconnect the moisture sensor circuitry when the circuit breaker is in the off position.
- K. A Pump Fail alarm shall be initiated upon a starter fail or circuit breaker trip.

- L. Alarm Handling:
 - 1. The exterior alarm light shall flash until the alarm condition is acknowledged or cleared.
 - 2. The inner door alarm light(s) shall remain on continuously until the alarm condition is cleared. The alarm acknowledge pushbutton shall shut off the exterior alarm light.
 - 3. Alarm delays shall be adjustable and coordinated with the Owner and Engineer. All alarm delays shall be initially set to zero.
 - 4. The following alarm points shall activate the alarm dialer:
 - a. High-High Level Alarm (Float Triggered)
 - b. High Level Alarm (Float Triggered-station is in backup mode)
 - c. Low Level Alarm
 - d. Motor Seal Failure (Each Pump)
 - e. Overtemperature Alarm (Each Pump)
 - f. Motor Fail Alarm (Each Pump)
 - g. Motor Trouble Alarm (from seal fail/overtemp motor manager unit)
 - h. Low Temperature Alarm
 - i. UPS/Control Power Fail
 - j. Phase/Power Fail
 - k. Intrusion Alarm

- M. Power Failure:
 - 1. Control circuit backup power shall be provided by a UPS.
 - 2. A UPS fail alarm shall bypass the UPS and initiate an alarm.
 - 3. Upon restoration of power, time delays shall be provided between starting of lead and lag pumps.
 - 4. A relay shall be provided ahead of the UPS to indicate control power failure.

- N. Operator Interface Screens:
 - 1. Provide the following graphic displays at the lift station:
 - a. HOA switch in "Hand", "Off", or "Auto" position.
 - b. Real-time wet well level.
 - c. Alarm and Operating setpoints.
 - d. Binary Float Status: Yellow when normal, Red when in alarm.
 - e. Operating mode (Float or Analog Control)
 - f. Pump Data:
 - 1) Running
 - 2) Accumulated Runtime
 - 3) Accumulated Cycles
 - 4) Normal/Fail status
 - 5) Fail delay time
 - g. Alarm Screen
 - h. Flow

- O. Control Devices located on front of inner lift station control panel door:
 - 1. Hand-Off-Auto selector switch for each pump.
 - 2. Green Run pilot light for each pump.
 - 3. Red Fail pilot light (Overtemperature, OL trip) for each pump
 - 4. Amber Seal Fail pilot light for each pump.
 - 5. Fail Reset pushbutton for each pump.
 - 6. Red High Level Alarm pilot light.
 - 7. Operator Interface.
 - 8. Float control reset pushbutton.
 - 9. Flow Meter Transmitter

- P. Other Devices accessible with inner door closed:
 - 1. Main breaker operating handle
 - 2. Pump breaker operating handle (for each pump)
 - 3. Pump starter reset (for each pump)
 - 4. Breaker operating handles.
 - 5. Duplex receptacle.

PART 2 PRODUCTS

2.01 CONTROL PANEL FABRICATION (MAIN LIFT STATION EXCEPT WHERE INDICATED)

A. Enclosure

1. Enclosures for outdoor control panels shall be NEMA 4X Type 304 stainless steel. Hoffman, or equal.
 - a. Maximum 60 inches high, width as required. Double sided enclosure if required due to space requirements of devices specified. Detail on drawing is based on single sided enclosure.
 - b. Removable back panel.
 - c. Inner door mounting HOA selector switches, and other operator controlled devices.
 - d. 12 inch by 12 inch by 1 inch pocket inside exterior door for documentation storage.
 - e. Free standing, pad mounted with 18 inch vented skirts.
 - f. Exterior gasketed doors with continuous hinge and 3 point handle-operated latching system. Handle with provisions for padlocking.
 - g. Internal doors with continuous hinge and quarter turn latches, control devices mounted on inner doors.
 - h. Circuit breaker operating handles and overload relay reset pushbuttons accessible with interior doors closed.
 - i. Door stop kits to hold exterior doors in desired position, Hoffman ADSTOPK or approved equal.
2. All components labeled per shop drawings.
 - a. Engraved labels attached with screws.
3. All wiring terminated on barrier-type terminal strips. Terminal strips shall be labeled with engraved plastic labels.
 - a. Labels shall be attached with two-part epoxy adhesive.
 - b. 600 volt terminal strips.
 - c. Ring or spade type clamp connectors.
 - d. Wiring laced using plastic ties and plastic wiring troughs.
 - e. Wiring held down with straps attached to enclosure with screws.
 - f. Separate power, control and signal conductors.
 - g. Power wiring: #14 AWG, stranded, 600V copper minimum.
 - h. Control wiring: #18 AWG, stranded, 600V copper minimum.
 - i. Signal wiring: shielded, 300V copper minimum.
 - j. Provide 15 amp, 10,000 AIC breaker on power circuits using #14 wire.
 - k. Connections to instruments via terminal strip or connectors. Soldering wired to terminal strips in not acceptable.
 - l. High voltage and low voltage components shall be separated by a barrier.
4. Tag all wires at each end with wire number matching shop drawings.

B. Programmable Logic Controller (PLC): **(Provide at Main Lift Station and Cleveland Lift Station)**

1. Programmable logic controller capable of performing relay logic, timing, counting, sequencing, mathematical, proportional-integral-derivative (PID) control, and other functions as required by the functional descriptions in this section. Provide complete unit with rack, power supply, modules, cables, and connectors.
2. Auto start-up after power failure. Retain program and setpoints so that system starts automatically when power is restored.
3. Ethernet communications with Operator Interface.
4. Embedded I/O
 - a. 12 digital inputs.
 - b. 12 digital outputs.
 - c. 4 analog inputs.
 - d. 4 analog outputs.
5. Expandable with 1762 I/O modules.
6. LED indicator.
7. Programmable in ladder logic using IBM-compatible computer as described in the functional description in this Section. Provide programming software that is standard product of the PLC manufacture. Software shall allow on-line program editing without interrupting PLC operation.

Software shall have an advanced instruction set including timing, sequencing, relay logic, close-loop PID control, mathematical, trigonometric, Boolean, floating-point and integer calculations, and time and event-based interrupts.

8. Environmental
 - a. Operating temperature: 0 degrees to 50 degrees C.
 - b. Humidity: 0 to 95 percent (non-condensing).
 - c. Noise immunity: comply with NEMA ICS-2-230.
 9. Manufacturer:
 - a. Allen-Bradley "MicroLogix" Model 1400, including options specified, and manufacturer's programming software.
 - b. Solid-state type pump controllers such as those manufactured by QCI or equal may be furnished so long as the controls proposed meet all functional requirements specified and shown on Drawings.
 10. Operator Interface (Touch Screen):
 - a. 10.4 inch flat panel color display
 - b. 640X480 resolution, 18-bit graphics
 - c. Panelview Plus, Maple System, C-More.
- C. Service Entrance
1. 480/277V, 100A, 3PH, 4W service from Utility.
 - a. Equipment shall be rated for fault current 22kA RMS Symmetrical.
 - b. Coordinate with Xcel Energy for electric service.
 2. Provide a neutral bus for terminating the service neutral, the ground electrode conductor and the equipment grounding conductors.
 3. A grounding electrode system shall be provided at the control panel.
 4. Main breaker mechanically interlocked portable generator breaker, (key interlocks not acceptable):
 - a. 100A, 3-pole utility breaker (UL Listed for service entrance)
 - b. 100A, 3-pole portable generator breaker.
 - c. Both breakers shall be molded case, thermal-magnetic with 22,000A interrupting capacity.
 - d. Interlock shall permit only one (1) breaker to be closed at any time and shall permit both breakers to be locked open with a single padlock.
 - e. Standby generator receptacle shall be 100A, reversed contacts, tool crimped connections, heavy duty, circuit breaking, weatherproof with 45 degree angle adapter, mounting box and spring door. Match with Owner's existing portable generator, Crouse-Hinds or equal.
 5. Surge Protector:
 - a. Provide protection from high frequency noise, electrical transients and high energy disturbances.
 - b. Maximum surge current: 120kA.
 - c. Working Voltage: 480/277V, 3 Phase, 4 Wire.
 - d. UL1449 VPR 3rd Edition: 1000V
 - e. LED Status Indication.
 - f. Cooper Industries MTL ZD16304 or equal.
 6. Power Factor Correction Capacitors
 - a. Construction:
 - 1) Industrial units for installation on a 480 volt, 3 phase, 60 Hz system.
 - 2) NEMA 12/3 enclosure.
 - 3) Current limiting fuses.
 - 4) Blown fuse indicating lamps.
 - 5) Internal discharge resistor.
 - 6) Non-PCB materials.
 - 7) External grounding terminal.
 - 8) UL approval (UL-810).
 - 9) General Electric Type GEM, Commonwealth - Sprague Unipak, Westinghouse DRI-VAR, or equal.
 - b. Sizing:
 - 1) Sized to correct motor full load power factor to 93 percent or higher.
 - 2) Shall not exceed the maximum KVAR rating on the motor nameplate.

- D. Phase Failure Relay
 - 1. Provide relay voltage sensing for under voltage, phase reversal, phase unbalance and phase loss. Prevent pump motor operation under any abnormal condition.
 - 2. Motor shall restart upon restoration of proper voltage and phase. Normal motor starting voltage dip shall not cause phase failure relay to trip motor.
 - 3. Phase failure relay shall be Symcom Motor Saver, or equal.

- E. Circuit Breakers: **(Provide at Main Lift Station and Cleveland Lift Station)**
 - 1. Circuit breakers will be UL labeled and shall be of the size shown. Provide breakers with an interrupting rating of not less than 10,000 amperes, symmetrical.
 - 2. Circuit breakers that are downstream of a control panel step-down transformer may have 10,000 amperes interrupting rating.
 - 3. Provide circuit breakers as shown on the Drawings.

- F. Control Panel Transformers:
 - 1. Provide control panel transformers inside control panel for all require voltages other than service to panel.
 - 2. Size control panel transformer to handle the 120VAC control power, plus power to the SCADA RTU, and general receptacle.
 - 3. Minimum size to be 3kVA
 - 4. Provide two (2) primary fuses and fuse holders.

- G. Pump Protection Relays: Provided by pump manufacturer for installation in the pump control panel.

- H. Motor Starters.
 - 1. NEMA rated Size 1 minimum. Provide larger size if required.
 - 2. Full voltage, non-reversing, circuit breaker type combination starters.
 - 3. Electronic overload relays with class 20 and phase loss protection.
 - 4. Individual motor breaker.
 - 5. Auxiliary contacts as required for the specified control functions.

- I. Elapsed Time Meters
 - 1. Operating voltage: 90-264VAC, 60Hz.
 - 2. 6 Digit, non-resettable.
 - 3. UL Recognized.
 - 4. Redington Model 722 or equal.

- J. Control switches
 - 1. Selector, momentary pushbutton, or maintained selector as required. Positions as required for application.
 - 2. Heavy duty, oil-tight, contacts as required.
 - 3. Contact rating shall conform to NEMA A-600.
 - 4. Allen Bradly 800T or equivalent.

- K. Control relays and timing relays
 - 1. Plug-in type with dust cover, socket and locking spring when relay mounted horizontally.
 - 2. Coil: continuous operation at 120 VAC \pm 10 percent unless shown otherwise.
 - 3. Contacts, 3 pole, double throw, minimum.
 - a. 10 amps, make-break, 120 VAC, resistive.
 - b. Insulation resistance: 1000 megaohms at 500 VDC.
 - c. Dielectric: 2000 VAC, 60 Hz.
 - 4. Operating time
 - a. 35 milliseconds (nominal) energization.
 - b. 100 milliseconds (nominal) de-energization.
 - 5. Mechanical life: 10⁶ operations.
 - 6. Timing relays shall be of the same manufacturer and series as control relays. Provide electronic timers with range as indicated.

- L. Indicating lights
 - 1. Sunlight visible, 30.5mm, high visibility LED.
 - 2. A "Push-to-Test" pushbutton shall be mounted on the inner door to illuminate all pilot lights when pushed.
 - 3. Heavy-duty, oil-tight.
 - 4. NEMA 4 rating.
 - 5. Allen Bradley 800T, or equal.
 - 6. Colors.
 - a. Running: Green.
 - b. Power on: White.
 - c. Alarm: Red.
 - d. Alert: Amber

- M. External Alarm Light
 - 1. Provide NEMA 4X, industrial units.
 - 2. Provide UL labeled alarm beacons suitable for top mounting on panel.
 - 3. Red flashing LED cluster lamps.
 - 4. Edwards 105 series or approved equal.
 - 5. Provide an illuminated toggle switch to allow the external alarm light to be disabled.

- N. Power Supply (UPS)
 - 1. True on-line with spike, line noise and RFI/EMI filtering.
 - 2. UL Listed.
 - 3. Cord and plug connected. Provide a receptacle in the control panel for connection of the UPS.
 - 4. Battery sized to power 115 percent of panel control power requirements for 10 minutes.
 - 5. Surge protection ANSI/IEEE C62.41
 - 6. Fail alarm circuit internal to UPS which bypasses the UPS and initiates an alarm upon activation.

- O. Control Circuit surge protection
 - 1. 120 VAC, 20 Amp rated in-line device. Listed for protection from ANSI/IEEE CG62.41 Category A and B Transients.
 - 2. 300 V peak Clamping voltage.
 - 3. ASCO model 252 or approved equal.

- P. Terminals
 - 1. NEMA style, barrier type, 0.4-inch spacing, nominal.
 - 2. 600V RMS, 55 amp rating.
 - 3. UL listed.
 - 4. Allen-Bradley 1492-CA1 series, or equal.
 - 5. Terminals for larger power circuits shall be 600 VAC barrier-type, sized for the conductors.

- Q. Enclosure Heaters:
 - 1. Heaters will have a metal housing, integral thermostat, and 0 to 100 degrees F adjustable range. Heaters shall be capable of heating the interior to 50 degrees F with an outside air temperature of -30 degrees F.
 - 2. Provide Hoffman Engineering "Design-Aire" type or equal.
 - 3. Provide a low temperature thermostat for low alarm notification.

- R. Receptacle: Provide UL-listed ground fault interrupter type, 20 A specification grade receptacles:
 - 1. One (1) mounted on inner door of panel.

- S. Door switches for monitoring the position of the exterior doors. **(Provide at Main Lift Station and Cleveland Lift Station)**

- T. Intrinsically-Safe Barrier
 - 1. UL labeled unit suitable for using non-rated devices in NEC Class 1, Division 1 explosive area.
 - 2. Terminal strip connections.

- U. LED Lighting package for panel interior with manual switch and lamp guard. Lighting shall be provided behind each door on both sides of the control panel, (high and low voltage sections).
- V. Enclosure security (verify operation with Owner) (**Provide at Main Lift Station and Cleveland Lift Station**)
 1. Provide a pushbutton on inner door with no label.
 2. Provide an amber pilot light on inner door with no label.
 3. Provide a door position monitor contact.
 4. When door is opened, provide a 20-second countdown timer for security alarm. If pushbutton is pressed within the timed countdown, de-energize the alarm and energize the amber pilot which will indicate that the alarm is disabled.
 5. When the alarm is disabled, and the pushbutton is pressed, start a 30-second countdown timer to allow operator to close the door, deactivate the amber pilot light, and arm the security system after the countdown timer expires.
 6. Provide security alarm to the Dialer

2.02 CELLULAR ALARM MONITOR

- A. Salvage and reinstall existing OmniSite XR50 in both pump control panels for the Main Lift Station and Cleveland Lift Station.

2.03 SUBMERSIBLE LEVEL TRANSDUCER

- A. Type 316 Stainless Steel Body
- B. 2-inch minimum diameter Teflon faced pressure-transmitting diaphragm.
- C. Solid state type internal transducer.
- D. Sealed cable entry.
- E. Stainless steel connecting hardware, clamps, cables, etc.
- F. Pressure range as required.
- G. Waterproof shielded cable.
- H. Sufficient length of cable to reach from the bottom of the wet well to the control panel.
- I. UL Approved as Intrinsically Safe for use in hazardous environments.
- J. Dwyer PBLTX, Sigma Series 6100, Siemens A1000i or approved equal.

2.04 FLOOR FLOOD SWITCH (METERING MANHOLE ALTERNATE 5 ONLY)

- A. Floor "Flood" Monitoring:
 1. Float switch with Buna-N float and 316 stainless steel stem; 1 1/2 inch.
 2. Wall-mounted bracket.
 3. Single-pole, single-throw, magnetically-actuated switch.
 4. Manufacture/Model for classified areas shall be stainless steel, explosion proof and rated for Class 1, Division 2 areas, or rated for Intrinsically Safe applications.

2.05 FLOAT LEVEL SWITCHES

- A. Provide level float switches integrally sealed suitable for Class 1, Division 1, Group D environments.
- B. Provide Switch Assemblies:
 1. Constructed of molded polyethylene, Teflon coated stainless, or equal.

2. One normally open switch to close as wet well level rises and reverse as level falls. SPST contact rated minimum 4 amps at 120Vac.
 3. Cable insulation suitable for continuous submergence in water or hydrocarbons. Wire minimum 14 AWG stranded copper. Cable length to suit the installation; see Drawings.
- C. Installation:
1. Mount float switches as shown on Drawings.
 2. Wire the switch to the control panel using the manufacturer supplied flexible cable. There shall be no splices or junctions between the switches and the control panel.
- D. Install in a manner that permits easy removal of the switches for maintenance or cleaning and without the need to empty the tank, wet well, or sump.
- E. Provide US Filter, Flygt, Anchor Scientific, or equal.

2.06 FLOAT LEVEL SWITCH MOUNTING CABLE

- A. 316 stainless steel mounting cable for hanging in lift station wet well for mounting of floats.
- B. 5 pound cast iron weight to provide tension to cable.

2.07 MAGNETIC FLOWMETER (METERING MANHOLE ALTERNATE 5 ONLY)

- A. Electro-magnetic induction type producing pulse DC signal proportional to flow.
- B. Stainless steel metering tube, polyurethane or ebonite liner.
- C. Field replaceable metering tube, 150 pound ASA flanges.
- D. 316 stainless steel conical raised electrodes.
- E. Flow tube shall be suitable for accidental submergence. Flow tube shall be rated for explosionproof area classification where indicated on drawings.
- F. Minimum operating temperature: 0-60 degrees C; relative humidity 20 percent to 100 percent condensing.
- G. Stainless steel ground rings shall be furnished with meter when used on non-metallic piping systems.
- H. All magnetic flowmeters on project shall be compatible and by same manufacture.
- I. Magnetic Flow Meter Transmitter
 1. Magnetic flow-to-current converter shall be micro-processor based, solid state type using a pulsed DC signal to determine flow.
 2. Output shall be 4-20mA dc linear with flow into load of 0 to 1000 ohms, minimum, isolated signal. Where indicated on Drawings, provide open-collector output to indicated when "reverse flow" condition is occurring.
 3. Operating source shall be 120 volts, 60 Hz, ± 3 Hz.
 4. Pulsed DC type shall include inherent zero.
 5. Minimum of three (3) independent totalizers for Daily, Monthly and Annual flow totals.
 6. Minimum technical requirements:
 - a. Accuracy: ± 1.0 percent of calibrated span.
 - b. Repeatability: ± 0.25 percent of calibrated span.
 - c. Supply effect: ± 0.25 percent of calibrated span of ± 10 percent power supply vibration.
 - d. Temperature: ± 50 percent of calibrated span over rated range.
 7. NEMA 4X construction. Provide interconnection cables between flow tube and converter. Where indicated on Drawings, transmitter shall be rated for explosionproof area classification.
 8. Converter shall have an integral LCD display and pushbuttons to allow field selection of display range and units. Program unit to display flow in engineering units specified for each loop.

9. Manufacturer:
 - a. Rosemount (Emerson)
 - b. Endress & Hauser
 - c. Siemens.
 - d. Or approved equal.

2.08 SPARE PARTS

- A. Contractor shall furnish the following spare parts to the Owner. Spares shall be delivered in boxes labeled on the outside with manufacturer and part number identified on the box:
 1. One (1) spare relay for each type of relay used.
 2. Two (2) fuses of each type used.
 3. One (1) spare power supply of each type used,
 4. One (1) spare submersible level transducer.
 5. One (1) spare float switch.
- B. Provide the following special tools:
 1. Mounting ring wrench(s) for pushbuttons, switches, and lights.
 2. Fuse puller.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. All work shall be performed in a neat and workmanlike manner consistent with the high-quality standards of the electrical trade. "A neat and workmanlike manner" shall be as required by NFPA 70, Section 110.12; and shall conform to NECA 1, Standard Practices for Good Workmanship in Electrical Contracting. Each electrician shall be knowledgeable and well-trained in the particular tasks to be performed.

3.02 LABELING

- A. Label all field mounted control devices, instrumentation, switches, etc., with tag number and item description.
- B. Labels shall be engraved laminated plastic with 1/4 inch high lettering. Labels shall be attached with stainless steel screws to the device or nearby wall.

3.03 CALIBRATION, ADJUSTING AND TESTING

- A. Devices requiring field calibration shall be calibrated in the presence of the Engineer's representative and documented.

3.04 PROJECT MANAGEMENT

- A. Supplier shall provide engineering and administrative services necessary to fulfill the requirements of this specification.
- B. Supplier shall provide the services of an experienced project manager as the overall coordinator during the course of the project.

3.05 TESTING, START-UP, AND TRAINING

- A. Complete panel fabrication and wiring at the control panel supplier's facility to the extent that only field wiring will be needed on Site after the panel has been installed.

- B. Test the panel before shipping. Simulate inputs as needed to test both the automatic controls and the backup control circuitry. Be prepared to demonstrate controls operation on site during start-up of the lift station.
- C. Supplier shall provide a skilled programmer/instrumentation engineer or technician who shall complete troubleshooting and start-up to place the entire system into satisfactory operation. The engineer or technician shall make the necessary inspection of the completed installation, make the necessary final field adjustments, and make program revisions as required for start-up.
- D. Verify motor rotation and proper phase connection prior to operating pump motors.
- E. Conduct a 4-hour demonstration of all system features and functions to Owner and Engineer.
- F. During start-up, make necessary adjustments, including minor wiring or PLC program changes if needed, to obtain proper operation of the lift station controls.
- G. Instruct the Owner's personnel in the proper operation and maintenance of the lift station controls.
- H. Record changes to the controls. Revise wiring diagrams and schematic diagrams to show final installation.
- I. Insert revised diagrams, final program printouts, and final operator interface screen printouts into each operation and maintenance manual in place of original diagrams.
- J. Contractor shall coordinate with the Owner for connection and operation of the Lift Station using a portable generator connection.
 - 1. Verify proper phasing of the generator receptacle.
 - 2. Verify operation of the pumps while connected to the generator.

3.06 ACCEPTANCE TESTING

- A. After the installation is complete, and proper operation has been demonstrated, a 60-day acceptance test shall begin. The entire system shall be required to operate for 60 days with no malfunctions, field repairable malfunctions excepted. Any malfunction during the 60-day test which cannot be corrected within 24 hours by the supplier shall be considered a non-field repairable malfunction and after repairs are complete, the test shall be repeated.
- B. The acceptance test shall apply to all equipment furnished under this Section.

3.07 SUPPLIES

- A. Contractor shall provide all expandable items for equipment installed under this contract. For system startup, checkout, and during the acceptance test.

END OF SECTION

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SECTION 43 22 51

PROPELLER-TYPE PROCESS FLOW METER

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pump Discharge Lines:
 - a. Meter.
 - b. Indicator.
 - c. Totalizer.
- B. Related Sections:
 - 1. Division 26
 - 2. Division 40

1.02 REFERENCES

- A. AWWA:
 - 1. C704 - Propeller-Type Meters for Waterworks Applications

1.03 DESCRIPTION

- A. Propeller meter with supplementary flow indicator-totalizer-transmitter.
 - 1. Flanged tube meter.
 - 2. Accuracy within 2 percent of actual flow within stated flow range.
 - 3. Size: 6-inch.
 - 4. Mounting: Horizontal.
 - 5. Register: Hermetically sealed.

1.04 SUBMITTALS

- A. Product Data
- B. Manufacturer's Instructions for Installation.
- C. Affidavit of Compliance with AWWA C704.
- D. Certificate of Testing for Accuracy and Capacity.

1.05 PROJECT CONDITIONS

- A. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.

1.06 WARRANTY

- A. Provide 5-year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sensus Technologies: Model OMNI+ Turbo (T²).

- B. "Or equal" models submitted and approved in accordance with Article 11 of the Instructions to Bidders and General Condition 6.05.A.1.

2.02 ACCESSORIES

- A. Indicator-Totalizer-Transmitter Assembly:
 - 1. Indicator:
 - a. 4-inch diameter, 250 degree sweep dial.
 - b. Center sweep test hand.
 - c. Units: Gallons per Minute.
 - 2. Totalizer:
 - a. 6-digit, straight reading.
 - b. Units: Gallons.
 - 3. Transmitter:
 - a. Provide from same manufacturer as meter.
 - b. Current Signal: 4-20 mA.
 - c. 2-wire scaled pulse rate output.
 - d. Pulse Rate: Fully programmable.

- B. End Connections: Flanged.
 - 1. Furnish companion flanges, gaskets, bolts, and nuts with flanged meter.

2.03 COMPONENTS

- A. Flow Tube:
 - 1. Fabricated steel.
 - 2. Straightening vanes.
 - 3. Fusion epoxy coated interior and exterior.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount meter horizontally in the location shown on the Drawings.
- B. Install equipment in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service:
 - 1. Inspect and approve final installation.
 - 2. Perform all necessary calibration and adjustments in accordance with the manufacturer's instructions.

END OF SECTION

SECTION 43 24 10.10

SUBMERSIBLE PUMP ACCESSORIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Provide accessories for reinstallation of salvaged Cleveland Lift Station submersible pumps.
 - 2. This specification only applies to the two (2) existing Cleveland Lift Station pumps and does not reference pumps from any other lift station.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A48 - Specification for Grey Cast Iron Castings.
 - 2. ASTM A108-81 - Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.
 - 3. ASTM A532-82 - Specification for Abrasion-Resistant Cast Irons.
 - 4. ASTM A582-80 - Specifications for Free-Machining Stainless and Heat Resisting Steel Bars, Hot-Rolled or Cold-Finished.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Provide accessories for use with the existing KSB submersible pumps.
 - 2. Refer to Appendix A of the Specifications referencing information on the existing KSB submersible pumps.

1.04 SUBMITTALS

- A. Vendor and manufacturer information:
 - 1. Name, address, toll-free phone number and email address of manufacturers.
 - 2. Name, address, and phone number of local service representative.
- B. Shop Drawings:
 - 1. Shop drawings in accordance with Section 01 33 00.
 - 2. Size, Model Number and Serial Number of each component.
 - 3. Detailed care and storage instructions.
 - 4. Detailed specifications, dimensions, and drawings for equipment.
 - a. Detailed specifications, dimensions, and weights for total assembly.
 - b. Specifications and complete bill of materials showing materials of construction, part numbers, etc.
 - 5. Typical installation guides.
- C. Operation and Maintenance Manuals
 - 1. Operation and maintenance data in accordance with Section 01 78 23.
 - 2. Parts list and list of recommended spare parts.
 - 3. Printed warranty shall be provided within 10 days of commencement of the warranty period.

1.05 RELATED SECTIONS:

- A. Refer to the following specification sections for additional requirements:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 51 00 - Temporary Utilities
 - 3. Section 01 60 00 - Product Requirements
 - 4. Section 01 75 00 - Starting and Adjusting

5. Section 01 78 23 - Operation and Maintenance Data
6. Section 01 78 37 - Product Warranties
7. Section 09 91 50 - Shop Painting

1.06 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage, and handling in accordance with Section 01 60 00.
- B. Inspection:
 1. Inspect all pipe and products as it is received to determine damage and/or missing parts.
 2. Notify Engineer of any missing, damaged, or defective products.
 3. Remove all products found to be defective by the Engineer from the site.
 4. Repair or replace damaged items in accordance with the manufacturer's instructions.
- C. Scheduling
 1. Schedule all process work in phases to accommodate the Owner's occupancy and treatment requirements.
 2. Refer to Specification Section 01 51 00 in advance of any service interruption, disruption to construction activities, or to the existing process system operation. Do not proceed until the Owner has granted approval.
- D. Provide storage and handling requirements for materials as recommended by equipment manufacturer and supplier in accordance with Section 01 78 23.

1.07 WARRANTY

- A. Refer to Section 01 78 37.
- B. Cost for any evaluation or inspections, removal, shipment, repair and installation by Contractor shall be included in warranty, as well as correction of defective work.
- C. Any part found to be defective is, upon request, to be returned to the manufacturer's factory, freight prepaid and in new condition.

1.08 MEASUREMENT AND PAYMENT

- A. The work performed in accordance with this item is considered incidental to the work in the Cleveland Lift Station lump sum bid item. No separate consideration or payment will be made for work hereunder.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. All equipment called for in this section shall be supplied by a single manufacturer or authorized sales representative to assure uniform quality, ease of maintenance, and minimal parts storage.

2.02 GENERAL

- A. These specifications shall be considered as minimum requirements. The Contractor or Equipment Supplier shall add such additional features as are necessary for satisfactory operation and functioning of equipment.

2.03 PRODUCTS

- A. Accessories
 1. Pump Guide Bars and Brackets:
 - a. Guide rail and lift out system provided for each pump.

- b. Guide bars, supports and fasteners:
 - 1) 316 stainless steel.
 - 2) Two (2) Schedule 40 pipe guide bars per pump with supports at bottom, top and midpoint.
 - 3) Attach intermediate support brackets to discharge piping at minimum 10-foot intervals.
 - c. Diameter: As recommended by pump manufacturer.
 - d. Length: As required to extend from lower guide holder or discharge connection to upper guide holder mounted on the access frame.
2. Pump Guide Claw
 - a. Guide claw provided for each pump to properly remove pump along guide bars.
 - b. Provide guide claw as 316 stainless steel.
 3. 50-foot pump power cable
 - a. Provide and install a 50-foot power cable for each pump to replace the existing 30-foot power cables.
 - b. Each pump shall be operated to verify that the installation of the new cables has been installed correctly. Manufacturers authorized representative shall perform startup procedures to verify pump operates as normal.
 4. Cable Holder:
 - a. Cable holder: fabricate from 316 stainless steel and attach below pump access cover.
 - b. Each pump power cable shall be supported on a separate minimum thickness 3/8-inch Type 316 stainless steel hook located within 6-inches of guide rail bracket for each pump. Hook shall have 1-1/2" bend. Each pump power cable shall be run as not to restrict removal of pumps. Furnish minimum 5 hooks per holder.
 - c. Cable holder may be used to support instrumentation. Each instrumentation cable shall be run as not to restrict removal of pumps.
 - d. Install with 5'-0" slack cable loops. Coordinate pump cable length with pump manufacturer.
 5. Discharge Connections:
 - a. Provide discharge connection for each pump. Discharge connections shall be designed for the model and discharge connection of each pump. Reference Appendix A for details on the existing pumps.
 - b. Grey cast iron, ASTM A-48, Class 30.
 - c. 90 degree elbow with base-mounting shoe for bolting to concrete floor of wet well as recommended by the manufacturer.
 - d. Provide guide bar support brackets and pump slide-on connection at one end.
 - e. Pipe-flange connection faced and drilled in accordance with ANSI B16.1, Class 125 flanges.
 6. Equipment Identification Tags
 - a. Permanently attach identification tags to the hatch cover above each pump.
 - b. Tags shall display "Pump 1" and "Pump 2" to properly identify each pump.
 - c. Tags: Engraved or stamped stainless steel permanently mounted to hatch covers in a high-visibility location.
 - 1) Lettering: 1/2-inch high.

2.04 ANCHOR BOLTS AND HARDWARE

- A. Contractor shall provide anchor bolts, hex nuts, and all other fastener hardware and shall be 316 stainless steel.
 1. Type 316 stainless steel bolts shall conform to:
 - a. ASTM F593.
 2. Type 316 Stainless steel nuts shall conform to:
 - a. ASTM F594.
- B. Locate all anchors and fasteners with templates furnished by equipment manufacturer as applicable.

2.05 SPARE PARTS AND SPECIAL TOOLS

- A. Not Used

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with Manufacturer's recommendations and as shown on Drawings.
- B. All installation of equipment shall be performed by the Contractor. All required installation hardware (such as, but not limited to, support braces, bolts, washers, nuts, and jam nuts) shall be furnished by the Contractor.
- C. Manufacturer's authorized representative shall supervise critical installation procedures as necessary, inspect final installation, perform any necessary calibration and adjustment, and start up the equipment. A copy of the startup report shall be included in the O&M manual.
- D. Install all anchors in accordance with certified prints supplied by equipment manufacturer.
- E. Installation shall include furnishing manufacturer recommended grade(s) of required oil and grease for initial operation.

3.02 FIELD SERVICE AND START UP

- A. Field test each piece of equipment in the presence of the Engineer.
 - 1. Utilize slide rails and lifting system to remove and reinstall salvaged submersible pumps.
 - 2. Verify pumps do not bind throughout the length of the guide system and freely traverse from seated at the wetwell invert through removal.
 - 3. Verify pump seats fully into discharge connection.
- B. Coordinate startup with installation of related equipment.
- C. Refer to Section 01 75 00 for additional requirements.

END OF SECTION

SECTION 44 44 18

TEMPORARY LIQUID FEED CHLORINATION EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. The furnishing and installation of a temporary chemical feed system for injecting liquid chlorine into the raw water line at Well #1. Contractor shall rent a temporary feed system meeting these specifications. The diffuser shall be a permanent install.
- B. Work Included:
 - 1. This section includes all labor, materials, tools, equipment, and related services necessary to install the liquid chlorine feed system as specified herein, and as shown on the Drawings.
 - 2. All necessary accessory equipment, whether or not identified in these Specifications or shown on the Drawings, shall be furnished and installed as required for a complete and operational system.
- C. Related Sections:
 - 1. Division 40.

1.02 REFERENCES

- A. State of Minnesota Department of Health regulations on public water supplies, Chapter 4720.
- B. Recommended Standards for Water Works "Ten State Standards", 2018 Edition.
- C. American Water Works Association (AWWA).

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Shop Drawings: Indicate system schematics, equipment locations, details, and control schematics.
- C. Product Data: Submit manufacturer's Product Data indicating methods, chemicals and equipment, and operating and maintenance data.
- D. Operation and Maintenance Manuals: Furnish prior to start-up, operation and maintenance manuals in accordance with Section 01 78 23.
- E. Installation inspection and start-up report in accordance with Section 01 75 00.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Materials and equipment provided in this Section shall comply with the recommended practices and standards for the Chlorine Institute, Inc and NSF International.

PART 2 PRODUCTS

2.01 GENERAL

- A. The chemical feed equipment shall be provided by one supplier and shall use common components to the greatest extent possible to simplify spare parts inventory and service.

2.02 CHEMICAL TANK

- A. Quantity: 1.
- B. Capacity: 50 gallons.
- C. Tank shall be rotationally molded, high density cross-linked polyethylene, and flat bottomed.
- D. Provide a secondary containment basin, of high density cross-linked polyethylene material, sized to contain more than 50 gallons of chemical plus volume of tank within secondary containment.
- E. Openings:
 - 1. Access opening with threaded cap.
 - 2. Bulkhead fitting for metering pump suction at top of tank.
 - 3. Bulkhead fitting for venting the tank.
 - 4. Bulkhead for metering pump pressure relief return.
 - 5. Verify and ensure that all openings are compatible with chemical feed equipment.

2.03 FEED PUMPS

- A. Type: Variable speed peristaltic metering pump.
- B. Quantity: One (1).
- C. Products: Blue-White: FlexFlo M1 or equal.
- D. Description:
 - 1. Control: See Section 40 90 00.
 - 2. Maximum Working Pressure: 100 psig.
 - 3. Capacity: 0.0001 - 0.44 gallons per hour.
 - 4. 120 VAC, single phase, 60 Hz.
 - 5. UL listed.
 - 6. Standard electrical plug, 6-foot cord.
 - 7. 10,000:1 turndown ratio.
 - 8. NEMA 4x (IP66) wash-down, chemically resistant enclosure.
 - 9. Self-priming.
 - 10. Safety: Tube failure detection.

2.04 DIFFUSER

- A. **Diffuser shall be a permanent installation.**
- B. Quantity: One (1).
- C. 3/4-inch PVC NPT ball valve main connection complete with diffuser.
- D. Adjustable PVC injection quill to inject chemical at 1/3 to 1/2 of process pipe diameter, into the process stream.
- E. Corporation stop.
- F. Check valve.
- G. Adapter for polyethylene tubing.

2.05 TUBING AND PIPING

- A. Clear polyethylene tubing shall be used between the metering pump and the injection point. Verify and ensure that tubing is compatible with chemical feed equipment.

2.06 ACCESSORIES

- A. Ball foot valve with EPDM seals for the solution suction line. Properly sized to permit specified flow.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Provide installation supervision by the manufacturer's representative.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's authorized representative shall check and certify that installation is leak free.

3.03 OPERATOR TRAINING

- A. Provide a minimum of 2 hours of operator training at Owner's convenience after equipment is operational.
- B. Ensure plant personnel are sufficiently trained and thoroughly acquainted with operations and maintenance materials to operate all components of the system.

END OF SECTION

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Appendix A

Cleveland Lift Station Existing Pumps

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Project
 Customer pos.no
 Project ID
 Pos.no
 Created by



Page 1 / 5
 Created 2023-12-14
 Update 2023-12-14

Data sheet

Pump type KRT F 100-254/224XEG-DV IE3

Operating data

Flow	364	US g.p.m.	Fluid		
Head	49.2	ft	Density of fluid	62.3	lb/ft ³
Operating speed	1,784	rpm	Viscosity	1.08E-5	ft ² /s
Shaft power	9.53	hp	Temperature	68	°F
Efficiency	47.4	%	Hydraulic acceptance acc.	ANSI HI § 4.4.2	
Required pump NPSH	16	ft			
Head H(Q=0)	66	ft			
Application range	Head		Flow		
	From	65.8 ft	4.86 US g.p.m.		
	To	22.8 ft	755 US g.p.m.		

Design

Make	KSB	Impeller type	Vortex impeller		
Design	Submersible pump		Open		
Series	KRT F -D	Impeller size	(215)	8 7/16	inch
Frame size	100-254		Max. (265)	10 7/16	inch
Stages	1		Min. (166)	6 9/16	inch
Curve number	K43409s/0	Free passage	3 15/16 inch		
		Weight	482.8 lb		
Type of bearings	Antifriction				
Nos. of bearings	1 / 1				
Lubrication	Grease lubrication. lubricated for lifetime				
Suction port	Pressure rating		CLASS 125		
	Flange size	DN0	4 inch		
	Flange size	DN1	4 inch		
	Norm		ASME/ANSI B16.1		
Discharge port	Pressure rating		CLASS 125		
	Flange size	DN2	4 inch		
	Flange size	DN3	---		
	Norm		ASME/ANSI B16.1		
Suction port: suction elbow (DN0)			Discharge port: pump (DN2)		

Materials

Pump casing	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Discharge cover	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Impeller	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Shaft	Stainless steel EN-1.4021+QT800 (A 276 Type 420)
Bearing bracket	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Motor casing	Grey cast iron EN-GJL-250 (A 48 Class 35B)
Bolts. nuts	Stainless steel A4 (EN-1.4571) (A 276 Type 316)
Cooling jacket	---
Shaft protection sleeve	---
Casing wear ring	
Impeller wear ring	
O-Rings	Nitrile rubber (NBR)

Project
Customer pos.no
Project ID
Pos.no
Created by



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2023-12-14

Data sheet

Pump type

KRT F 100-254/224XEG-DV IE3

Shaft seal

Type of seal
Arrangement:
Seal on medium side
Mechanical seal. pump-side
Mechanical seal. bearing-side

Double mechanical seal
Tandem
with elastomer bellows
Silicon carbide / Silicon carbide
Carbon / Silicon carbide

Monitoring

Thermal winding protection
Explosion proof protection
Motor housing monitoring
Mechanical seal leakage detection
Bearing temperature monitoring

SensThermNo
By PTC (Explosion proof models only)
By conductive moisture sensor electrode

Coating

Preparatory treatment
Blasting method
Primer
Dry film thickness primer
Top coat
Solids content
Dry film thickness top coat
Color

SSPC near white SP 10
Steel grit blasting
Zinc phosphate or Zinc dust
> 1 1/2 mils (35 microns)
2-component epoxy resin
> 82 %
> 6 mils (150 microns)
Ultramarine Blue (RAL 5002 to DIN 6174)

Installation

INSTALLATION

Type of installation:
Vertical dry pit installation,
flange-mounted motor
integrally coupled.
pump and motor suitable for submerged operation

Submersible pump in

Discharge size:
Flange dimensions to:
Installation accessories:
fasteners

4 inch
ASME/ANSI B16.1, CLASS 125
Foundation rails,

SUCTION ELBOW WITH STAND

Flanges (DN0/DN1):
Flange dimensions to:
Minimum diameter of clean-out port:
Material:

4 inch / 4 inch
ASME/ANSI B16.1, CLASS 125
4 3/4
Grey cast iron EN-GJL-250 (A 48 Class 35B)

Project
 Customer pos.no
 Project ID
 Pos.no
 Created by



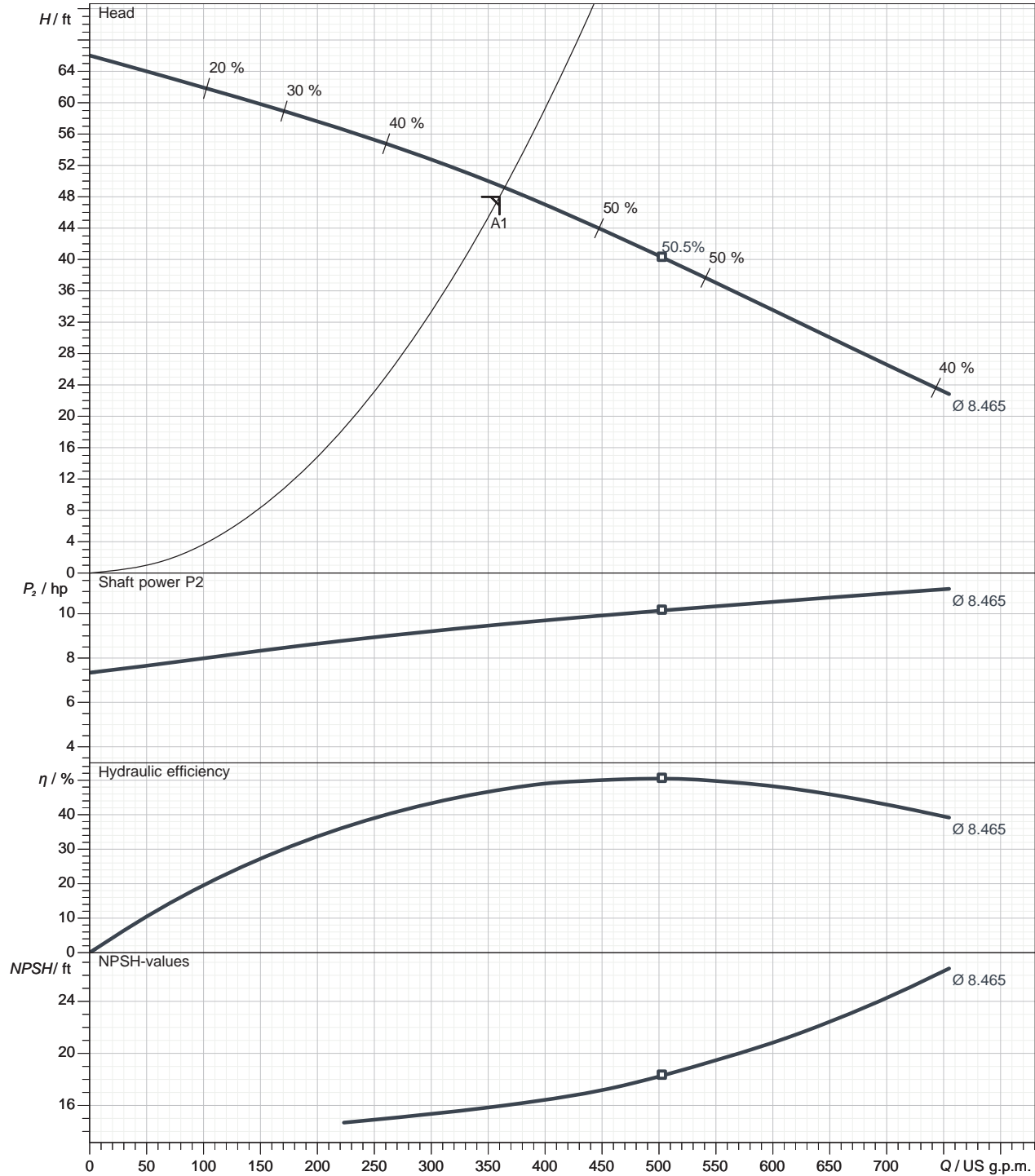
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Created 2023-12-14
 Update 2023-12-14

Performance curve

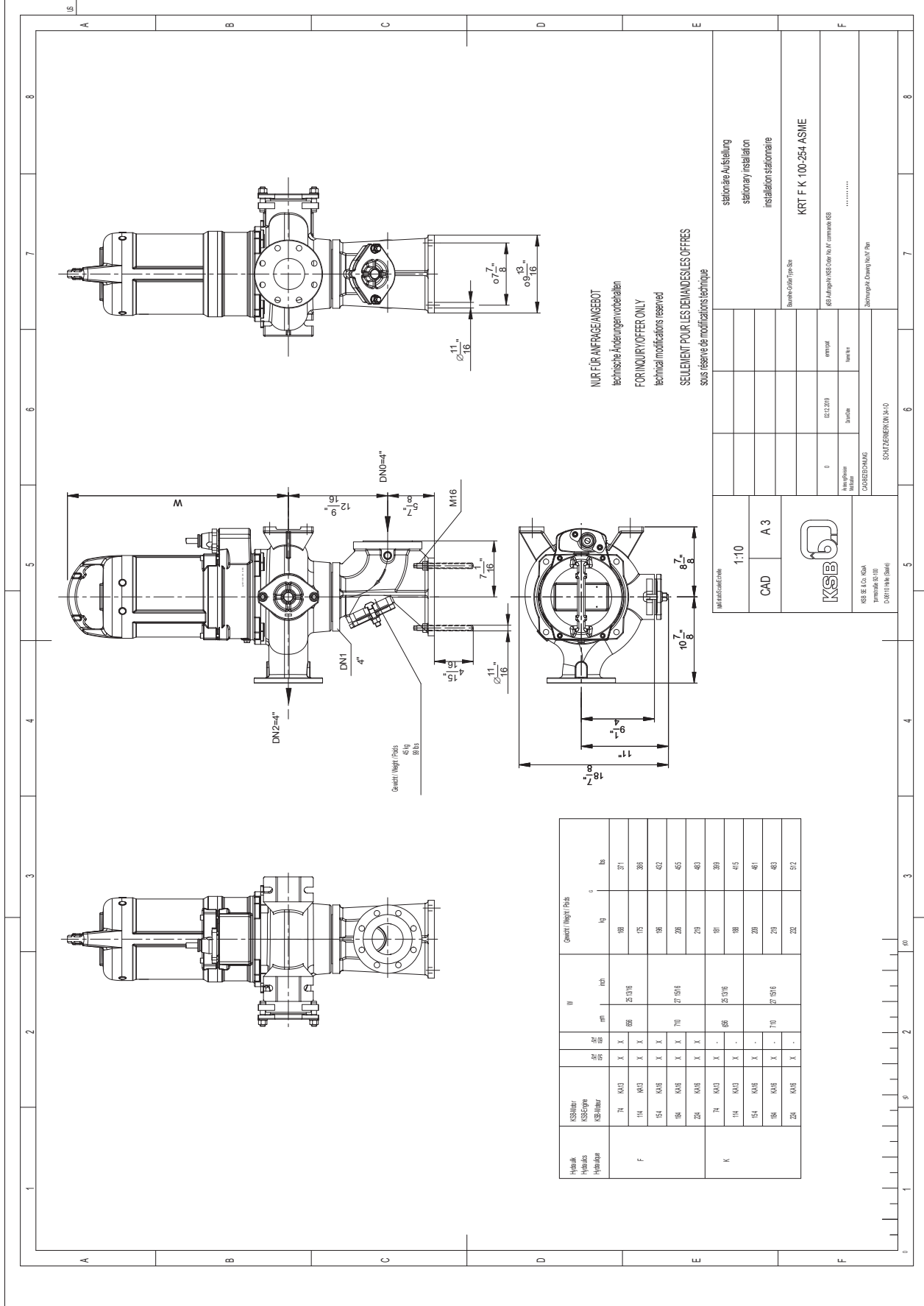
Pump type

KRT F 100-254/224XEG-DV IE3



Impeller type	Vortex impeller	,Open	Curve number	K43409s/0
Free passage	3 15/16inch	Density of fluid	Frequency	60 Hz
Impeller size	8 7/16inch	Viscosity	Speed	1,784 1/min
				ANSI HI § 4.4.2

2021/06/02 (Build 21/3), 32 bit R16.10.03 - 12-10-2021 ALLIANCE/SA



NUR FÜR ANFRAGE/ANGEBOT
 technische Änderungen vorbehalten
 FOR INQUIRY/OFFER ONLY
 technical modifications reserved
 SEULEMENT POUR LES DEMANDES/OFFRES
 sous réserve de modifications techniques

Hydraulik Hydraulics Hydraulique	KSB-Motor KSB-Motor KSB-Motor	H ₀ m		H ₁ m		H ₂ m		Gewicht/Weight/ Poids	
		25	50	25	50	25	50	kg	lb
F	T4	KX10	X	X	25	50	188	417	271
	T14	KX10	X	X	25	50	175	385	263
	S4	KX16	X	X	25	50	198	437	312
	S6	KX16	X	X	25	50	206	455	324
	Z6	KX16	X	X	25	50	219	483	345
	T4	KX10	X	X	50	100	181	399	283
K	T14	KX10	X	X	25	50	188	417	298
	S4	KX16	X	X	25	50	206	455	324
	S6	KX16	X	X	25	50	219	483	345
	Z6	KX16	X	X	25	50	222	492	350

1:10		KRT F 100-254 ASME	
CAD	A 3	stationäre Anstellung stationary installation installation stationnaire	
KSB		KRT F 100-254 ASME	
KSB SE & Co. USA Drexel Ave. 100 Darien, NY 13028		KSB Anlagenbau AG Karl-Liebknecht-Str. 14 42699 Solingen, Germany	
SCHAFFNER/ON 34-10		SCHAFFNER/ON 34-10	

Project
 Customer pos.no
 Project ID
 Created by
 Pos.no



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 2023-12-14
 2023-12-14

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 Update

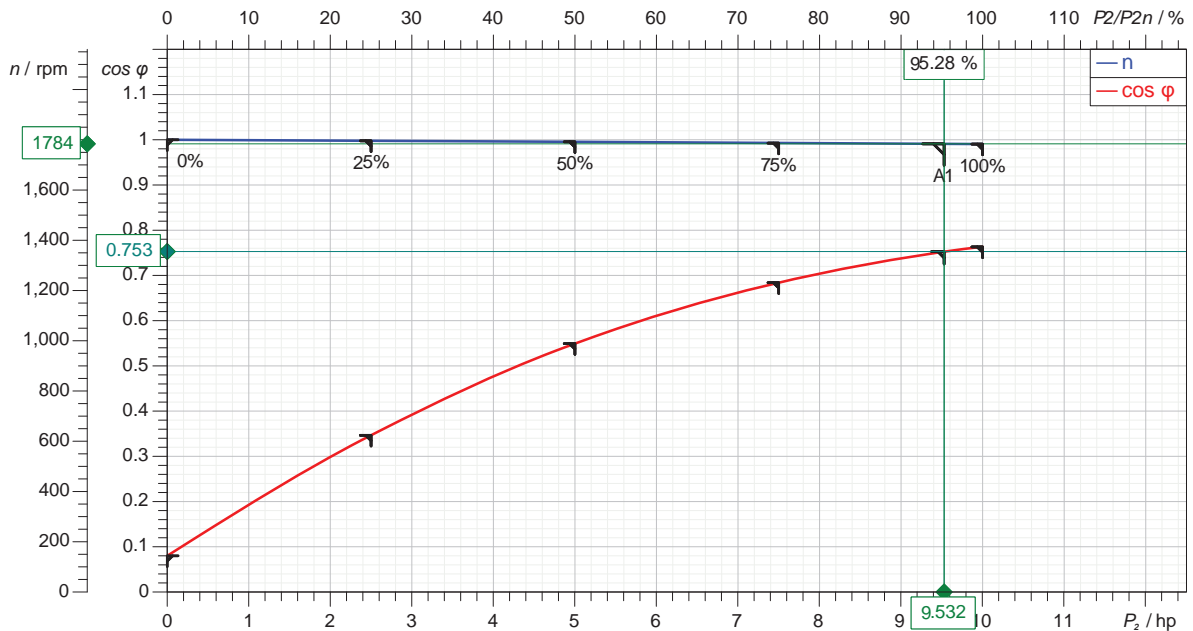
Data sheet: Motor data

Motor type **224XEG D IE3**

Motor manufacturer	KSB SE & Co. KGaA	Rated voltage	230	V
Design acc. standard	IE3	Rated frequency	60	Hz
Service factor	1.14	Rated HP (D.O.L) or VFD	10	hp
Degree of protection	IP68	Rated current	26.7	A
Insulation class		Nominal speed	1,783	rpm
Starting mode	Direct starting	NEMA code letter	N	
No. starts / h	10	Starting to rated current	11.7	
Coolant temperature	</= 104 °F (40 °C)	Starting current	312.4	A
Motor casing	Grey cast iron EN-GJL-250 (A 48 Class 35B)			
Explosion protection	Class I, Div. 1, Groups C&D T3			
Pump type	KRT F 100-254/224XEG-DV IE3			

Load	P1 kW	P2 hp	eta %	cos phi	I A
4/4	8.12	10.0	91.9	0.76	26.7
3/4	6.13	7.5	91.3	0.68	22.5
2/4	4.20	5.0	88.8	0.55	19.2
1/4	2.30	2.5	81.0	0.35	16.7

Main cable 1 x AWG 11-7+15-5 Diameter 0.83 inch...0.91 inch
 Control cable --- Diameter
 Cable. outer sheath Waterproof synthetic rubber compound
 Cable length 33 ft (10 m)



KSB Inc., 4415 Sarellen Road, Richmond, Virginia 23231, Phone: 001-804-222-1818, Fax: 001-804-226-6961
 KSB Pumps Inc, 5885 Kennedy Road, Mississauga, Ontario L4Z 2G3 (Canada), Phone: (0905) 568-9200, Fax: (0905) 568-9120

KSB SE & Co. KGaA, Turmstrasse 92, 06110 Halle (Germany), Phone +49 (345) 48260, Fax +49 (345) 4826 4699, www.ksb.com

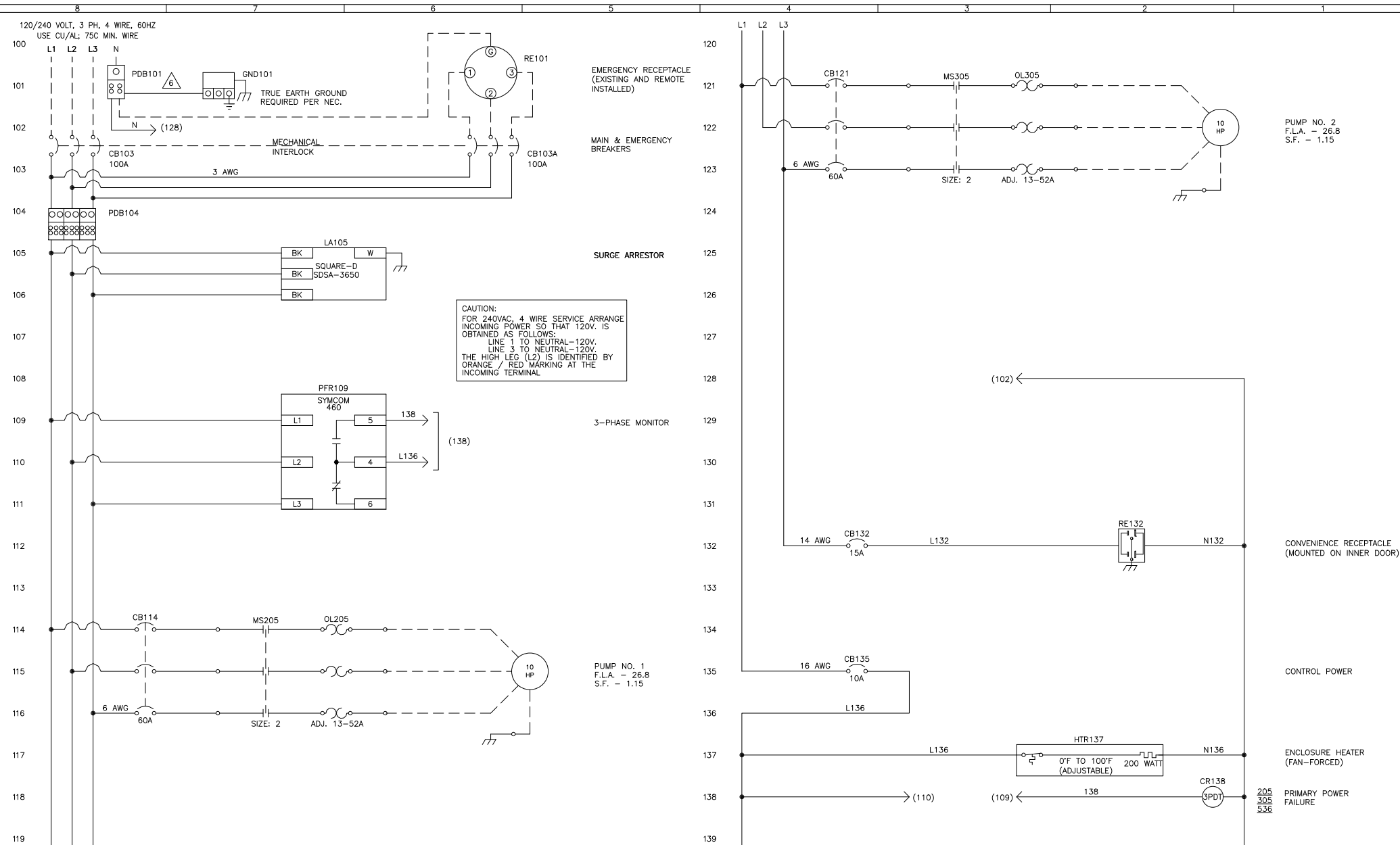
2021/06/02 (Build 213), 32 bit R16:10.03 - 12-10-2021 ALL USA

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Appendix B

Cleveland Lift Station Existing Control Panel

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REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT

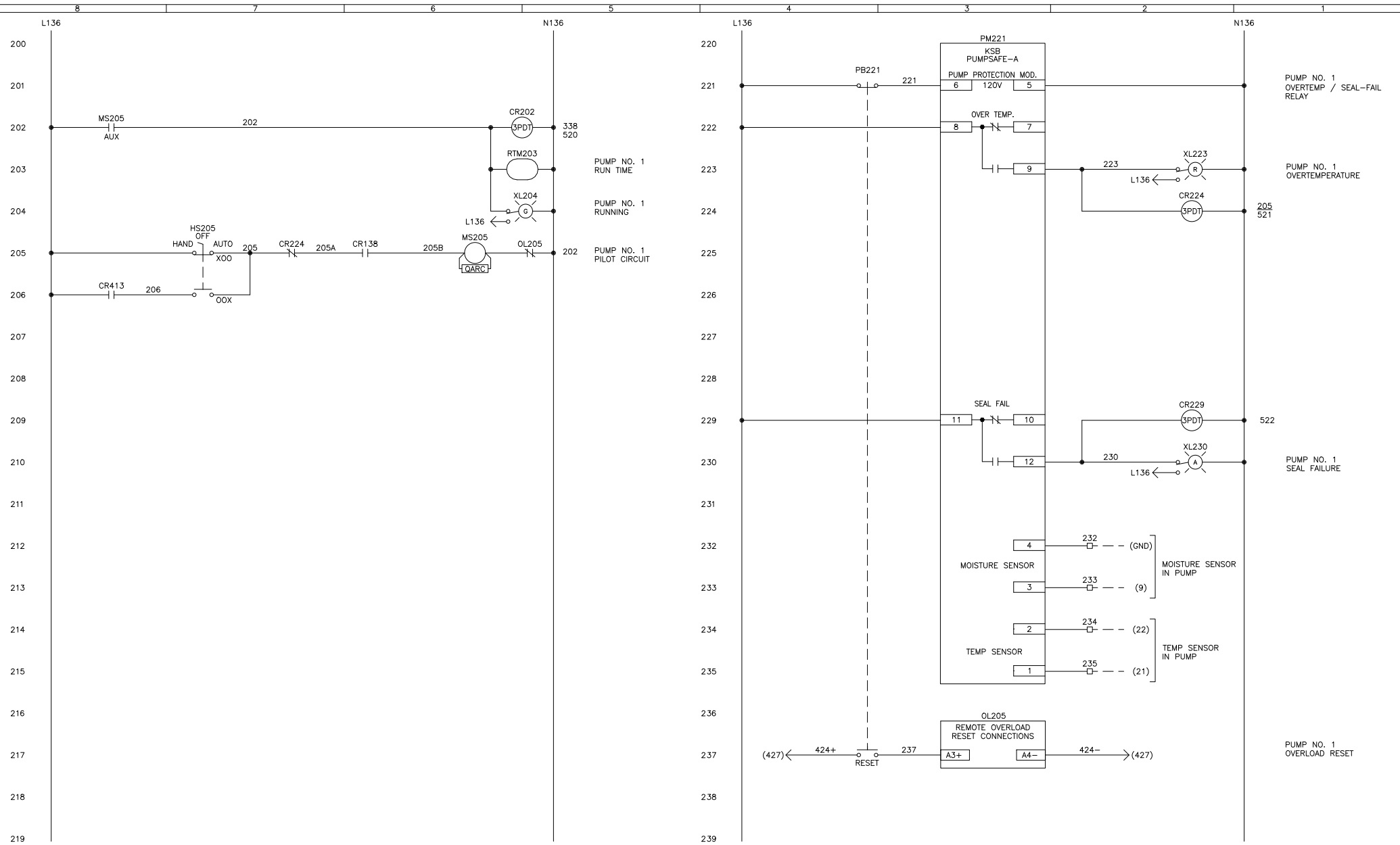
- NOTES:
- 1) FOR A COMPLETE LIST OF DRAWINGS AND PARTS, REFER TO THE TABLE OF CONTENTS AND THE BILL OF MATERIALS.
 - 2) GROUND LUG TO BE EARTH-GROUNDED BY INSTALLING ELECTRICIAN PER NEC.
 - 3) PULL ALL ANALOG SIGNAL WIRING AND ANY LOW VOLTAGE DC WIRING IN METALLIC CONDUIT, SEPARATE FROM POWER/LOAD WIRINGS.
 - 4) SEE ELECTRICAL DEVICE FOR ELECTRICAL RATINGS.
 - 5) CONTROL WIRING IS 16AWG UNLESS SPECIFIED.
 - 6) REMOVE JUMPER FOR NON-SERVICE ENTRANCE RATED APPLICATIONS.

Quality Control
& INTEGRATION

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ENG. STAMP	PROJECT INFORMATION	FILENAME	SHT. NO.
	SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	29926-P001-01	1 OF 5
	DUPLEX PUMP CONTROL PANEL INCOMING POWER		



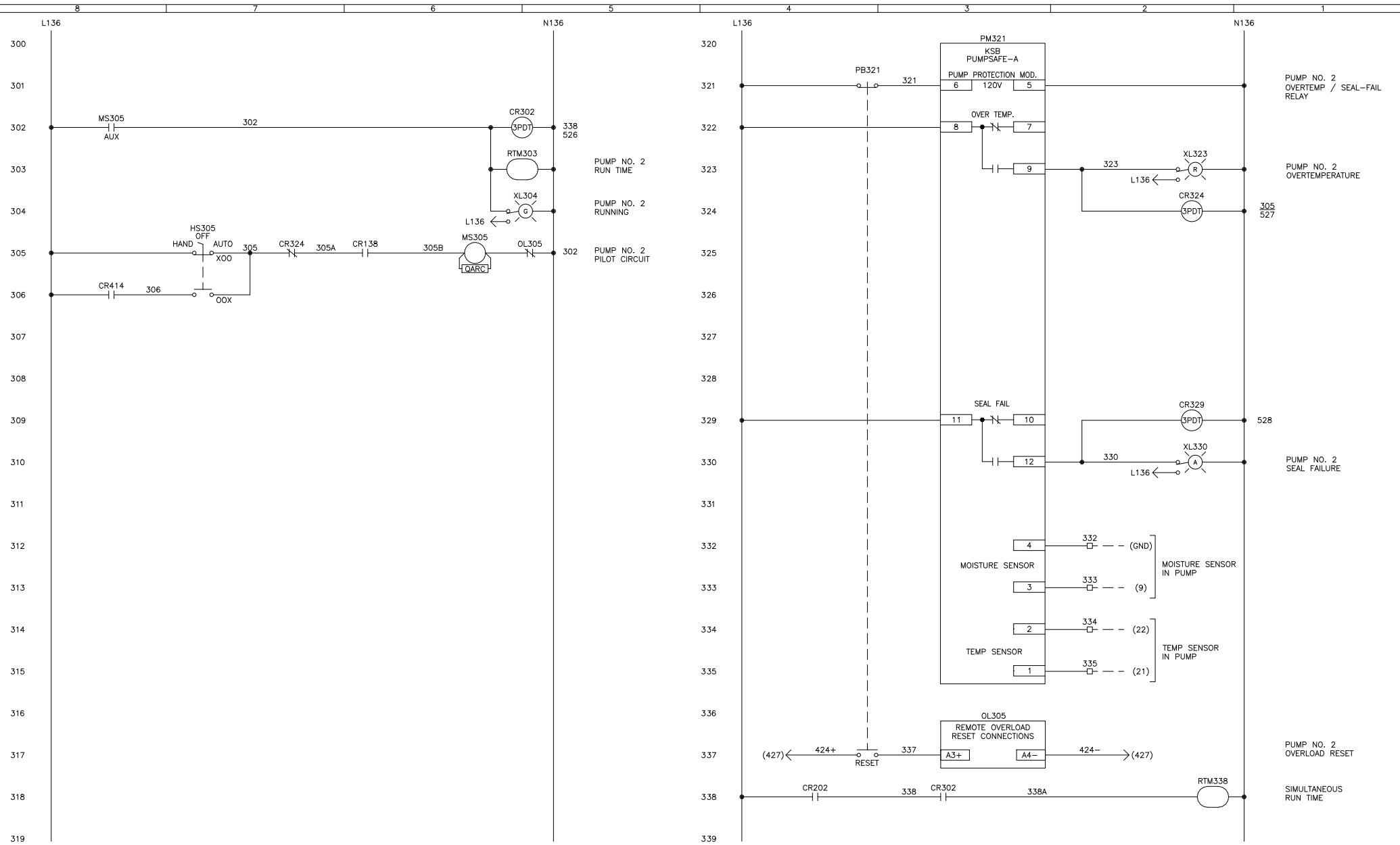
REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT

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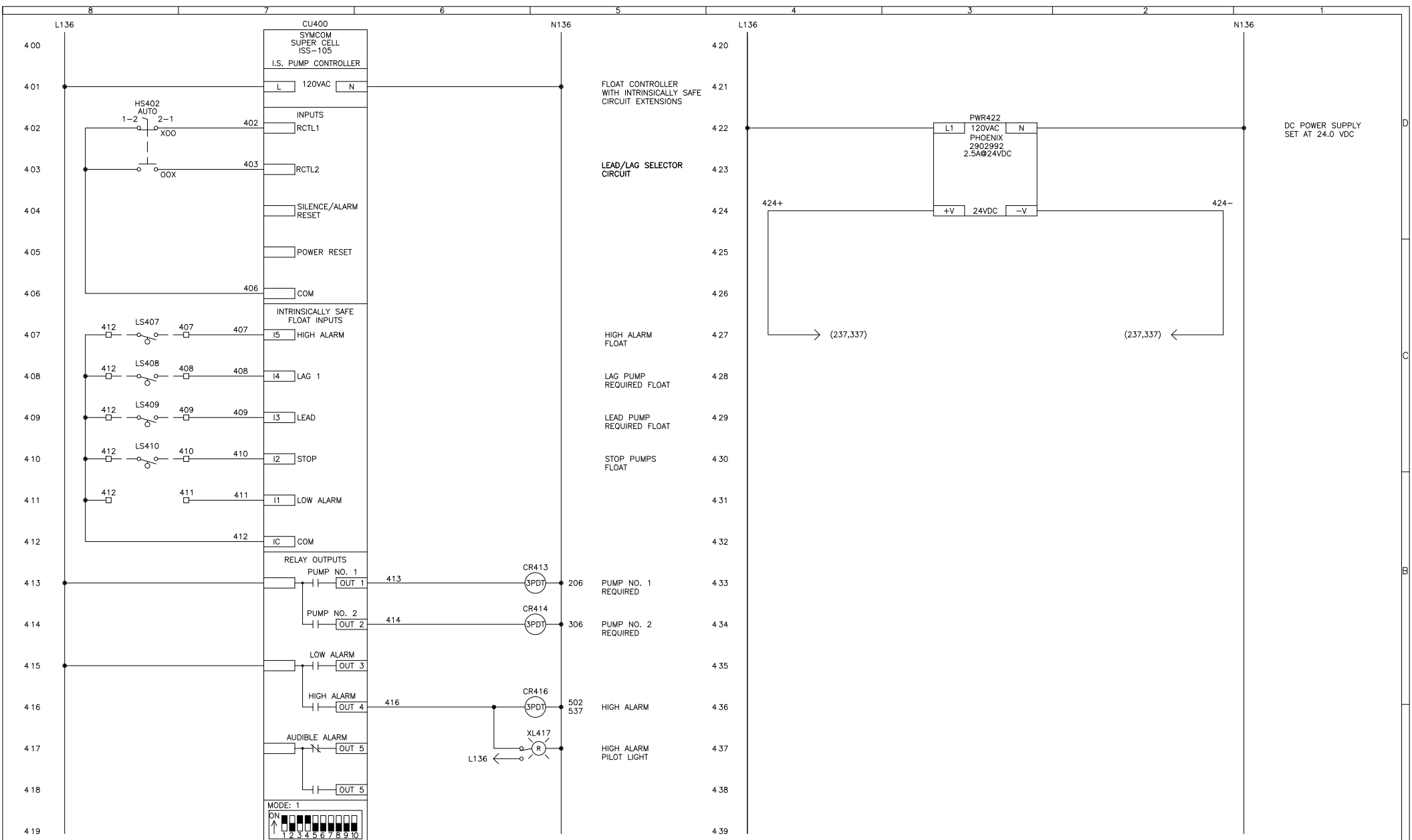
ENG. STAMP	SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	PROJ. NO. 29926
	DUPLIX PUMP CONTROL PANEL PUMP NO 1 CONTROLS	PANEL NO. P001
	FILENAME 29926-P001-02	SHT. NO. 2 OF 5



REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT



ENG. STAMP	SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	PROJ. NO. 29926
	DUPLIX PUMP CONTROL PANEL PUMP NO 2 CONTROLS	PANEL NO. P001
	FILENAME 29926-P001-03	SHT. NO. 3 OF 5



REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT



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ENG. STAMP

SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	PROJ. NO. 29926
DUPLEX PUMP CONTROL PANEL FLOAT CONTROL LOGIC 24VDC POWER SUPPLY	PANEL NO. P001
FILENAME 29926-P001-04	SHT. NO. 4 OF 5

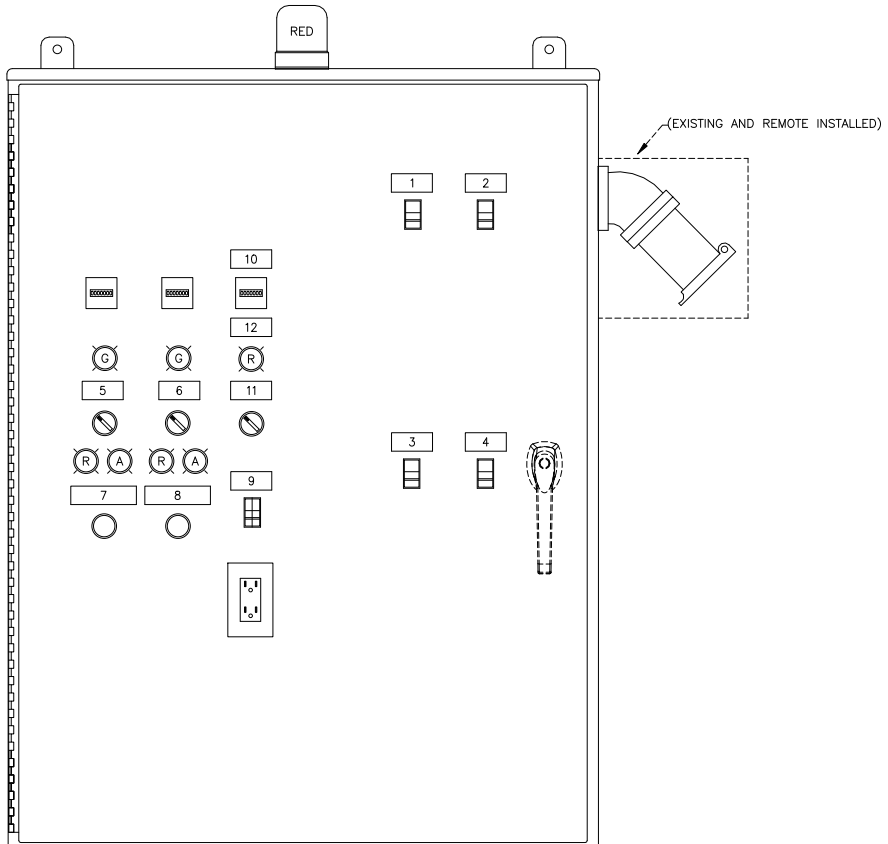


REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT

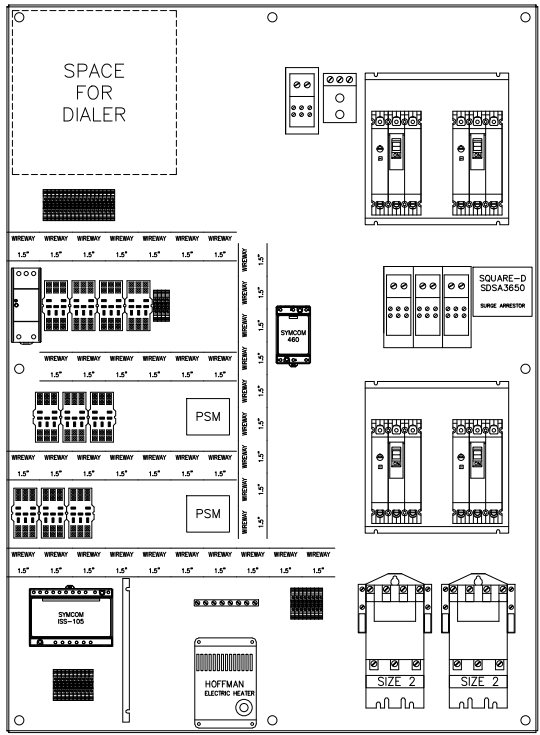


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ENG. STAMP		PROJ. NO.
SILVER LAKE, MN CLEVELAND LIFT STATION REHAB		29926
DUPLEX PUMP CONTROL PANEL ALARM CIRCUIT DRY CONTACTS		PANEL NO. P001
FILENAME 29926-P001-05		SHT. NO. 5 OF 5



INNER DOOR VIEW
(SHOWN WITH OUTER DOOR REMOVED)



BACK PANEL LAYOUT
(SUBJECT TO MINOR CHANGES)

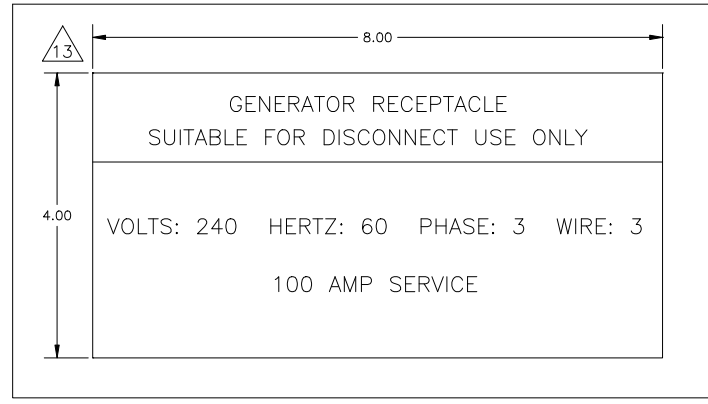
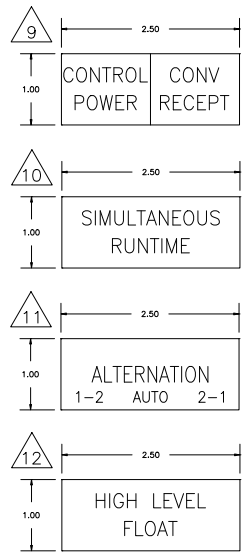
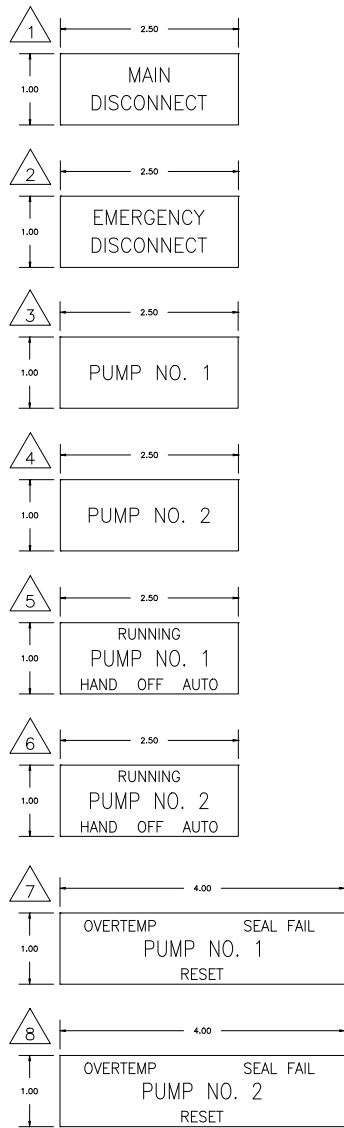
- NOTES:
- ENCLOSURE IS A NEMA 4X, 304 STAINLESS STEEL 48"H X 36"W X 12"D, WITH 3-POINT PADLOCKABLE HANDLE
 - INNER DEAD-FRONT DOOR PAINTED STEEL
 - SKIRTED LEG STAND SYSTEM 18"H

REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT

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ENG. STAMP	PROJECT	PANEL NO.	SHT. NO.
	SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	29926	
	DUPLEX PUMP CONTROL PANEL ENCLOSURE LAYOUT	PO01	
	FILENAME 29926-PO01-ENCL-01		1 OF 1



SHIPPED LOOSE

- NOTES:
1. NAMEPLATES ARE WHITE LETTERING ON BLACK BACKGROUND
 2. DIMENSIONS IN INCHES
 3. NAMEPLATES ATTACHED WITH ADHESIVE TAPE

REV	DATE	DESCRIPTION	DESIGN	DWG	CHK
B	01/10/22	AS BUILT	VMW	VMW	VMW
A	12/07/21	SUBMITTED FOR APPROVAL	KMK	KMK	BJT



ENG. STAMP	PROJ. NO.
SILVER LAKE, MN CLEVELAND LIFT STATION REHAB	29926
DUPLEX PUMP CONTROL PANEL NAMEPLATE LEGEND	PANEL NO. P001
FILENAME 29926-P001-NMPL-01	SHT. NO. 1 OF 1

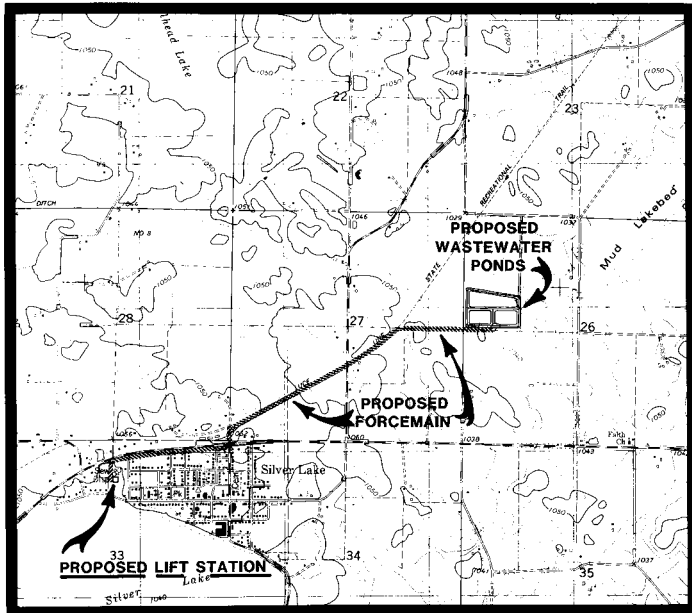
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Appendix C

Main Lift Station and Wastewater Ponds Record Drawings

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WASTEWATER TREATMENT FACILITIES SILVER LAKE, MINNESOTA



LOCATION PLAN

SCALE: 0 1/4 1/2
MILES



MINNESOTA

CITY OFFICIALS

MAYOR

COUNCILMEN

CLERK - TREASURER

WASTEWATER SUPERINTENDENT

DUANE YUREK

DALE MISKA
HENRY SHIMANSKI
DUANE JASKOWIAK
CLARENCE MIKOLICHEK

CARMEN MERRILL

DALE KOSEK

EPA PROJECT NO. C271053-02

RCM PROJECT NO. 861406

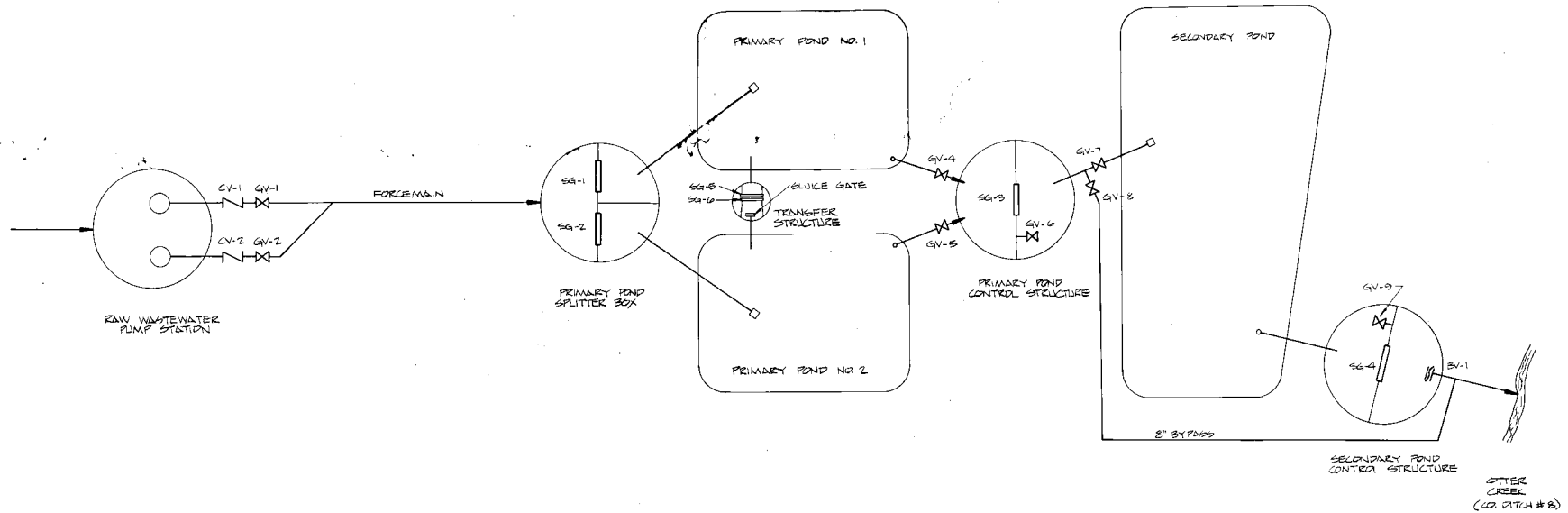
RIEKE-CARROLL-MULLER

ARCHITECTS ENGINEERS LAND SURVEYORS

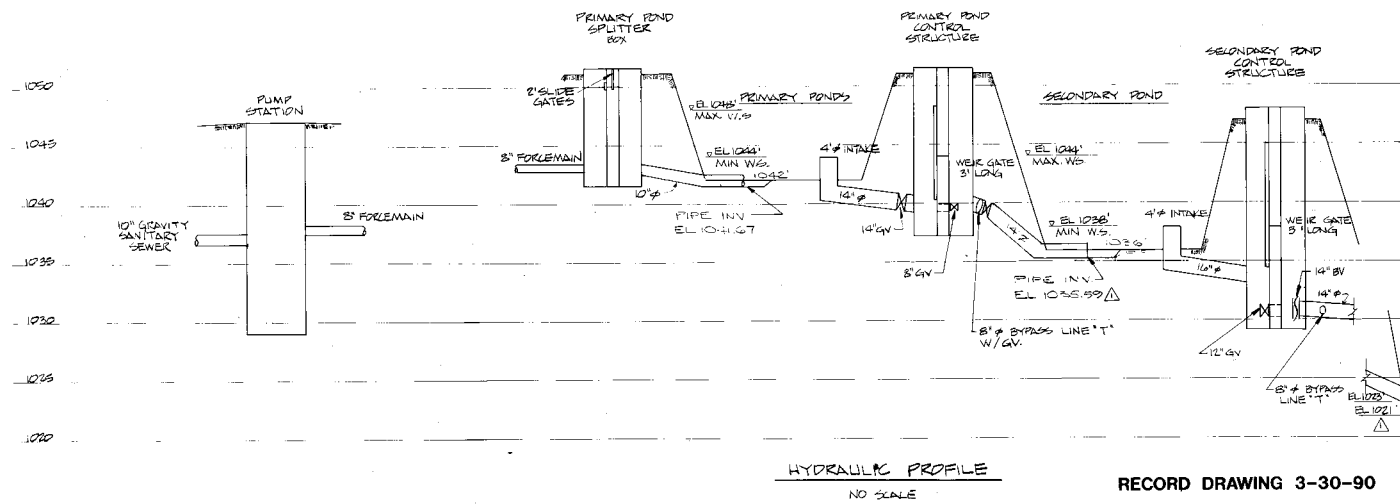
ASSOCIATES INC.

MINNETONKA, MINNESOTA

RECORD DRAWING 3-30-90



WASTEWATER FLOW SCHEMATIC DIAGRAM



HYDRAULIC PROFILE
NO SCALE

RECORD DRAWING 3-30-90

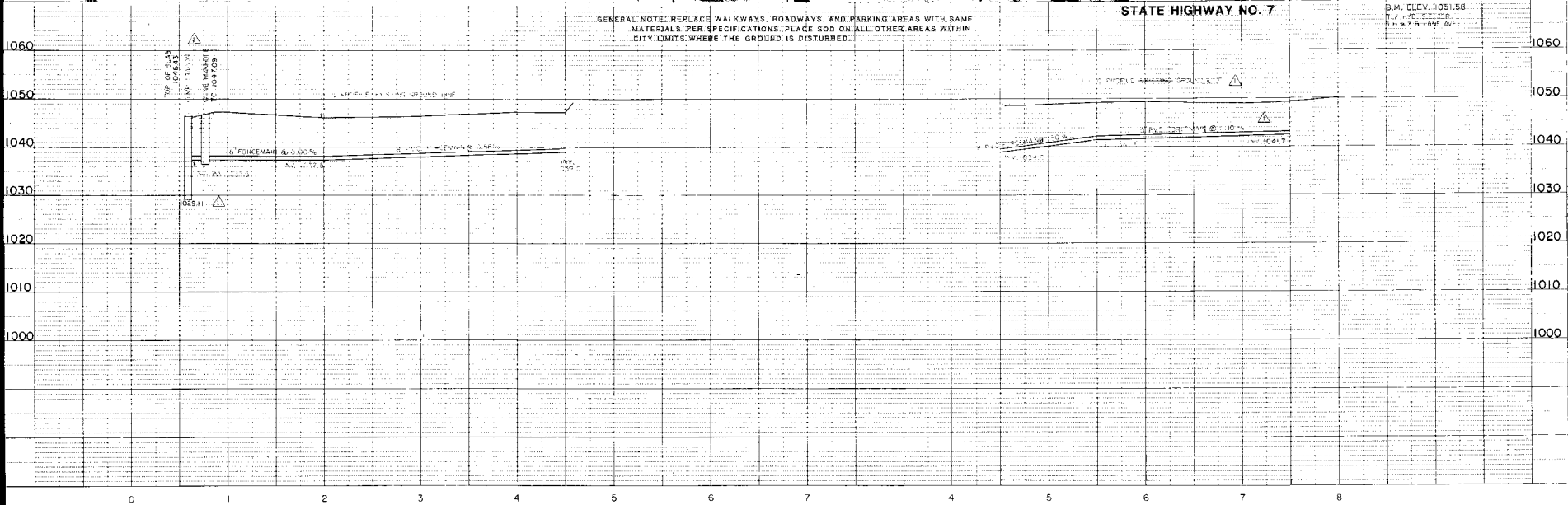
rikke
civil
engineers
inc.

DESIGNED BY: SEM
DRAWN BY: JLE
CHECKED BY: JMW

HYDRAULIC PROFILE & FLOW SCHEMATIC
WASTEWATER TREATMENT FACILITIES
SILVER LAKE, MINNESOTA. EPA NO. 0271053-02

DATE: AUGUST 1987
FILE NO: 861406

SHEET NO: 3



rike
 carroll
 associates inc
 architects-engineers-land surveyors-planners

STATE HIGHWAY NO. 7
 S.W. ELEV. 1051.55
 8.7% RISE
 11.7' @ 10' SLOPE DIST.

DESIGNED BY
 DRAWN BY
 CHECKED BY

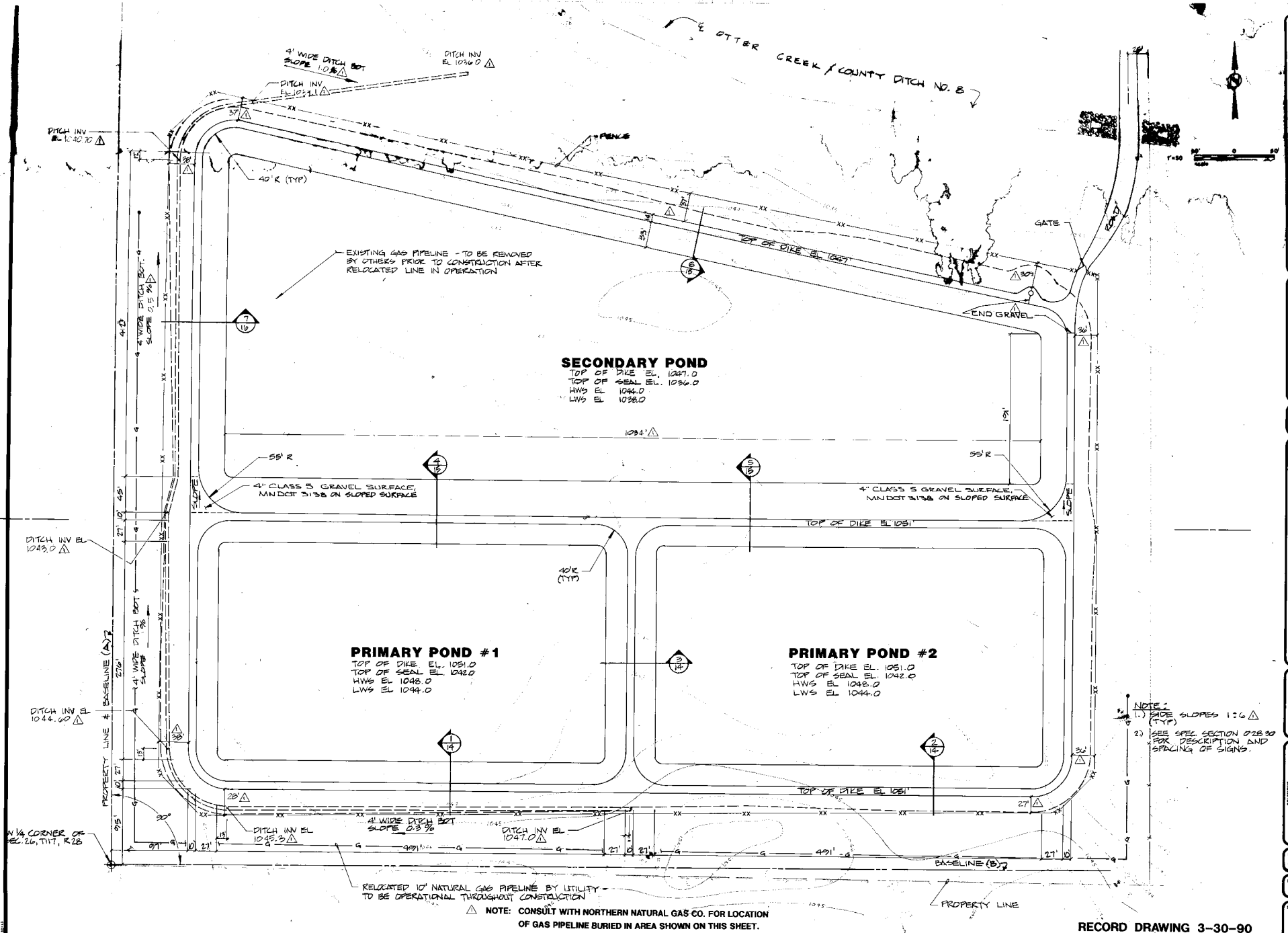
FORCEMAIN - PLAN AND PROFILE
 WASTEWATER TREATMENT FACILITIES
 SILVER LAKE, MINNESOTA, EPA NO. C271003.02

REVISIONS
 Δ RECORD DWG

DATE

FILE NO.
 861406

SHEET NO.
 4

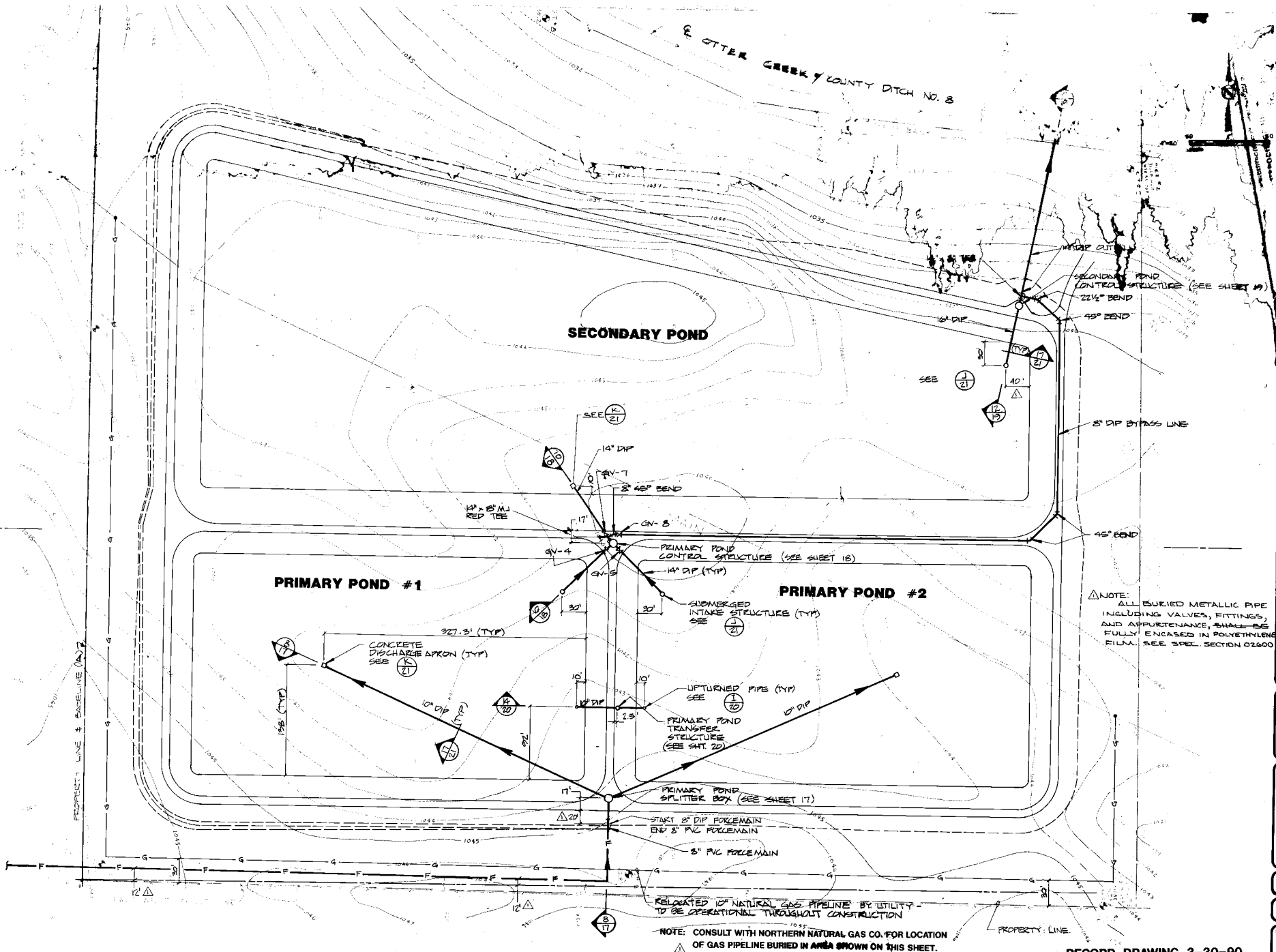


rd

DESIGNED: JMW 1987
 DRAWN: DLE
 CHECKED: JMW

POND LAYOUT PLAN
WASTEWATER TREATMENT FACILITIES
 SILVER LAKE, MINNESOTA. EPA NO. C271053-02

DATE: AUGUST 1987
 FILE NO.: 861406
 SHEET NO.: 12



NOTE: ALL BURIED METALLIC PIPE INCLUDING VALVES, FITTINGS, AND APPURTENANCE, SHALL BE FULLY ENCASED IN POLYETHYLENE FILM. SEE SPEC. SECTION 02600

NOTE: CONSULT WITH NORTHERN NATURAL GAS CO. FOR LOCATION OF GAS PIPELINE BURIED IN AREA SHOWN ON THIS SHEET.

RECORD DRAWING 3-30-90

CON

CONSTRUCTION CONSULTANTS INC.

PERSON: JMW/SEA
DRAWN: PLS
CHECKED: JMW

POND PIPING PLAN

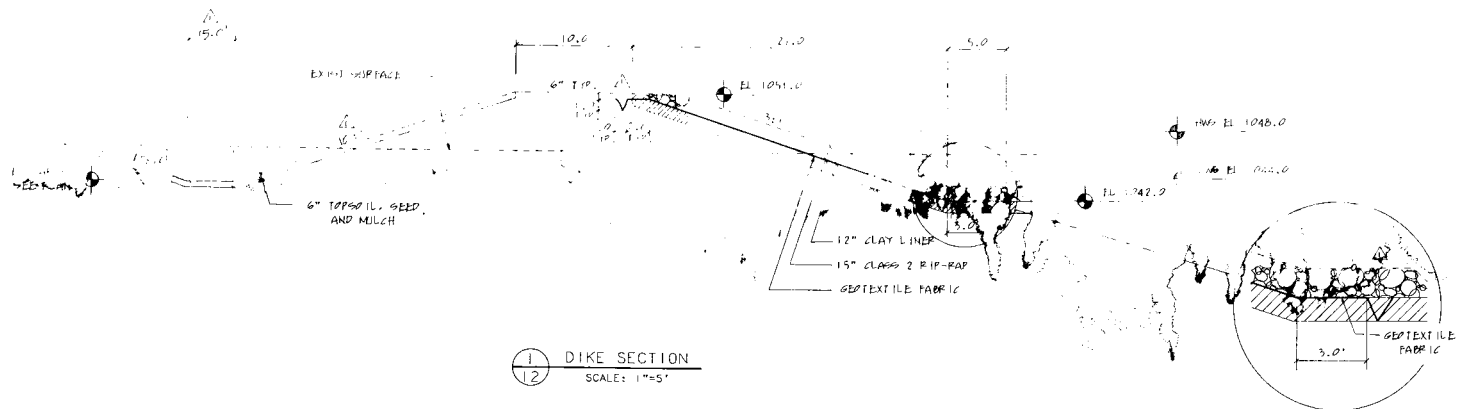
WASTEWATER TREATMENT FACILITIES

SILVER LAKE, MINNESOTA EPA NO. C271053-02

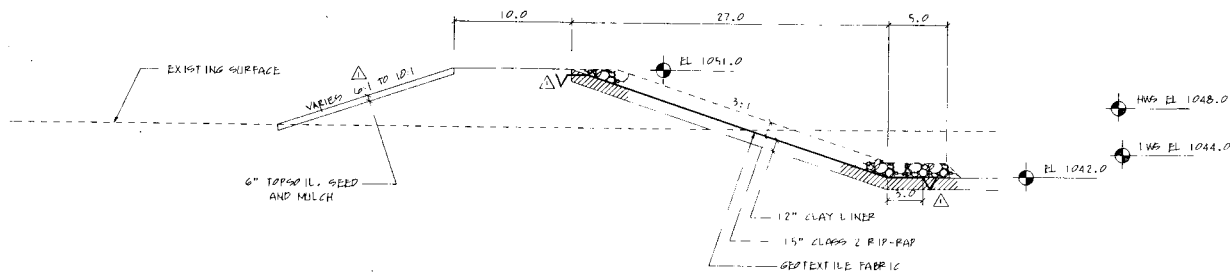
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FILE NO: 861406

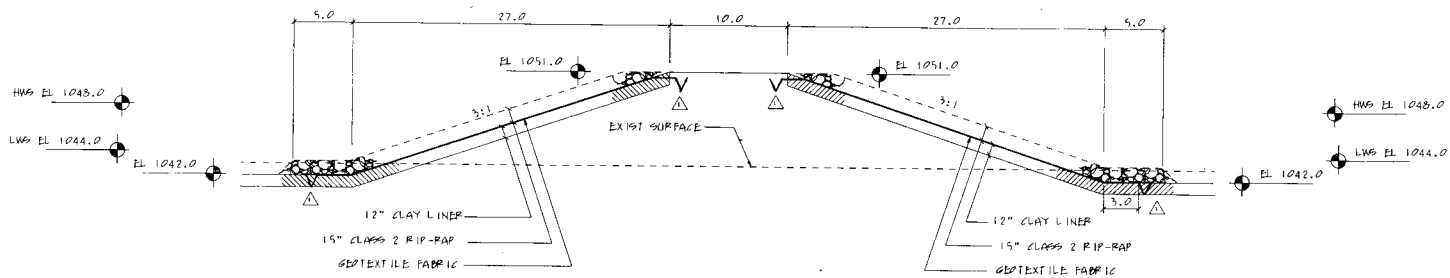
SHEET NO: 13



1
12 DIKE SECTION
SCALE: 1"=5'



2
12 DIKE SECTION
SCALE: 1"=5'



3
12 DIKE SECTION
SCALE: 1"=5'

rick
 carroll
 muller
 associates inc
 architects-engineers-land surveyors

DESIGNED: MCM, P.E.
 DRAWING: CFA
 CHECKED: JMM/VV

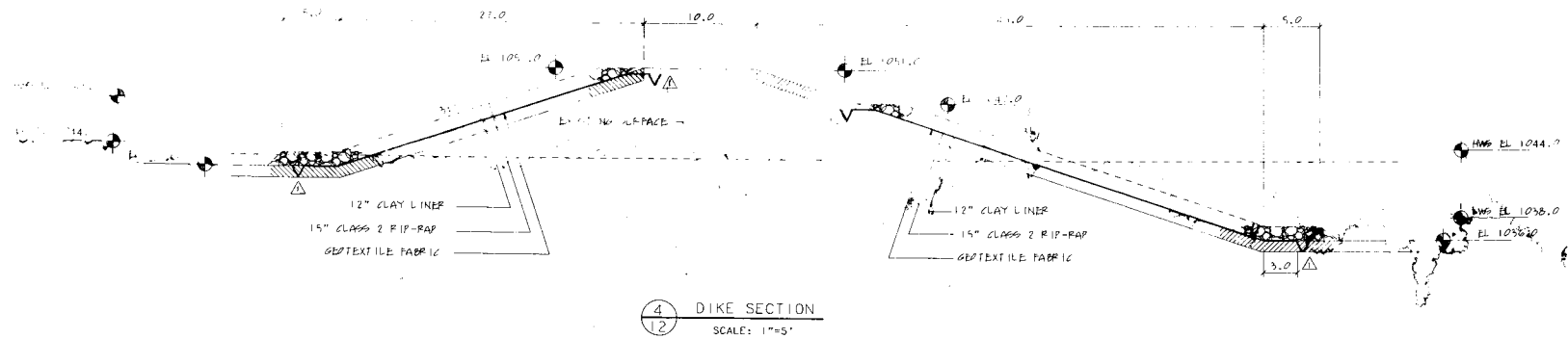
DIKE SECTIONS
 WASTEWATER TREATMENT FACILITIES
 311 WEST WASHINGTON ST., SUITE 100
 MINNEAPOLIS, MN 55402

REVISIONS
 DATE
 BY
 DATE

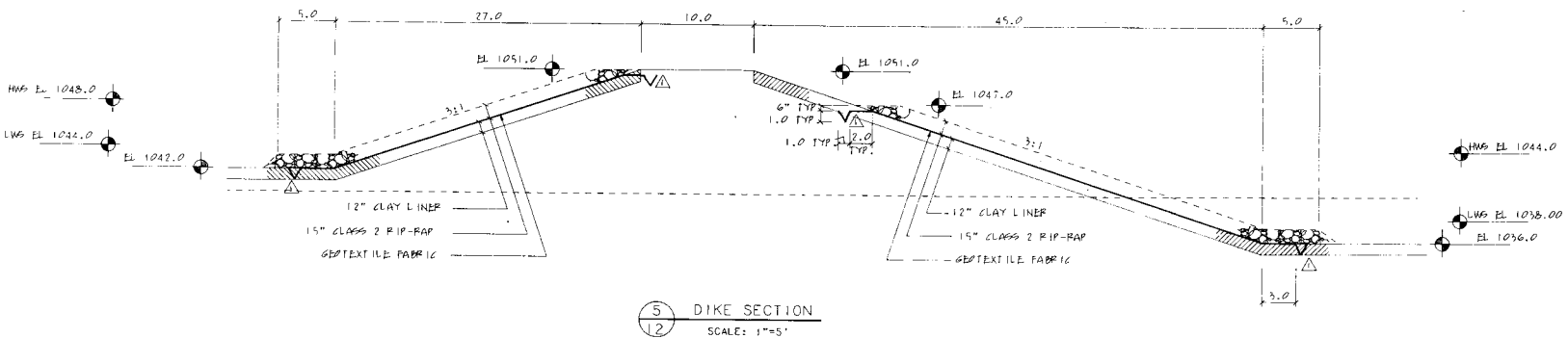
DATE
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FILE NO.

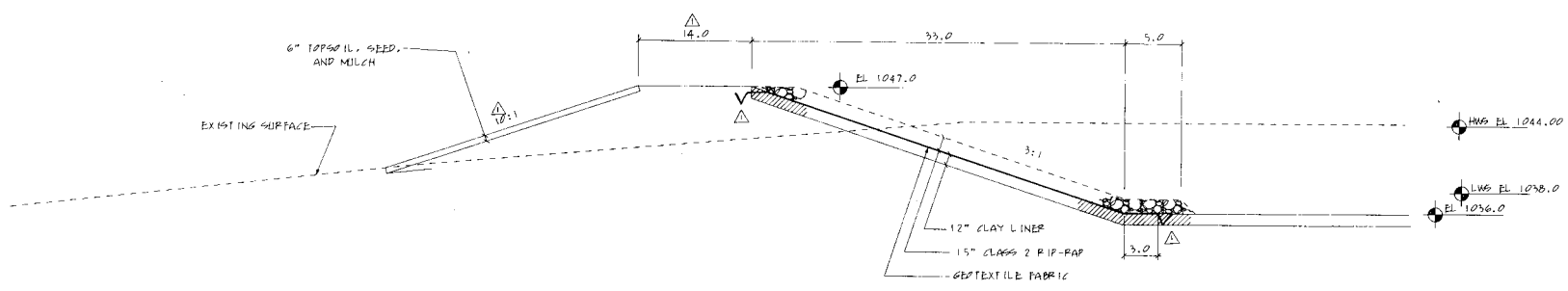
SHEET NO.
 14



4 DIKE SECTION
SCALE: 1"=5'



5 DIKE SECTION
SCALE: 1"=5'



6 DIKE SECTION
SCALE: 1"=5'

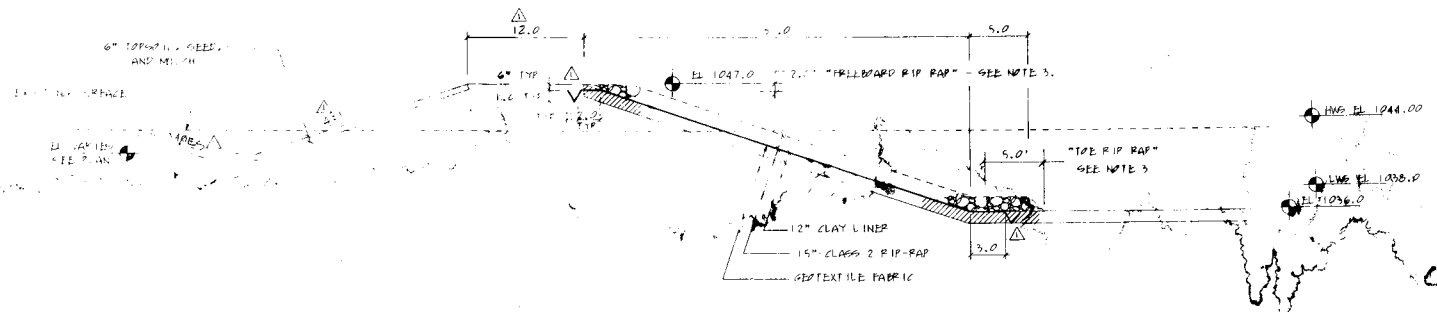
rcm
 rick-carroll-muller-associates inc
 architects engineers and surveyors

DESIGNED BY: [Signature]
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]

DIKE SECTIONS
 WASTEWATER TREATMENT FACILITIES

REVISIONS:
 DATE: [Signature]
 DESCRIPTION: [Signature]
 1-10-87: [Signature]

DATE: AUGUST 1987
 SHEET NO: 15



7 DIKE SECTION
12 SCALE: 1"=5'

GENERAL NOTES:

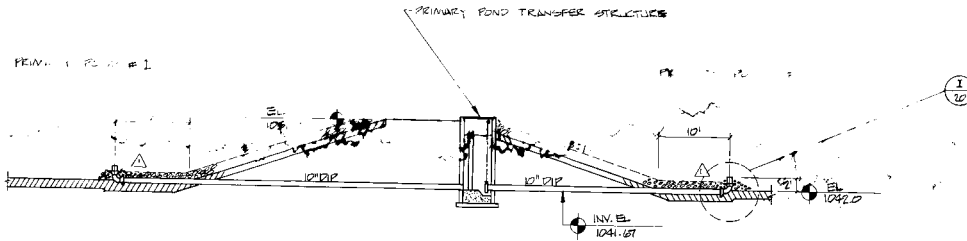
- In areas of cutting for pond bottom construction, where construction equipment has difficulty operating due to wet, soft silt/clay soil, or if sand or topsoil is exposed at the bottom of the minimum one-foot excavation, an additional one-foot cut is required, resulting in a minimum two-foot liner thickness in those areas. Where referred to as a soil classification, "Additional Liner Subcut" shall include the material associated with the extra one-foot cut as defined above.
- Refer to Specification Section 02590 and the Soils Reports appended to the Project Manual for work required in construction work required in construction of the wastewater treatment ponds, including earthwork.
- "Freeboard Rip Rap" is defined for bidding purposes as the rip rap from one-foot to three-foot measured vertically above the high water surface. "Toe Rip Rap" is defined for bidding purposes as the rip rap extending five-foot horizontally from the dike toe out onto the pond bottom. This note is typical for all pond dikes which are rip rapped.

rieke carroll mulder associates inc
 architects engineers and surveyors

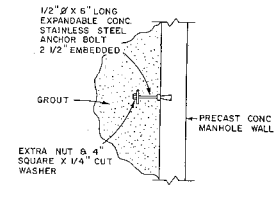
DESIGNED: W.M. 5/87
 DRAWN: S.W.
 CHECKED: M.W.

DIKE SECTIONS

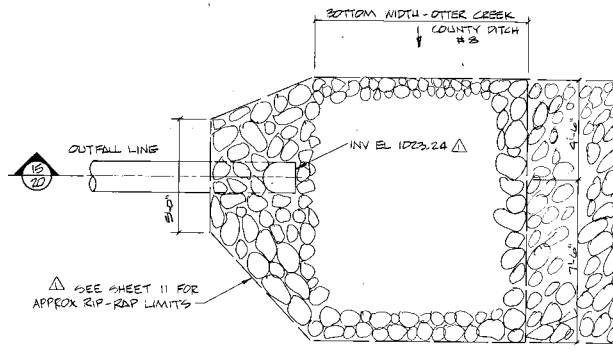
DATE: AUGUST 1987
 SHEET NO. 16



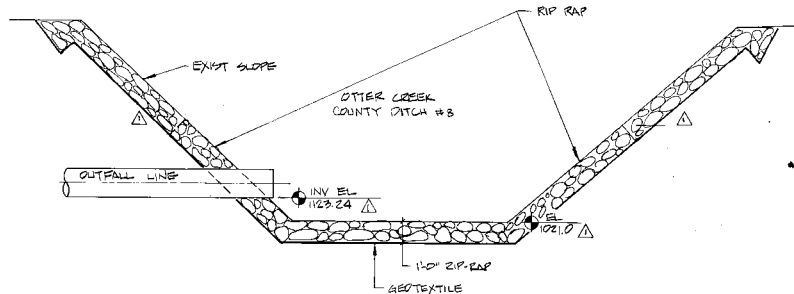
14 PRIMARY POND TRANSFER STRUCTURE PIPING PROFILE
SCALE: 1/2" = 1'-0"



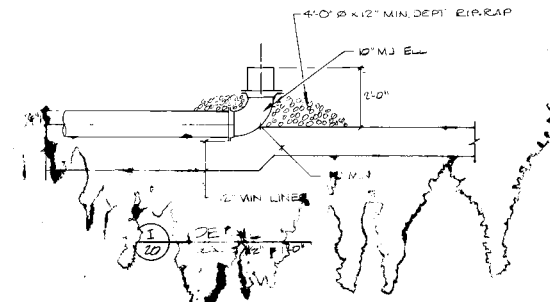
15 GROUT ANCHOR BOLT DETAIL
SCALE: 1/2" = 1'-0"



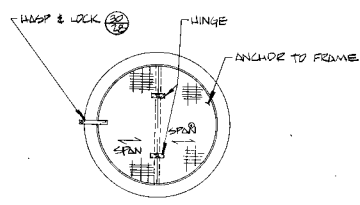
16 OUT FALL RIP RAP PLAN
SCALE: 3/8" = 1'-0"



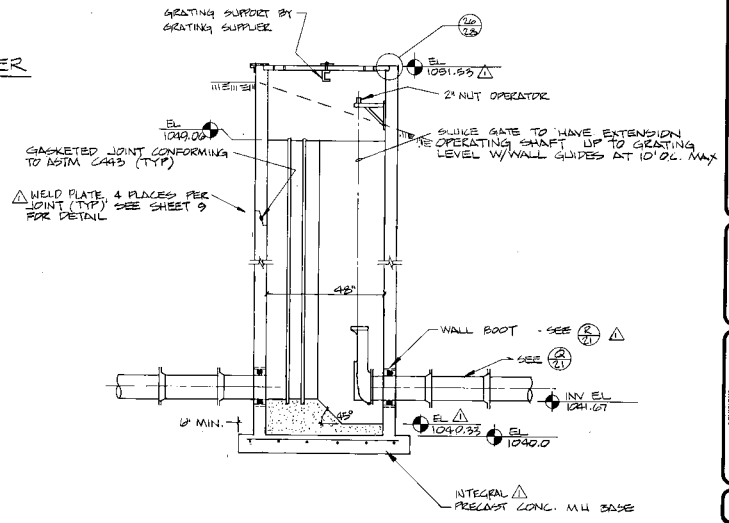
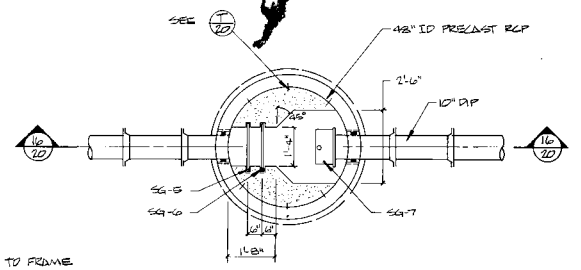
15 SECTION
SCALE: 3/8" = 1'-0"



17 PRIMARY POND TRANSFER STRUCTURE MANHOLE
SCALE: 1/2" = 1'-0"



18 PRIMARY POND TRANSFER STRUCTURE MANHOLE TOP PLAN
SCALE: 1/2" = 1'-0"



16 SECTION
SCALE: 1/2" = 1'-0"

rcm
 risko
 carroll
 mulier
 associates
 architects-engineers-land surveyors

TRANSFER STRUCTURE / DETAILS

DESIGNED JMM/SEH
 DRAW DLE
 CHECKED JMM

REVISION
 DATE 8/20
 BY
 DATE AUGUST 1987
 FILE NO.
 SHEET NO.

20

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