

Contract Routing Form

printed on: 05/22/2023

ROUTING: Routine

Contract between: Speedway Sand & Gravel, Inc
and Dept. or Division: Engineering Division
Name/Phone Number:

Project: Truax Lift Station Replacement

Contract No.: 9312
Enactment No.: RES-23-00381
Dollar Amount: 1,280,313.65

File No.: 77487
Enactment Date: 05/19/2023

(Please DATE before routing)

Table with 3 columns: Signatures Required, Date Received, Date Signed. Rows include City Clerk, Director of Civil Rights, Risk Manager, Finance Director, City Attorney, and Mayor with handwritten dates.

Please return signed Contracts to the City Clerk's Office
Room 103, City-County Building for filing.

Original + 2 Copies

05/22/2023 11:33:14 enjls - Kyle Frank 266-4089



Legislation Details (With Text)

File #: 77487 **Version:** 1 **Name:** Awarding Public Works Contract No. 9312, Truax Lift Station Replacement.

Type: Resolution **Status:** Passed

File created: 4/26/2023 **In control:** Engineering Division

On agenda: 5/16/2023 **Final action:** 5/16/2023

Enactment date: 5/19/2023 **Enactment #:** RES-23-00381

Title: Awarding Public Works Contract No. 9312, Truax Lift Station Replacement. (12th AD)

Sponsors: BOARD OF PUBLIC WORKS

Indexes:

Code sections:

Attachments: 1. 9312_BidOpeningTab.pdf, 2. 9312 breakdown.pdf

Date	Ver.	Action By	Action	Result
5/16/2023	1	COMMON COUNCIL	Adopt	Pass
5/3/2023	1	BOARD OF PUBLIC WORKS		
4/26/2023	1	Engineering Division	Refer	

Fiscal Note

The proposed resolution authorizes awarding the contract for the Truax Lift Station Replacement at a total estimated cost of \$1,382,740.00 including contingency. Funding for the project is available in Munis 12457-83-173. No additional appropriation is required.

Title

Awarding Public Works Contract No. 9312, Truax Lift Station Replacement. (12th AD)

Body

BE IT RESOLVED, that the following low bids for miscellaneous improvements be accepted and that the Mayor and City Clerk be and are hereby authorized and directed to enter into a contract with the low bidder contained herein, subject to the Contractor's compliance with Section 39.02 of the Madison General Ordinances concerning compliance with the Affirmative Action provisions **and subject to the Contractor's compliance with Section 33.07 of the Madison General Ordinances regarding Best Value Contracting:**

BE IT FURTHER RESOLVED, that the funds be encumbered to cover the cost of the projects contained herein.

See attached document (Contract No. 9312) for itemization of bids.

PROJECT

CONTRACTOR

AMOUNT OF BID

CONTRACT NO. 9312
TRUAX LIFT STATION REPLACEMENT

SPEEDWAY SAND & GRAVEL, INC.

\$1,280,313.65

Acct. No. 12457-83-173: 54445 (91345)
Contingency 8%±

\$1,280,313.65
102,426.35

GRAND TOTAL

\$1,382,740.00



Demographics

Company Name: Fidelity and Deposit Company of Maryland

NAIC CoCode: 39306

State of Domicile: Illinois

Organization Type: Stock

Short Name:

Country of Domicile: United States

Date of Incorporation: 03/18/1969

SBS Company Number: 54219634

Domicile Type: Foreign

NAIC Group Number: 212 - ZURICH INS
GRP

Merger Flag: No

Address

Business Address

1299 Zurich Way
Schaumburg, IL 60196
United States

Mailing Address

1299 Zurich Way
Schaumburg, IL 60196
United States

Statutory Home Office Address

1299 Zurich Way
Schaumburg, IL 60196
United States

Main Administrative Office Address

1299 Zurich Way
Schaumburg, IL 60196
United States

Phone, Email, Website

Phone

Type

Number

Email

No results found.

Website

No results found.

Company Type

Business Primary Phone (847) 605-6000

Company Type: Property and Casualty

Status: Active

Status: Reciprocal

Status Date: 01/01/1993

Company Type: Property and Casualty

Business Activities of Members:

Appointments

Show 10 entries

Showing 1 to 4 of 4 entries

dom

Licensee Name	License Number	NPN	License Type	Line of Authority	Appointment Date	Effective Date	Expiration Date
KELLY RADOMSKI	6510473	6510473	Intermediary (Agent) Individual	Property	01/21/2016	01/10/2023	03/15/2024
KELLY RADOMSKI	6510473	6510473	Intermediary (Agent) Individual	Casualty	01/21/2016	01/10/2023	03/15/2024



Licensee Name	License Number	NPN	License Type	Line of Authority	Appointment Date	Effective Date	Expiration Date
TINA DOMASK	17584644	17584644	Intermediary (Agent) Individual	Casualty	07/15/2019	01/10/2023	03/15/2024
TINA DOMASK	17584644	17584644	Intermediary (Agent) Individual	Property	07/15/2019	01/10/2023	03/15/2024

Line Of Business

Line of Business	Citation Type	Effective Date
Aircraft	Aircraft	01/01/1982
Automobile	Automobile	01/01/1982
Credit Insurance	Credit Insurance	01/01/1982
Fidelity Insurance	Fidelity Insurance	01/01/1982
Fire, Inland Marine and Other Property Insurance	Fire, Inland Marine and Other Property Insurance	01/01/1982
Liability and Incidental Medical Expense Insurance (other than automobile)	Liability and Incidental Medical Expense Insurance (other than automobile)	01/01/1982
Miscellaneous	Miscellaneous	01/01/1982
Ocean Marine Insurance	Ocean Marine Insurance	01/01/1982
Surety Insurance	Surety Insurance	01/01/1982
Workers Compensation Insurance	Workers Compensation Insurance	01/01/1982

Contact

Contact Type	Preferred Name	Name	E-mail	Phone	Address
Registered Agent for Service of Process		*			Other CORPORATION SERVICE COMPANY 33 E MAIN ST STE 610 MADISON, WI United States County 53703

Company Merger

No results found.

Name Change History

Previous Name	New Name	Effective Date
	Fidelity and Deposit Company of Maryland	

\$1,280,313.65
ORIGINAL

BID OF SPEEDWAY SAND & GRAVEL, INC.

2023

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

TRUAX LIFT STATION REPLACEMENT

CONTRACT NO. 9312

PROJECT NO. 12457

MUNIS NO. 12457

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON MAY 16, 2023

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

<https://bidexpress.com/login>

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

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This Proposal, and Agreement have
been prepared by:

**CITY ENGINEERING DIVISION
CITY OF MADISON
MADISON, DANE COUNTY, WISCONSIN**

Greg Friess for JMW
James M. Wolfe, P.E., City Engineer

JMW: kdf

SECTION A: ADVERTISEMENT FOR BIDS AND INSTRUCTIONS TO BIDDERS

REQUEST FOR BID FOR PUBLIC WORKS CONSTRUCTION CITY OF MADISON, WISCONSIN

A BEST VALUE CONTRACTING MUNICIPALITY

PROJECT NAME:	TRUAX LIFT STATION REPLACEMENT
CONTRACT NO.:	9312
SBE GOAL	4%
BID BOND	5%
SBE PRE BID MEETING	See Pre Bid Meeting info below
PREQUALIFICATION APPLICATION DUE (2:00 P.M.)	4/13/2023
BID SUBMISSION (2:00 P.M.)	4/20/2023
BID OPEN (2:30 P.M.)	4/20/2023
PUBLISHED IN WSJ	4/6/2023 & 4/13/2023

SBE PRE BID MEETING: Small Business Enterprise Pre-Bid Meetings are not being held in person at this time. Contractors can schedule one-on-one phone calls with Tracy Lomax in Affirmative Action to count towards good faith efforts. Tracy can be reached at (608) 267-8634 or by email, tlomax@cityofmadison.com.

PREQUALIFICATION APPLICATION: Forms are available on our website, www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-get-prequalified. If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable.

BIDS TO BE SUBMITTED: by hand to 1600 EMIL ST., MADISON, WI 53713 or online at www.bidexpress.com.

Bids may be submitted on line through Bid Express or in person at 1600 Emil St. The bids will be posted on line after the bid opening. If you have any questions, please call Alane Boutelle at (608) 267-1197, or John Fahrney at (608) 266-9091.

STANDARD SPECIFICATIONS

The City of Madison's Standard Specifications for Public Works Construction - 2023 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website, www.cityofmadison.com/engineering/developers-contractors/standard-specifications.

The Contractor shall review these Specifications prior to preparation of proposals for the work to be done under this contract, with specific attention to Article 102, "BIDDING REQUIREMENTS AND CONDITIONS" and Article 103, "AWARD AND EXECUTION OF THE CONTRACT." For the convenience of the bidder, below are highlights of three subsections of the specifications.

SECTION 102.1: PRE-QUALIFICATION OF BIDDERS

In accordance with Wisconsin State Statutes 66.0901 (2) and (3), all bidders must submit to the Board of Public Works proof of responsibility on forms furnished by the City. The City requires that all bidders be qualified on a biennial basis.

Bidders must present satisfactory evidence that they have been regularly engaged in the type of work specified herein and they are fully prepared with necessary capital, materials, machinery and supervisory personnel to conduct the work to be contracted for to the satisfaction of the City. All bidders must be pre-qualified by the Board of Public Works for the type of construction on which they are bidding prior to the opening of the bid.

In accordance with Section 39.02(9)(a)l. of the General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms.

The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

SECTION 102.4 PROPOSAL

No bid will be accepted that does not contain an adequate or reasonable price for each and every item named in the Schedule of Unit Prices.

A lump sum bid for the work in accordance with the plans and specifications is required. The lump sum bid must be the same as the total amounts bid for the various items and it shall be inserted in the space provided.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of which such corporation was chartered. The required signatures shall in all cases appear in the space provided thereof on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address of the Contractor or submitted electronically through Bid Express (www.bidexpress.com). Proposals will be accepted at the location, the time and the date designated in the advertisement. Proposals received after the time and date designated will be returned to the bidder unopened.

SECTION 102.5: BID DEPOSIT (PROPOSAL GUARANTY)

All bids, sealed or electronic, must be accompanied with a Bid Bond (City of Madison form) equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

MINOR DISCREPANCIES

Bidder is responsible for submitting all forms necessary for the City to determine compliance with State and City bidding requirements. Notwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion or performance of the contract.

Bidders for this Contract(s) must be Pre-Qualified for at least one of the following type(s) of construction denoted by an

Building Demolition

- 101 Asbestos Removal
- 120 House Mover

- 110 Building Demolition

Street, Utility and Site Construction

- 201 Asphalt Paving
- 205 Blasting
- 210 Boring/Pipe Jacking
- 215 Concrete Paving
- 220 Con. Sidewalk/Curb & Gutter/Misc. Flat Work
- 221 Concrete Bases and Other Concrete Work
- 222 Concrete Removal
- 225 Dredging
- 230 Fencing
- 235 Fiber Optic Cable/Conduit Installation
- 240 Grading and Earthwork
- 241 Horizontal Saw Cutting of Sidewalk
- 242 Hydro Excavating
- 243 Infrared Seamless Patching
- 245 Landscaping, Maintenance
- 246 Ecological Restoration
- 250 Landscaping, Site and Street
- 251 Parking Ramp Maintenance
- 252 Pavement Marking
- 255 Pavement Sealcoating and Crack Sealing
- 260 Petroleum Above/Below Ground Storage Tank Removal/Installation
- 262 Playground Installer

- 265 Retaining Walls, Precast Modular Units
- 270 Retaining Walls, Reinforced Concrete
- 275 Sanitary, Storm Sewer and Water Main Construction
- 276 Sawcutting
- 280 Sewer Lateral Drain Cleaning/Internal TV Insp.
- 285 Sewer Lining
- 290 Sewer Pipe Bursting
- 295 Soil Borings
- 300 Soil Nailing
- 305 Storm & Sanitary Sewer Laterals & Water Svc.
- 310 Street Construction
- 315 Street Lighting
- 318 Tennis Court Resurfacing
- 320 Traffic Signals
- 325 Traffic Signing & Marking
- 332 Tree pruning/removal
- 333 Tree, pesticide treatment of
- 335 Trucking
- 340 Utility Transmission Lines including Natural Gas, Electrical & Communications
- 399 Other _____

Bridge Construction

- 501 Bridge Construction and/or Repair

Building Construction

- 401 Floor Covering (including carpet, ceramic tile installation, rubber, VCT)
- 402 Building Automation Systems
- 403 Concrete
- 404 Doors and Windows
- 405 Electrical - Power, Lighting & Communications
- 410 Elevator - Lifts
- 412 Fire Suppression
- 413 Furnishings - Furniture and Window Treatments
- 415 General Building Construction, Equal or Less than \$250,000
- 420 General Building Construction, \$250,000 to \$1,500,000
- 425 General Building Construction, Over \$1,500,000
- 428 Glass and/or Glazing
- 429 Hazardous Material Removal
- 430 Heating, Ventilating and Air Conditioning (HVAC)
- 433 Insulation - Thermal
- 435 Masonry/Tuck pointing

- 437 Metals
- 440 Painting and Wallcovering
- 445 Plumbing
- 450 Pump Repair
- 455 Pump Systems
- 460 Roofing and Moisture Protection
- 464 Tower Crane Operator
- 461 Solar Photovoltaic/Hot Water Systems
- 465 Soil/Groundwater Remediation
- 466 Warning Sirens
- 470 Water Supply Elevated Tanks
- 475 Water Supply Wells
- 480 Wood, Plastics & Composites - Structural & Architectural
- 499 Other _____

State of Wisconsin Certifications

- 1 Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.
- 2 Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.
- 3 Class 7 Blaster - Blasting Operations and Activities for structures greater than 15' in height, bridges, towers, and any of the objects or purposes listed as "Class 5 Blaster or Class 6 Blaster".
- 4 Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)
- 5 Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: www.dhs.wisconsin.gov/Asbestos/Cert. State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.
- 6 Certification number as a Certified Arborist or Certified Tree Worker as administered by the International Society of Arboriculture
- 7 Pesticide application (Certification for Commercial Applicator For Hire with the certification in the category of turf and landscape (3.0) and possess a current license issued by the DATCP)
- 8 State of Wisconsin Master Plumbers License.

SECTION B: PROPOSAL

Please refer to the
Bid Express Website
at <https://bidexpress.com>
look up contract number
and go to
Section B: Proposal Page

You can access all City of Madison bid solicitations for FREE at www.bidexpress.com

Click on the "Register for Free" button and follow the instructions to register your company and yourself. You will be asked for a payment subscription preference, since you may wish to bid online someday. Simply choose the method to pay on a 'per bid' basis. This requires no payment until / unless you actually bid online. You can also choose the monthly subscription plan at this time. You will, however, be asked to provide payment information. Remember, you can change your preference at anytime. You will then be able to complete your free registration and have full access to the site. Your free access does not require completion of the 'Digital ID' process, so you will have instant access for viewing and downloading. To be prepared in case you ever do wish to bid online, you may wish to establish your digital ID also, since you cannot bid without a Digital ID.

If you have any problems with the free registration process, you can call the bidexpress help team, toll free at 1-888-352-2439 (option 1, option1).

SECTION C: SMALL BUSINESS ENTERPRISE

Instructions to Bidders City of Madison SBE Program Information

2 Small Business Enterprise (SBE) Program Information

2.1 Policy and Goal

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The bidder acknowledges that its bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to the "ADVERTISEMENT FOR BIDS" for the goal for the utilization of SBEs on this project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this project. In the event that the bidder is unable to achieve the SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the bidder being deemed a non-responsible contractor ineligible for award of this contract.

A bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total base bid proposed by the Contractor. The total base bid price is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

2.2 Contract Compliance

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

2.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 2.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at www.cityofmadison.com/civil-rights/contract-compliance/targeted-business-enterprise-programs/targeted-business-enterprise.

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 2.2 or you may access the Targeted Business Certification Application online at www.cityofmadison.com/civil-rights/contract-compliance/targeted-business-enterprise-programs/targeted-business-enterprise. Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this project.

2.4 Small Business Enterprise Compliance Report

2.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

- 2.4.1.1 Attendance at the pre-bid meeting.
- 2.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.
- 2.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.
- 2.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.
- 2.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.
- 2.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.
- 2.4.1.7 Providing SBEs with specific information regarding the work to be performed.
- 2.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.
- 2.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest bidder), although not necessarily low.
- 2.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.
- 2.4.1.11 Completion of Cover Page (page C-6), Summary Sheet (page C-7) and SBE Contact Reports (pages C-8 and C9) if applicable.

2.4.2 Reporting SBE Utilization and Good Faith Efforts

The Small Business Enterprise Compliance Report is to be submitted by the bidder with the bid: This report is due by the specified bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below may be deemed non-responsible and the bidder ineligible for award of this contract. Notwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion, performance of the contract, or percentage of SBE utilization.

2.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.1.1 **Cover Page**, Page C-6; and

2.4.2.1.2 **Summary Sheet**, C-7.

2.4.2.2 If the bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.2.1 **Cover Page**, Page C-6;

2.4.2.2.2 **Summary Sheet**, C-7; and

2.4.2.2.3 **SBE Contact Report**, C-8 and C-9. (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

2.5 Appeal Procedure

A bidder which does not achieve the established goal and is found non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may appeal that decision to the Small Business Enterprises Appeals Committee. All appeals shall be made in writing, and shall be delivered to and received by the City Engineer no later than 4:30 PM on the third business day following the bidder's receipt of the written notification of ineligibility by the Affirmative Action Division Manager. Postmark not acceptable. The notice of appeal shall state the basis for the appeal of the decision of the Affirmative Action Division Manager. The Appeal shall take place in accordance with Madison General Ordinance 33.54.

2.6 SBE Requirements After Award of the Contract

The successful bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the project to ensure that the actual percentage commitment to SBE firms is carried out.

2.7 SBE Definition and Eligibility Guidelines

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

- A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.
- B. A business that has averaged no more than \$4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of \$1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

SECTION D: SPECIAL PROVISIONS
TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312

It is the intent of these Special Provisions to set forth the final contractual intent as to the matter involved and shall prevail over the Standard Specifications and plans whenever in conflict therewith. In order that comparisons between the Special Provisions can be readily made, the numbering system for the Special Provisions is equivalent to that of the Specifications.

Whenever in these Specifications the term "Standard Specifications" appears, it shall be taken to refer to the City of Madison Standard Specifications for Public Works Construction and Supplements thereto.

SECTION 102.11: BEST VALUE CONTRACTING

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than \$74,000 for a single trade contract; or equal to or greater than \$360,500 for a multi-trade contract pursuant to MGO 33.07(7).

ARTICLE 103 AWARD AND EXECUTION OF THE CONTRACT

The bidder must completely fill in the base bid and the alternative bid. After the initial bid advertisement and prior to bid opening the City will establish a Construction Budget Dollar Value. If any responsible bidder submits a base bid plus the alternate bid item #1 that is below the Construction Budget Dollar Value, the City will award the contract to the lowest responsible bidder based on the base bid plus alternate #1. If no responsible bidder submits a base bid plus alternative bid item #1 that is below the Construction Budget Dollar Value, the City will award the contract based on the base bid only. The procedure notes the process for awarding the contract, and the City shall have the right to proceed or not proceed with alternative #1 regardless of how the bid was awarded. The City shall have the right to reject all bids regardless of the value of the bids submitted.

ARTICLE 104 SCOPE OF WORK

The work under this contract shall include, but is not limited to, the removal and replacement of a sanitary sewer lift station, reconnection to the existing force main, installation of emergency generator, installation of control module enclosure, installation of telemetry antenna tower, and restoration of the project site.

The project limits for the work are in sanitary sewer easements at 2701 Anderson St.

The Contractor shall view the site prior to bidding to become familiar with the existing conditions. It will be the responsibility of the Contractor to work with the utilities located in the right of way and easements to resolve conflicts during the construction process.

SECTION 104.4 INCREASE OR DECREASE QUANTITIES

The Contractor shall note that some bid item quantities may increase or decrease based on what is encountered in the field. If the actual field conditions vary from the plan quantity, no additional compensation shall be given for increasing or decreasing quantities. Any overruns shall be paid for under the appropriate bid item(s) without any penalty or change to the bid price for the associated bid item. The Contractor shall not be reimbursed for any deletions to the contract. No change to the unit bid price will be allowed for changes to the quantities

SECTION 105.12 COOPERATION BY THE CONTRACTOR

The Contractor shall use care around existing trees, plantings, fences, walls, steps and driveways that are indicated on the plans to remain. Damage to these items during construction shall be repaired or replaced at the Contractor's expense. No trees, other than those shown on the plan to be removed, shall

be cut or disturbed without the approval of the City Construction Engineer and the City Forester; the abutting property owners shall be notified in accordance with the City's Administrative Procedure Memorandum No. 6-2.

Coordination with Utilities

Work in this contract may require utility relocations to complete the work shown on the plan sheets. It will be the responsibility of the Contractor to work with the utilities located in the project area to resolve conflicts during the construction process and provide working area for installation of new facilities.

Madison Gas (underground) and Electric (overhead and underground service) facilities within or near the project limits. New gas and electrical service is required as part of the project. The Contractor shall be responsible for coordinating and providing working area for the installation of the new electrical service. The contractor shall be responsible for coordinating and providing working area for MGE gas to install new natural gas service and meter. The Contractor shall be responsible for applying for and payment of any permits and/or fees required for the installation of the gas and electrical services.

Coordination with City of Madison Engineering Operations

Note, this section only applies in the event that ALTERNATIVE BID #1 is not accepted. The Contractor shall coordinate, provide time, and a working area for City of Madison Engineering Operations to install the emergency generator on the Contractor install generator base slab.

SECTION 107.6 DUST PROOFING

The Contractor shall take all necessary steps to control dust arising from operations connected with this contract. When ordered by the City Construction Engineer, the Contractor shall dust proof the construction area by using power sweepers and water. Dust proofing shall be incidental with operations connected with this contract.

SECTION 107.7 MAINTENANCE OF TRAFFIC

All signing and barricading shall conform to Part VI of the Federal Highways Administrations "Manual on Uniform Traffic Control Devices" (MUTCD), the State of Wisconsin Standard Facilities Development Manual (including Chapter 16 – Standard Detail Drawings) and the City of Madison Standards for sidewalk and bikeway closures.

The Contractor shall submit an acceptable Traffic Control Plan, including all necessary phases, to Tom Mohr, tmohr@cityofmadison.com. A minimum of five (5) working days prior to the pre-construction meeting, The Traffic Control Plan shall address all requirements of this section of the Special Provisions. The Contractor shall not start work on this project until the Traffic Engineering Division has approved a traffic control plan and traffic control devices have been installed in accordance with the approved plan. Failure of the Contractor to obtain approval of a Traffic Control Plan, as specified above, may prevent the Contractor from starting work and shall be considered a delay of the project caused by the Contractor.

The traffic control plan may need to be altered as conditions change in the field or as unexpected conditions occur. This shall include relocating existing traffic control or providing additional traffic control. The Contractor shall install and maintain any necessary modifications or additions to the traffic control, as directed by the City Traffic Engineer, at no cost to the City.

Traffic Control shall be measured as a lump sum. Payment for the Traffic control is full compensation for constructing, assembling, hauling, erecting, re-erecting, maintaining, restoring, and removing non-permanent traffic signs, drums, barricades, and similar control devices, for providing, placing, and maintaining the work zone. Maintaining shall include replacing damaged or stolen traffic control devices.

Construction equipment and materials are not to be stored within the street right-of-way that is open to traffic during non-working hours. Construction equipment and materials are not to be stored within the street right-of-way that is outside the project limits.

The Contractor shall not in any manner unnecessarily obstruct the streets or crossings, and shall at all times and under all circumstances provide safe and sufficient means for foot passengers and vehicles. When sidewalk closures are necessary for completion of the work, sidewalk closed signs shall be provided at the cross walks prior to the closure.

Contact Tom Mohr, Traffic Engineering Division, tmohr@cityofmadison.com, with any questions concerning these traffic control specifications.

SECTION 108.2 **PERMITS**

The City of Madison has obtained a City of Madison Erosion Control Permit, DNR Sanitary Sewer Submittal, and the project has been approved through the City of Madison Zoning Site Plan Review process.

The Contractor shall be responsible for applying for and obtaining a City of Madison Building Permit to construct the lift station on private property. Any associated cost of obtaining a City of Madison Building Permit shall be the responsibility of Contractor. Contractor shall be responsible for any Demolition Permit that is require by City of Madison Building Inspection, including any associated cost of the permit fee and to develop any required demo plan.

The City's obtaining these permits is not intended to be exhaustive of all permits that may be required to be obtained by the Contractor for construction of this project. It shall be the responsibility of the Contractor to identify and obtain any other permits needed for construction, **including any permits needed for gas and electric services.**

The Contractor shall meet the conditions of all permits. They shall install and maintain the erosion control measures shown on the plans, specified in these Special Provisions, or as directed by the City Construction Engineer or designees. This work will be paid for under the appropriate contract bid items or, if appropriate items are not included in the contract, shall be paid for as Extra Work. A copy of the permit is available at the City of Madison, Engineering Division office.

This permit covers trench dewatering to a maximum of 70 gallons/minute from the project, provided appropriate control measures are in place.

SECTION 109.2 **PROSECUTION OF WORK**

The total time for completion of this contract is **ONE HUNDRED TWENTY (120) CALENDAR DAYS**. The Contractor shall begin work within **ONE HUNDRED TWENTY (120) CALENDAR DAYS** of either; confirmed delivery date of generator, pump control panel, and pumps or prior to **DECEMBER 31, 2024**, whichever occurs earlier.

The Contractor shall be required to submit the Manufacturers notification of shipping date as well as the Contractor confirmation date of delivery within three (3) days of receiving it.

The fixed, agreed, and liquidated damages for failure to complete all work within the specified timeframe, both the overall timeframe and construction timeframe, shall be calculated in accordance with Section 109.9 of the City of Madison Standard Specifications for Public Works Construction Latest Edition.

Work shall begin only after the start work letter is received. The Contractor shall notify the City Engineer three (3) weeks in advance of the selected start date. If it is desirable to begin work before the above-mentioned date, the Contractor shall establish a mutually acceptable date with the City Engineer. The Contractor shall limit workdays to 7:00 A.M. to 7:00 P.M.

SECTION 210.1(d) **STREET SWEEPING**

When required, either by the erosion control plan or the Construction Engineer, the Contractor shall perform mechanical street sweeping on all streets or paved surfaces affected by construction equipment, hauling or related construction activities that result in mud tracking or siltation. Mechanical street sweeping shall be completed as directed by the Construction Engineer and shall remove all loose material to the satisfaction of the Construction Engineer. Depending on site conditions, construction activities, and hauling methods utilized by the Contractor mechanical street sweeping may be required multiple times throughout the day with an absolute minimum that all streets are clean at the end of the work day.

ARTICLE 500 SEWER AND SEWER STRUCTURES GENERAL

SANITARY SEWER GENERAL

This project shall include installing of a new sanitary sewer lift station, approximately 125 linear feet of gravity sewer, and approximately 42 linear feet of new ductile iron force main of sizes and locations that are specified on the plan set and in accordance with the Standard Specifications. The gravity sewer installation shall be paid for under individual BID ITEM 50307 and BID ITEM 50702. The force main installation shall be paid for under BID ITEM 90071. Topsoil, Seed, and Matting shall be paid for separately under each individual bid item.

It is advised that the Contractor visit the site prior to bidding to determine the type of bypass setup and traffic control will be necessary for completion of the project.

SECTION 502.1(C) DEWATERING

In addition to dewatering requirements specified in Section 502.1(C) of the City of Madison Standard Specifications for Public Works Construction Latest Edition, the Contractor shall be required to provide sediment capture device as part of type II dewatering plan. The cost for sediment capture device shall be included in BID ITEM 50202 TYPE II DEWATERING. A dewatering plan should be submitted to Engineer for approval showing sediment capture device detail prior to beginning any dewatering work.

BID ITEM 90070 – SANITARY SEWER LIFT STATION

DESCRIPTION

This work shall include, but not necessarily be limited to, site clearing and grubbing, provide temporary construction fence, excavation for the lift station structures (wet well and valve vault) and lift station piping, removal of existing pump station building and structures, salvaging existing equipment, installation of the lift station, electrical service equipment and installation, project site grading, crushed stone, base course, clear stone bedding encased in geotextile fabric base for wet well and valve vault, concrete slabs, telemetry antenna and base, 24" outside drop connection, and furnishing all labor, tools, supplies, materials, equipment and any and all items necessary to provide a complete and properly operating lift station in accordance with the Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition. Topsoil, Seed, and Mulch shall be paid for separately under each individual bid item. Heavy Wastewater Control and Type II Dewatering shall also be paid separately under each individual bid item.

After completion of the project and before the completed lift station is considered accepted, the Contractor shall provide the City with a general cost breakdown of the overall project costs for the City to determine cost to depreciate the lift station asset. The cost breakdown shall include the costs for the following categories: 1. Pumps/Pump Controls, 2) Telemetry, 3) Wet Well Rehabilitation, and 4) Generator.

MEATHOD OF MEASUREMENT

SANITARY SEWER LIFT STATION shall be measured LUMP SUM for all work complete and accepted.

BASIS OF PAYMENT

SANITARY SEWER LIFT STATION, as provided above, shall be paid for at the contract price which shall be full compensation for all site clearing and grubbing, excavation for the lift station structures (valve vault and wet well) and lift station piping, removal of existing lift station, salvaging existing equipment, construction of the lift station including but not limited to pumps, piping, valves, controls, all fees and costs required to provide electrical and gas service to the lift station site, electrical service equipment, lift station site grading, base course, concrete slabs, connection to force main and to sanitary sewer, restoration of the site, and furnishing all labor, tools, supplies, materials, equipment and any and all items necessary to provide a complete and properly operating lift station and to complete the work in accordance with the Specifications and Plans. The cost of furnishing, installing, and renovating the Sanitary Sewer Lift Station shall be included in the "Sanitary Sewer Lift Station" lump sum bid item.

BID ITEM 90071 – SANITARY SEWER FORCE MAIN – 14 INCH

DESCRIPTION

This work shall consist of excavating required trenches, furnishing and laying therein 14 inch ductile iron pipe force main, including all necessary fittings, bedding, backfill, labor, tools, supplies, materials, and any and all items necessary to complete work in accordance with the Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition.

Materials

Force main pipe shall be ductile iron pipe in accordance with AWWA C151/ANSI A21.51. Any required fittings shall be ductile iron mechanical joints in accordance to AWWA C110/ANSI A21.10 or AWWA C153/ANSI A21.53-11. Acceptable joint restraints shall be mechanical joint restraints with multiple locking wedges, EBAA Iron Sales MEGALUG Series 1100, or approved equal. Buttresses shall be high early strength concrete. Slid concrete blocks may be used when approved by the City of Madison Representative.

Construction Methods

Construction methods shall conform to the Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition.

Sewer Electronic Marker Balls

Contractor shall install SEWER ELECTRONIC MARKERS above the force main, in accordance with section 503.2(f) and 503.2(g) of the Standard Specifications, at all horizontal and vertical grade breaks in the force main. SEWER ELECTRONIC MARKERS shall be paid separately under BID ITEM 50390.

Pressure Testing

The force main shall be installed and tested prior to making the final connection. Pressure testing shall be done in conformance with 501.3(c) of the City of Madison Standard Specifications for Public Works Construction Latest Edition.

METHOD OF MEASUREMENT

SANITARY SEWER FORCE MAIN – 14 INCH shall be measured by LINEAR FOOT.

BASIS OF PAYMENT

SANITARY SEWER FORCE MAIN – 14 INCH shall be measured and paid at the contract unit price per lineal foot. This price shall be full compensation for all excavation, bedding, native backfill, compacting,

buttresses, restraint testing, connections to the existing sanitary sewer, furnishing all materials, permanent fittings, temporary fittings, tools, equipment, labor, and any and all items necessary to complete the work in accordance with the Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition.

BID ITEM 90072 – EXISTING LIFT STATION DEMOLITION

DESCRIPTION

This work shall consist removing the existing lift station components and shall include removal of enclosure building, removal of any concrete slabs, demolition of concrete slabs, removal of piping, removal of pumps, removal of all internal components of the existing lift station, installation of any plugs or fittings, drilling of drainage holes, sand backfill up to subgrade, and furnishing all labor, tools, supplies, materials, equipment and any and all items necessary to remove and abandon existing lift station structure in accordance with the Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition.

MEATHOD OF MEASUREMENT

EXISTING LIFT STATION DEMOLITION shall be measured LUMP SUM for all work complete and accepted.

BASIS OF PAYMENT

EXISTING LIFT STATION DEMOLITION shall be measured and paid at contract unit price and shall be full compensation for all materials, tools, equipment, labor and any and all items necessary to complete the work in accordance with Plans, Special Provisions, and City of Madison Standard Specifications for Public Works Construction Latest Edition.

BID ITEM 90073 – HEAVY WASTEWATER CONTROL

DESCRIPTION

Work under this bid item shall include wastewater control (bypass pumping of the sewer being replaced). Work shall be completed in accordance with Article 503.3 of the City of Madison Standard Specifications for Public Works Construction Latest Edition.

We are anticipating an average daily flow of 375 gpm based on lift station pump run times. The existing wet well has a volume of approximately 12,000 gallons. With the average flow of 375 gpm, the wet well would fill up in approximately 30 minutes without bypassing or with the pumps turned off.

METHOD OF MEASUREMENT

HEAVY WASTEWATER CONTROL shall be measured by the Lump Sum acceptably completed.

BASIS OF PAYMENT

HEAVY WASTEWATER CONTROL measured as described, which will be paid at the contract unit price, which shall be full compensation for all materials, labor, equipment, and incidentals necessary to acceptably complete the work as set forth in the description.

BID ITEM 90074 – ALTERNATE BID ITEM #1 - GENERATOR

DESCRIPTION

Work under this bid item shall include providing and installing the emergency generator per the special provisions and plan set. This shall include physically providing the generator, placing the generator on

the generator pad, and making connections to the electric and gas services. The installation of the generator pad and the electric and gas services are not included with this item and should be included with BID ITEM 90070 SANITARY SEWER LIFT STATION.

METHOD OF MEASUREMENT

ALTERNATE BID ITEM #1 – GENERATOR shall be measured by LUMP SUM acceptably completed.

BASIS OF PAYMENT

ALTERNATE BID ITEM #1 – GENERATOR measured as described shall be full compensation for all materials, labor, equipment, and incidentals necessary to acceptably complete the work in accordance with the Plans, Special Provisions, and the City of Madison Standard Specifications for Public Works Construction Latest Edition.



Legend

⊕ Denotes Boring Location

Notes

1. Boring location is approximate
2. Soil Boring performed by Badger State Drilling in April 2021

Scale: Reduced

Job No. C21051-4		SOIL BORING LOCATION MAP Truax Lift Station Replacement Madison, Wisconsin
Date: 5/2021		



LOG OF TEST BORING

Project Truax Lift Station
 Location Madison, WI

Boring No. 1
 Surface Elevation (ft) 855±
 Job No. C21051-4
 Sheet 1 of 1

2921 Ferry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rac (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	w	LL	PL	LI
					9 in. TOPSOIL					
1	10	M	6		FILL: Loose Brown Silty Sand with Gravel					
2	12	M	9	5	Loose, Dark Brown Sedimentary to Fibrous PEAT (PT)					
3	18	M	1		Very Soft, Gray Organic to Lean CLAY, Trace Sand (OH/CL)	(<0.2)				
4	18	W	0	10		(<0.2)				
5	18	W	19	15	Medium Dense, Gray Fine to Medium SAND, Some Silt, Scattered Clay Seams and Lenses (SM) P200= 35.0%					
6	12	W	30	20	Medium Dense to Dense, Light Brown Fine SAND, Little Silt (SP-SM) P200= 5.0%					
7	8	W	32	25	Dense, Brown Fine to Medium SAND, Little Gravel and Silt (SP-SM) P200= 6.1%					
8	18	W	17	30	Medium Dense, Grayish-Brown Silty Fine SAND (SM) P200= 42.0%					
9	10	W	22	35	Medium Dense, Brown Fine SAND, Trace Silt (SP)					
10	0	W	31	40	Medium Dense to Dense, Brown Fine to Medium SAND, Trace Silt and Gravel (SP)					
11	10	W	29	45						
12	12	W	41	50						
					End Boring at 50 ft					
					Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS	GENERAL NOTES
While Drilling ∇ <u>8.5'</u> Upon Completion of Drilling _____ Time After Drilling _____ Depth to Water _____ Depth to Cave in _____	Start <u>4/21/21</u> End <u>4/21/21</u> Driller <u>BSD</u> Chief <u>MC</u> Rig <u>CME-55</u> Logger <u>DB</u> Editor <u>ESF</u> Drill Method <u>2.25" HSA; Autohammer</u>
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.	

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A handwritten signature in black ink, appearing to read "Alan Bush".

26 05 53	Identification for Electrical Systems
26 09 00	Controls and Instrumentation
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DIVISION 33 - UTILITIES

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APPENDIX A

Geotechnical Report

APPENDIX B

City of Madison General Ordinance Section 10.085

APPENDIX C

City of Madison General Ordinance Standard Details

APPENDIX D

TDS Telecom email dated June 20, 2022

SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Work included in contract documents
 - 2. Work under other contracts
 - 3. Contractor use of premises
 - 4. Products ordered in advance
 - 5. Work restrictions
 - 6. Specification and drawing conventions
 - 7. Notifications and protection of existing facilities

- B. Related Documents:
 - 1. Drawing Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. City of Madison Standard Specifications for Public Works Construction, and all Supplemental Specifications, unless otherwise called for on the plans and specifications.
 - 3. Wisconsin Department of Natural Resources Technical Standards, Latest Edition.

1.02 WORK INCLUDED IN CONTRACT DOCUMENTS

- A. **Description of the Overall Project.** Replace the existing Truax Lift Station No. 16 located at 2701 Anderson Road.
- B. Type of Contract: Owner will award a Single Prime Contract to Construction Contractor.

1.03 WORK UNDER OTHER CONTRACTS

- A. Other work at site: none.

1.04 CONTRACTOR USE OF PREMISES

- A. Confine operations at Site to areas permitted under contract or as directed by Owner and Engineer.
- B. Conform to site rules and regulations affecting Work while engaged in Project construction.
- C. Existing Structures:
 - 1. 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 within the work zones.
- 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.

1.05 PRODUCTS ORDERED IN ADVANCE

- A. Storage:
 - 1. Products will not be allowed to be stored at the Site prior to commencement of construction activities.
 - 2. Contractor shall store such items off site and bring to site as needed.

1.06 WORK RESTRICTIONS

- A. Work Hours: Limit work including equipment operation to working hours of 7:00 a.m. to 5:00 p.m., Monday through Saturday, except as otherwise indicated. It is understood that the site will need to be occupied after hours for the purposes of continuing bypass pumping and dewatering.
 - 1. Sunday work is prohibited.
- B. Existing Utility Interruptions: Do not interrupt utilities unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner and Engineer not less than 48 hours in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner and Engineer not less than 48 hours in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Controlled Substances: No use of controlled substances on the Project site will be permitted.

1.07 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published herein.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.08 NOTIFICATIONS AND PROTECTION OF EXISTING FACILITIES

- A. Diggers Hotline – CONTRACTOR is to contact Diggers Hotline a minimum of three working days prior to construction. Property Location is 2701 Anderson Road.
- B. Utilities. Known utility contacts include:
 - 1. Madison Gas & Electric – Electric: Roger Ahles, Phone (608) 252-5682, email: rahles@mge.com
 - 2. Madison Gas & Electric – Gas: Mark Bohm, Phone (608) 252-4730, email: mbohm@mge.com
 - 3. AT&T: Brian Scholz, Phone (608) 888-5555, email: bs3154@exo.att.com
 - 4. TDS Telecom: Mike Sweet, Phone (608) 664-4539

5. MCI(Verizon): R. J. Cicatello, Phone (262) 232-1323
6. Lumen Technologies: Kent Holmquist, Phone (608) 598-9667
7. Bear Communications: Phone (608) 444-9056
8. Century Link: Phone (877) 366-8344
9. MCI: Phone (800) 289-3427
10. Wisconsin National Guard: Phone (608) 444-6240

- C. Protection of Existing Facilities. CONTRACTOR shall suitably protect or maintain a safe working distance from public utilities and municipal utility infrastructure.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

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.

1.03 SUBMITTALS

- A. Substitution Request After Bid: 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.
 - 1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for change order proposals.
 - 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related specification section and Drawing numbers.
 - 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product data, including drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by Owner and separate contractors, that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall contract time.
 - f. Cost information, including a proposal of the net change, if any in the contract sum.
 - g. Certification by Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated.
 - h. Include Contractor's waiver of rights to additional payment or time, which may subsequently become necessary because of the failure of the substitution to perform adequately.

B. 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.

C. 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.

D. 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.

E. Engineer's Action:

1. Request Prior to Bid: If approved, substitution will be included in an addendum.
2. 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: Dan Schaeffer, PE
 Short Elliott Hendrickson Inc.
 809 North 8th Street, Suite 205
 Sheboygan, WI 53081-4032
 920.452.6603

PROJECT: Yorkville Wastewater Treatment Facility Improvements

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 No
 If yes, which project? _____

**All questions must be answered. Incomplete forms will not be reviewed.
 Include a self-addressed, stamped envelope for reply.**

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 _____	

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 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 his 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. 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

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
- B. Related Sections:
 - 1. Section 01 31 13 - Coordination
 - 2. Section 01 33 00 - Submittal Procedures

1.02 PRECONSTRUCTION CONFERENCE

- A. Scheduled by Engineer at Site 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, Consultants, Contractors, major subcontractors, other concerned parties represented by persons familiar with and authorized to conclude matters relating to Work.
- C. Agenda:
 - 1. Items of significance that could affect progress including, but not limited to:
 - a. Submittal of executed bonds and insurance certificates.
 - b. Execution of Owner-Contractor Agreement if not previously completed.
 - c. Distribution of Contract Documents.
 - d. Use of premises by Owner and Contractor:
 - 1) Owner's requirements and occupancy.
 - 2) Construction facilities provided by Owner (if any).
 - 3) Temporary utilities provided by Owner (if any).
 - 4) Use of premises office, work, and storage areas.
 - e. Security and housekeeping procedures.
 - f. Submittals:
 - 1) Final list of subcontractors, suppliers, products.
 - 2) Schedule of Values.
 - 3) Progress Schedule.
 - 4) Designation of responsible personnel:
 - a) Contractor's principal staff and consultants.
 - b) Contractor's superintendent or job foreman acting as Contractor's Site representative.
 - c) Owner's and Contractor's designated individuals authorized to sign Change Orders, field modifications, and monthly pay requests.
 - g. Procedures for processing:
 - 1) Field decisions.
 - 2) Submittals:
 - a) Shop Drawings.
 - b) Product Data.
 - c) Samples.
 - 3) Substitutions.
 - 4) Applications for Payments.
 - 5) Proposal requests.

- 6) Change Orders.
- 7) Contract Closeout.
- h. Schedules:
 - 1) Tentative construction schedule.
 - 2) Critical Work sequencing.
 - 3) Progress meetings.
- i. Procedures for testing.
- j. Procedures for maintaining Record Documents.
- k. Requirements for startup of equipment: Inspection and acceptance of equipment put into service during construction period.
- l. Equipment deliveries and priorities.
- m. Contractor responsibilities:
 - 1) Safety procedures.
 - 2) First aid.

1.03 PROGRESS MEETINGS

- A. Contractor:
 - 1. Schedule and administer monthly 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 (2 to Engineer and Owner) within 2 days to participants, and entities affected by decisions at the meetings.
 - 4. If Contractor does not preside, record, and distribute meeting notes, Engineer will do so at Engineer's standard hourly rate submitted to Owner. An equivalent amount will be deleted from Contract by Work Change Directive.
- B. Attendees:
 - 1. Contractor, 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.

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 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 10 days after date of Notice to Proceed. After review, resubmit required revised data within 10 days.
- B. Submit revised Progress Schedule with each Application for Payment.
- C. Submit 1 electronic copy in PDF format 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. Material Safety Data Sheets
 - 9. Payment Schedule

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. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.
- E. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- 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 AIA Form G703, Contractor's standard form or media-driven printout.
- 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 a directly proportional amount of Contractor's overhead and profit.
- D. 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 his approval stamp and signature.
- B. Submit all Shop Drawings electronically in pdf format via the Project website.
- C. Submit showing system fabrication, installation drawings including plans, elevations, section details of components, and configuration between system and adjoining systems.

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 the Project website.
- 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. Submit samples for selection of finishes within 90 days after date of Contract.
- 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 MATERIAL SAFETY DATA SHEETS

- A. Submit MSDS to the Site on all products with chemical emissions and as called for in individual technical sections.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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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. Telephone services and Internet Access.
 - 6. Heat.
 - 7. Sanitary facilities.
 - 8. Sewers and drainage.

- B. Related Requirements:
 - 1. Section 01 57 00 - Temporary Controls

1.02 PRICE AND PAYMENT PROCEDURES

- A. Temporary Utilities 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.
- B. 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 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.

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 lift station on a continuous basis until new lift station can be constructed, tested, and placed into service.
- B. Connection to water supply shall be approved by Owner where usage can be metered and system sanitation can be maintained.

- C. 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.
- D. Maintain temporary distribution system to avoid damage to existing or new permanent distribution system.
- E. 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.
- F. Damages to permanent plumbing related to temporary building connections shall be corrected and paid for by the Contractor.
- G. Disinfect temporary service lines, headers, connections, and appurtenances in accordance with Minnesota Health Department and AWWA C651 rules and regulations.
- H. Protect temporary water system from freezing.

3.03 CONSTRUCTION WATER

- A. Owner will pay for water used for construction purposes.
- B. Secure water necessary for construction and testing and pay service connection charges.
- C. Install water service and distribution piping of sizes and pressures adequate for construction purposes.
- D. Where available supply of potable water is inadequate, provide non-potable water for purposes other than drinking and washing.
- E. Where non-potable water is used, provide warning signs on the discharge end of each length of hose and at the shut-off nozzles.
- F. 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.
- G. Trades needing a larger source of water are responsible for the source and distribution.
- H. Exercise control over usage to conserve water.
- I. Sterilize temporary water piping for potable water prior to use.
- J. Maintain distribution system to avoid damage to existing or new construction.
- K. 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. It will be necessary for the Contractor to provide temporary re-routing of electrical power to the existing lift station, in order to construct the new lift station.
- 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. When permanent power and lighting systems are in operation, they may be used for construction purposes.

- D. 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.
- E. Install service and grounding in compliance with NFPA 70. Include necessary meters, transformers, overload protected disconnect, and main distribution switch gear.
- F. Connect temporary service to local electric power company main as directed by electric company officials.
- G. Install temporary service with an automatic ground-fault interrupter feature, activated from circuits of the system.
- H. 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.
- I. Provide identification/warning signs at power outlets that are other than 110 to 120 volt power.
- J. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110 to 120 volt plugs into higher voltage outlets.
- K. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
- L. 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 TELEPHONE SERVICES AND INTERNET ACCESS

- A. Contractor shall maintain and pay for telephone (and fax machine) on Site for use of Contractors, Engineers, Architect, and others who have legitimate need for telephone communication in pursuit of Work of this Project.
- B. Arrange for local telephone company to install temporary service. Install telephone on a separate line for each temporary office and first aid station.

- C. At each telephone location post a list of important telephone numbers, including:
 - 1. Local police and fire departments.
 - 2. Doctor.
 - 3. Ambulance service.
 - 4. Contractor's offices.
 - 5. ENGINEER's offices.
 - 6. Subcontractor's offices.
- D. Provide high speed internet access if available in area.

3.07 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.
 - 2. Do not use open burning or salamander type heating units unless authorized by Engineer.
- 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.
- 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 of 50 degrees in permanently enclosed portions of the structures and areas where finished Work has been installed.

3.08 SANITARY FACILITIES

- A. Provided by Contractor for workers engaged in this Work.

3.09 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.
- 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.

3.10 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 13

FIELD OFFICE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and maintaining field office for use by Contractor, subcontractors, and Engineer during construction operations.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 51 00 - Temporary Utilities
- C. Basis of Payment: Incidental to Mobilization.

1.02 DESCRIPTION

- A. Basic Requirements:
 - 1. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
 - 2. Minimum 8-foot wide and 7-foot ceiling height.
 - 3. Minimum 120 square feet of usable space.
 - 4. Weatherproof and insulated.
 - 5. Finished interior walls.
 - 6. Heating and air conditioning system: See Section 01 51 00.
 - 7. Telephone service: See Section 01 51 00.
 - 8. Electrical service: See Section 01 51 00.
 - 9. Lighting: 50-foot C at desktop height and exterior lighting at entrance doors.
 - 10. Internet access: See Section 01 51 00.
- B. Furnishings:
 - 1. Desk and chair.
 - 2. Flat surface large enough to examine Construction Documents.
 - 3. Drawing rack.
 - 4. Conference table and chairs to seat at least 6 persons.
 - 5. Telephone.
 - 6. Answering machine.
 - 7. Wastebasket.
 - 8. Potable water supply.
 - 9. Fire extinguisher.
 - 10. Six adjustable-band protective helmets for visitors.
 - 11. One 10-inch outdoor weather thermometer.

1.03 LOCATION

- A. Locate to provide convenient access to construction Site and as provided on Drawings or determined in field by Engineer.
- B. Subject to Owner's approval.
- C. Existing facilities shall not be used for field offices.
- D. Designated existing spaces may be used for field offices.

- E. When permanent facilities are enclosed with operable utilities, relocate offices into building, with written agreement of Owner, and remove temporary buildings.

1.04 SCHEDULE

- A. Provide facility and services upon commencement of construction or within 10 days after date fixed in Notice to Proceed.
- B. Remove building, utilities, and foundation upon completion and acceptance of Work. Restore area.

1.05 MAINTENANCE

- A. Maintain, clean, and repair field office and services to ensure proper working order throughout the duration of construction operations.
- B. Maintain approach walks free of mud, water, and snow.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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
 - 4. Section 01 57 00 - Temporary Controls
 - 5. City of Madison standard specifications for earthwork and paving bases

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 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. Barriers.
 - 7. Protection:
 - a. Shoring and bracing.
 - b. Enclosures.
 - c. Installed work.
 - d. Security.
 - e. Fire protection.
 - 8. Site cleaning.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 52 13 - Field Office
 - 3. Section 01 55 10 - Access Roads and Parking Areas
 - 4. Section 02 41 11 - Demolition, Removal and Disposal

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements: As a minimum, comply with local, state, and federal requirements.

1.03 DRAINAGE CONTROL

- A. Refer to Civil Drawings.
- 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.

1.04 DUST CONTROL

- A. Refer to Civil Drawings.
- B. Execute Work by methods to minimize raising dust from construction operations.
- C. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.05 EROSION AND SEDIMENT CONTROL

- A. Refer to Civil Drawings.
- 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.

1.06 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.

1.07 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.08 BARRIERS

- A. Reference: See Section 02 41 11, and Civil Drawings.
- B. Provide barriers as required to:
 1. Prevent public entry to construction areas.
 2. Protect existing facilities, designated plantings and trees, and adjacent properties from damage from construction activities.
- C. Construction:
 1. Type: Contractor's option.
 2. Height: 4-foot.
 3. Gates: Equip with vehicular and pedestrian gates with locks.
- D. Access: Provide barricades and covered walkways as required for public rights-of-way, for public access to, and emergency egress from existing buildings.

1.09 PROTECTION

- A. Shoring and Bracing:
 1. Refer to Civil Drawings.
 2. Provide temporary shoring, bracing, and protection as required for installation and protection of Work.
 3. Ensure adequacy of such items.
 4. Repair or replace damaged Work occasioned by inadequate temporary supports.
 5. Leave temporary shoring and bracing in place until permanent construction is complete to point where installed Work is properly supported.
- B. Enclosures:
 1. Exterior:
 - a. Provide temporary weather-tight closures of openings in exterior surfaces to:
 - 1) Provide acceptable working conditions and protection for materials.
 - 2) To allow for temporary heating.
 2. Interior:
 - a. Provide temporary partitions and ceilings as required to:
 - 1) Separate Work areas from Owner-occupied areas.

- 2) Prevent penetration of dust and moisture into Owner-occupied areas.
- 3) Prevent damage to existing areas and equipment.
- b. Construction:
 - 1) Framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces.
 - 2) STC rating of 35 in accordance with ASTM E90.
 - 3) Paint Surfaces exposed to view in Owner occupied areas.
 - 4) One-hour rated fire resistant construction.
- C. Installed Work:
 1. Provide temporary protection for installed products; control traffic in immediate area to minimize damage.
 2. Provide protective coverings at walls, projections, jambs sills, and soffits of openings; protect finished floors and stairs from traffic, movement of heavy objects.
 3. Prohibit traffic and storage on waterproofed and roofed surfaces or on lawn and landscaped areas.
- D. Security:
 1. Provide security program and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, and theft.
 2. Provide doors in enclosures with self-closing hardware and locks.
 3. Provide temporary locks for doors installed in Work.
- E. Fire Protection:
 1. Fire extinguishers shall be non-freeze type such as A-B-C rated dry chemical of not less than 10-pound capacity.
 2. Provide and maintain in working order during entire construction period, a minimum of 1 fire extinguisher in construction area and 1 in field office.
 3. Contractors who maintain enclosed sheds on the premises shall provide and maintain, in an accessible location, a minimum of 1 non-freezing type extinguisher in each shed.
 4. Each Contractor using open flame (i.e., welding or soldering) shall have a 10-pound minimum extinguisher within closest practical distance.

1.10 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 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).
 - 3. New products consisting of recycled materials are allowed unless stated otherwise in technical sections.
 - 4. Products shall contain no asbestos containing material (ACM).

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 permanent nameplate on each item of service-connected or power-operated equipment.
 - b. Locate on an easily accessible surface that is inconspicuous in occupied spaces.
 - c. 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 and 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 23
FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Field engineering provided by Contractor.
 - 2. Site layout.
 - 3. Staking.
 - 4. Quantity surveys and computations.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
- C. Method of Measurement: All field engineering will be considered incidental to the Work.

1.02 SUBMITTALS

- A. Submit name and qualifications of surveyor that will perform Work.
- B. Submit log or other records of all survey Work completed.
- C. Submit copies of measurement and calculations for quantity surveys.

1.03 QUALITY ASSURANCE

- A. All Work in this Section shall be under the direction of a surveyor registered in the State in which the Project is located.

1.04 SITE CONDITIONS

- A. Benchmarks and control points are identified on the Drawings.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify locations of control points prior to start of Work.
- B. Relate information given on the Drawings to existing Site conditions.
- C. Promptly advise Engineer of any discrepancies.

3.02 PREPARATION

- A. Protect and preserve all benchmarks and control points.

- B. Advise ENGINEER of the required relocation of any reference points due to grade changes or other reasons.
- C. Replace dislocated reference points based on original survey control.

3.03 SURVEY REQUIREMENTS

- A. Staking:
 - 1. Establish locations, layouts, lines and elevations by instrumentation and similar methods for all improvements.
 - 2. Tolerances:
 - a. Horizontal Distances: 1/7500
 - b. Horizontal Angles: 0 degrees - 00 minutes - 00 feet - 01 inches
 - c. Elevation:
 $0.050ft.x\sqrt{length (miles)}$
 - 3. Maintain log or record book indicating all Work completed for review and submittal.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Procedures for administration of cutting and patching of existing structures and buildings.
 - a. Submittals.
 - b. Quality assurance.
 - 2. Materials.
 - 3. Examination: Site conditions.
 - 4. Preparation:
 - a. Temporary Support.
 - b. Protection.
 - 5. Construction:
 - a. Special techniques.
 - b. Interface with others.
 - 6. Cleaning.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Individual Specification Sections inferred by Cutting and Patching required.

1.02 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Schedules:
 - 1. Initial Schedule:
 - a. 5 days prior to proposed start of work, submit to Engineer **electronic** copies of schedule of work involving cutting or patching.
 - 2. Utility Schedule:
 - a. Include with initial schedule the following utility information:
 - 1) Which utilities will be disturbed or affected, including those that will be relocated or temporarily out-of-service.
 - 2) Length of time service will be disrupted.
 - 3. Revised Schedules: Submit 6 copies of updated schedules not less than once per week.
- C. Structural Elements: Where cutting and patching involves addition to reinforcement to structural elements, submit 6 copies of Shop Drawings including all details and structural calculations showing how reinforcement is integrated with the original structure.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Personnel: Employ skilled workers.
- B. Regulatory Requirements:
 - 1. Structural Work Limitations:
 - a. Do not cut and patch structural elements in manner to reduce load-carrying capacity or load-deflection ratio. Obtain acceptance of cutting and patching proposal before cutting and patching following structural elements:
 - 1) Foundation construction.
 - 2) Bearing walls.

- 3) Structural concrete.
 - 4) Structural steel.
 - 5) Lintels.
 - 6) Structural decking.
 - 7) Miscellaneous structural metals.
 - 8) Equipment supports.
- b. Operational and Safety Limitations:
- 1) Do not cut and patch operating elements or safety related components in manner to reduce their capacity to perform as intended, or result in increased maintenance or decreased operational life and safety. Obtain acceptance of cutting and patching proposal before cutting operating elements or safety related systems.
 - 2) Visual Requirements:
 - a) Do not cut and patch construction exposed on exterior or in occupied spaces in manner to, in Engineer's opinion, reduce structure's/building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in visually unsatisfactory manner. If possible, retain project contractors to patch following categories of exposed work, otherwise engage other recognized experienced, specialized firms including, but not limited to:
 - (1) Special concrete finishes.
 - (2) Masonry.
 - (3) Stucco and plaster.
 - (4) Acoustical ceilings.
 - (5) Ceramic tile.
 - (6) Flooring.
 - (7) Roofing.
- c. Preinstallation Meetings: Before proceeding, meet at Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures, resolve potential conflicts before proceeding.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Identical to existing materials. If not available or not usable where exposed surfaces are involved, match existing adjacent surfaces to fullest extent possible with regard to visual effect. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Conditions: Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. If unsafe or unsatisfactory conditions are encountered, correct before proceeding.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut.
- B. Protection:
1. Prevent damage to existing construction. Protect portions of project that might be exposed during work from adverse weather conditions.
 2. Avoid interference with use of or free passage to adjoining areas.
 3. Take necessary precautions to avoid cutting existing pipe, conduit, ductwork.

3.03 CONSTRUCTION

A. Special Techniques:

1. Cutting:

a. General:

- 1) Use methods least likely to damage elements to be retained or adjoining construction. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- 2) Equipment:
 - a) Hand or small power tools designed for sawing or grinding. For concrete and masonry, use cutting machine such as carborundum saw or diamond core drill.
- 3) Existing finished surfaces: Avoid marring; cut or drill from exposed or finished side into concealed surfaces.
- 4) Excavating and Backfilling: Comply with requirements of applicable Sections of Division 31.
- 5) Utility services:
 - a) Where services are shown or required to be removed, relocated or abandoned, bypass before cutting.
 - b) Cut off pipe or conduit in walls or partitions to be removed.
 - c) Cap, valve or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture, other foreign matter after by-passing and cutting.

b. Patching:

- 1) Seams: Durable, invisible as possible.
- 2) Exposed finishes:
 - a) Restore, extend finish restoration into retained adjoining construction in manner to eliminate evidence of patching and refinishing.
 - b) Where finished areas extend into others, patch and repair floor and wall surfaces in new space to provide even surface of uniform color and appearance. Remove existing floor and all coverings, replace with new materials, if necessary to achieve uniform color and appearance.
 - c) Where patching occurs in smooth painted surface, extend final paint coat over entire unbroken area containing patch, after patched area has received primer and second coat.
 - d) Patch, repair, rehang existing ceilings as necessary to provide even plane surface of uniform appearance.

- B. Interface with Others: Cut to provide for installation of other components or performance of the reconstruction activities and subsequent fitting and patching required to restore surfaces to original condition.

3.04 CLEANING

- A. Thoroughly clean areas, spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty, similar items. Thoroughly clean piping, conduit, similar features before painting or other finishing is applied. Restore damaged pipe covering to original condition.

END OF SECTION

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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 33 00 - Submittal Procedures
 - 2. Section 01 77 00 - Closeout Procedures
 - 3. Section 01 78 23 - Operation and Maintenance Data
 - 4. 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.

1.03 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. Provide a video tape of 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.
 - 6. Pest control.

- 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.
 - 4. Bonding and insurance:
 - a. Consent of Surety to Reduction In or Partial Release of Retainage (if Performance Bond provided).
 - b. Advise Owner of pending insurance change-over-requirements (if Builder's Risk Insurance is provided by Contractor).

- 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. Contractor's Affidavit of Release of Liens.
 - e. Consent of Surety (if Performance Bond provided).
 - 1) To Partial Release of Retainage.
 - 2) To Final Payment.

- f. Assurance that unsettled claims will be settled.
 - g. Proof that fees and similar obligations have been paid.
 - h. Evidence of final, continuing insurance coverage complying with insurance requirements.
 - i. Notarized certification of compliance with wage rate requirements.
 - j. 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.
2. Warranties: Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, similar documents on, but not limited to, the following items:
- a. Siding.
 - b. Roofing.
 - c. Flashings.
 - d. Doors.
 - e. Hardware.
 - f. Glazing.
 - g. Curtain wall systems.
 - h. Resilient flooring.
 - i. Carpet.
 - j. Wall coating system.
 - k. Visual display boards.
3. Maintenance:
- a. Materials (each type and color):
 - 1) Masonry.
 - 2) Tile.
 - 3) Ceiling panels.
 - 4) Acoustical wall panels and fabric.
 - 5) Resilient tile and vinyl base.
 - 6) Resilient sheet vinyl.
 - 7) Carpet.
 - 8) Paint.
 - 9) Fuses.
 - b. Maintenance instructions.
 - c. Maintenance services:
 - 1) Overhead doors.
 - d. HVAC Balancing Reports.
 - e. Maintenance manuals: See Section 01 78 23
 - 1) Organize operating, maintenance data into suitable sets of manageable size.
 - 2) 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.
 - 3) Include:
 - a) Emergency instructions.
 - b) Spare parts listing.
 - c) Copies of warranties.
 - d) Wiring diagrams.
 - e) Recommended "turnaround" cycles.
 - f) Inspection procedures.
 - g) Shop Drawings and Product Data.
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.
 - c. Inspection Reports:
 - 1) Alarm tests.
 - 2) Fire sprinkler test.

- 3) Elevator.
 - 4) Meter readings.
- B. Record Drawings: Submit to ENGINEER and Owner 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 tape 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

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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:
 - 1. Organize operation, maintenance data for equipment prepared in the form of an instruction manual of manageable size.
 - 2. 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.
 - 3. 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.
 - 4. Clearly mark each sheet of product data to specify products, component parts, and data applicable to installation; delete inapplicable information.
 - 5. Drawings and photographs shall have reinforced, punched binder tabs. Bind in with text, folding larger drawings to size of text pages.
- C. Submittal Schedule:
 - 1. Submit electronic copies of preliminary draft of contents no later than 45 calendar days after approval of Shop Drawings.
 - 2. Submit 6 individually bound copies and one electronic copy 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 6 copies 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, shutdown, 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.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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. Separate Prime Contracts:
 - 1. Each prime Contractor is responsible for warranties related to its own contract. Each Contractor shall warrant their work for labor and material for 1-year minimum. This warranty shall include material purchased directly by Owner and installed by Contractor. Warranty requirements noted in individual sections may exceed this 1-year minimum; if it does, the warranty shall apply for the stipulated time 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.

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

SECTION 02 41 11

DEMOLITION, REMOVAL AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Demolition, removal and disposal of:
 - a. Concrete
 - b. Miscellaneous items
 - 2. Backfilling of resulting depressions.
- B. Refer to Civil Drawings:
- C. Method of Measurement:
 - 1. Measurement by Lump Sum:
 - a. Concrete removal and disposal:
 - 1) Shall include all concrete, regardless of condition, within the grading limits.
 - 2) Shall include all necessary labor, equipment and permits.
 - b. Miscellaneous removal and disposal:
 - 1) Shall include all wood, steel, asphaltic, building materials and all other items unsuitable for backfill within the grading limits.
 - 2) Shall include all necessary labor, equipment and permits.
- D. Basis of Payment:
 - 1. The backfilling of depressions resulting from removals shall be considered as embankment.
 - 2. Payment for removal items shall be included in the contract lump sum bid price. All associated work items shall be considered incidental.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 REMOVAL OPERATIONS

- A. Remove all concrete within 10 feet of the proposed new structures.
- B. Remove concrete for existing structures to be demolished to a minimum of 2 feet below subgrade.
- C. Any concrete slabs remaining below subgrade shall be broken or drilled to allow for drainage.

3.02 BLASTING

- A. Adhere to the Wisconsin Administrative Code on explosives and all local ordinances.
- B. Contractor will be held solely responsible for any damage to adjacent property due to blasting operations.
- C. Submit a blasting schedule for approval.

3.03 DISPOSAL OF MATERIALS AND DEBRIS

- A. Dispose of all materials in accordance with all applicable laws and ordinances.

- B. Obtaining disposal sites shall be the responsibility of the Contractor.
- C. No burning shall be allowed.
- D. All surplus excavated materials shall become the property of the Contractor for disposal.

3.04 BACKFILLING DEPRESSIONS

- A. Backfill all depressions resulting from removal.

END OF SECTION

SECTION 02 41 33

REMOVING PAVEMENT AND MISCELLANEOUS STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Removal and disposal of:
 - a. Pavements.
 - b. Sewers and appurtenances.
 - c. Culverts.
 - d. Guard rail.
 - e. Abandoned structures.
 - 2. Salvaging of designated materials.
 - 3. Backfilling of resulting depressions.
- B. Refer to Civil Drawings:
- C. Basis of Payment:
 - 1. Removal of bituminous curbing and bituminous pavements less than 6 inches thick shall be considered incidental.
 - 2. Items identified for salvage which are damaged by the Contractor's negligence shall be replaced at Contractor's expense.
 - 3. Payment for removal, salvage or abandon items shall be included in the contract lump sum bid price. All associated work items shall be considered incidental.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Sawing Pavement:
 - 1. Saw concrete pavement along removal lines to a depth 1/3 of the pavement thickness.
 - 2. Saw bituminous pavement along removal lines through entire pavement thickness.
 - 3. Produce a neat, square edge prior to restoration.
- B. Protect all in place structures and facilities not designated for removal.

3.02 REMOVAL OPERATIONS

- A. Remove only structures and facilities that have been so 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.
- D. Completely remove structures that are designated for removal.
- E. Whenever possible, remove concrete to an existing joint.

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.
- E. All surplus excavated materials shall become the property of Contractor for disposal.

3.04 BACKFILLING DEPRESSIONS

- A. Backfill all depressions resulting from removals.

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. Related Sections:
 - 1. Section 33 32 16 – Packaged Utility Wastewater Pumping Stations

1.02 REFERENCES

- A. ASTM - American Society for Testing Materials
- B. International Association of Corrosion Engineers (NACE)
- C. International Concrete Repair Institute (ICRI)
- 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. Dry Film Thickness (DFT): Minimum dry coating thickness.
- C. SFPG: Square feet per gallon.
- D. VOC: Volatile Organic Compounds.
- E. Regional: The state in which the Project is located and surrounding states.
- F. LEL: Lower Explosion Limit.
- G. 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.
- H. Moderate Service: Surfaces subject to normal exposure and moderate humidity. Includes concrete, concrete masonry, structural steel, miscellaneous metals, doors, and frames.
- I. Severe Service: Surfaces subject to frequent splashing, spilling, and exposure to high humidity and condensation. Includes structural steel, miscellaneous metals, piping, valves, and equipment.
- J. Immersion Service: Surfaces subject to immersion, or constant exposure to high humidity and condensation.

1.04 SUBMITTALS

- A. Manufacturer current Product Data sheets.
 - 1. Coatings
 - 2. Abrasive(s)
 - 3. Additives (as applicable)
- B. Material Safety Data Sheets (MSDS) 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 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 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 PRODUCTS MANUFACTURERS

- A. Coatings/Fillers:
 - 1. Acceptable Manufacture: Subject to compliance with specified requirements, acceptable manufacturers and products are:
 - a. Raven
 - b. BASF www.basfbuildingsystems.com
 - c. General Polymers Corporation (GPC) www.generalpolymers.com
 - d. AW Cook (Cemtec Concrete Repair) www.awcook.com
 - e. Sherwin-Williams (SWC) www.sherwin.com
 - f. Tnemec (TCI) www.tnemec.com
- 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
- 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.

1.10 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 2 EXECUTION

2.01 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.

2.02 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: NAPF 500-03-04 Abrasive Blast Cleaning.
- L. Re-blast all Surfaces:
1. Where rusting has recurred.
 2. That do not meet the above requirements.

2.03 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.

2.04 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.

2.05 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".

2.06 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.

2.07 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.

2.08 SCHEDULES

A. See the following pages.

ROOM FINISH SCHEDULE

LOCATION	COATING SYSTEM No.	COATING TYPE
Lift Station		
Ductile Iron Pipe (Valve Vault)	D3	100% Solids Epoxy
Concrete (interior of new Manholes, Wet Well and Valve Vault)	C4	100% Solids Epoxy

COATING SYSTEMS

SYSTEM NUMBER	TYPE	SUBSTRATE / SERVICE	SURFACE PREP	MFG	FIRST COAT	DFT (Mils)	SECOND COAT	DFT (Mils)	NOTES
C4	100% Solids High Build Epoxy	Concrete	P13 4.3.1	SWC	Corobond 100	4.0 – 6.0	Duraplate 5900	30.0 – 40.0	Fill bugholes and voids with Steel Seam FT 910 or Duraplate 2300. Duraplate 5900 may be apply up to 125.0 mils DFT where required.
					Series 201	4.0 – 6.0	Series 435	30.0 - 40.0	
D3	100% Solids High-Build Epoxy	Ductile Iron Pipe Exterior (Moist Environment)	P15	SWC	Duraplate 235	3.0 - 6.0	Duraplate 5900	15.0 – 40.0	Fill bugholes and voids with Series 215 or Series 218.
				TCI	Series N69	3.0 – 5.0	Series 435	15.0 – 40.0	

END OF SECTION

DAILY APPLICATION RECORD

RECORD EVERY 3 HOURS

DATE		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						
TIME STOP							

Area Prepared _____

Area Coated _____

Type of Material & Quantity Applied: _____

SIGNED

PROJECT NAME: _____

OWNER: _____

SEH FILE No.: _____

CONTRACTOR: _____

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, apply to this Section.

1.02 SUMMARY

- A. Scope of Work:
 - 1. The work included under Division 26 shall consist of furnish labor and materials necessary for the complete installation of electrical systems shown on the Contract Drawings and Specifications. Includes work at:
 - a. Lift station
 - 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 reasonable necessary to complete the installation and usually included in similar work even though not specifically mentioned in the Contract Document.
 - 4. Deviations due to particular manufacturer's requirements shall be provided at no additional cost.
 - 5. Coordinate with general contractor and other disciplines.
 - 6. Factory-trained manufacturer's representative to provide operator training.
 - 7. Provide record drawings and documents.
- B. Related Requirements:
 - 1. 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, 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 electrical contractor.
- B. Provide inspections as requested by each contractor and 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 authority having jurisdiction.
- C. 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 drawing and specifications are in conflict with these codes, notify the Engineer prior to rough-in.
- C. The following is a 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: In addition to conduit includes fittings, hangers, pullboxes, 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 beams, joist bridging shall not be used for supporting electrical equipment.
 - 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 as a result 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.

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.

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 GAS AND ELECTRICAL SERVICE - UTILITY

- A. Coordinate with Madison Gas and Electric (MG&E) for new gas service and modified electric service to the site. Cost of gas and electric services to be paid for by Owner.
 - 1. Consult with MG&E to verify service information.
 - 2. Consult with MG&E regarding service entrance requirements and metering equipment.
 - 3. Install metering equipment and empty conduit for metering conductors to meet standards and requirements of MG&E.
 - 4. Coordinate schedule for installation of electric service with MG&E.
- B. Gas and Electrical Service Summary:
 - 1. Gas: New service, 750 scfh at 6 – 13 inches of water.
 - 2. Electric: Modified existing 120/208-volt 3-phase 4-wire service to lift station.
- C. MG&E contacts are as follows:
 - 1. Gas: Roger Ahles, Phone (608) 252-5682, email: rahles@mge.com.
 - 2. Electric: Mark Bohm, Phone (608) 252-4730, email: mbohm@mge.com.
- D. Coordinate any electrical service shutdown of the facility with the Owner.

1.10 TEMPORARY ELECTRICAL SERVICE

- A. Provide and maintain a complete temporary electrical power service for the use of all trades during construction.
 - 1. Contractor responsible for temporary electrical services needed.
- B. Provide and maintain a complete temporary lighting services for use by all trades during construction.
 - 1. Provide adequate lighting suitable for conditions for high quality workmanship and for safety throughout the area of construction. Provide minimum requirements of one 200 watt luminaire per each 400 square feet or per room.
 - 2. Provide and maintain an exit and safety lighting system where required by code or OSHA.
- C. Temporary connect existing control monitoring as indicated on Contract Documents.

1.11 WARRANTY

- A. Provide guarantee and maintain the stability of workmanship and material and keep same in good operating condition for a period of one year after final completion of the work as evidenced by issuance of final certificate by the Engineer. Contractor shall provide written warranty statement letter including start and end dates of warranty period.

- 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 or 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 progress of construction to allow for electrical installation.
- B. Install material and equipment in accordance with manufacturers' recommendations, instructions and current NECA and UL standards.
- C. Install equipment and materials to provide required access for servicing and maintenances. Coordinate equipment location with required access panels and doors. Allow ample space for removal of parts that require replacement of servicing.
- D. Coordinate the installation of required supporting devices and sleeves with structural components.
- E. Coordinate with other trades before installing equipment so that conflicts will be adjusted 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 11 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 in finished areas unless noted otherwise.
- I. Drilling:
 - 1. Drill holes in masonry with rotary drills.

2. Properly seal penetrations with an approval fire-rated seal.
3. Verify fire rating of walls prior to work and restore.

3.03 PROTECTION

- A. Contractor shall be responsible for damage of electrical equipment or materials and shall keep clean the materials installed by him until final acceptance of the entire building by the Owner. Contractor shall touch-up equipment with chips or scratch marks.
- 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 exactly specified. In case of dispute, the Owner may remove the rubbish and charge the cost to the Contractor as the Engineer shall determine to be just.

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.

END OF SECTION

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 SUMMARY

- A. Provide:
 - 1. Electrical systems.
 - 2. Minor offsets, bends, saddles and junction boxes.
 - 3. Electric utility permanent power.

1.02 SUBMITTALS

- A. Submit appurtenance embedment plan locating & identifying electrical conduits for approval prior to installation.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Provide materials and equipment listed by Underwriter's Laboratories, Inc. (UL).
 - 2. Comply with installation standards of National Electrical Contractors Association (NECA).
 - 3. Meet codes and regulations of the following:
 - a. State and Local Building Codes.
 - b. State Board of Health.
 - c. State Industrial Commission.
 - d. State and Local Fire Codes and Regulations.
 - e. National Electric Code.
 - f. State and Local Electrical Installation Codes.
 - g. Local Power Company Regulations and requirements.
 - h. Occupational Safety and Health Administration (OSHA) Rules and Regulations.
 - i. Americans with Disability Act.
- B. Inspections:
 - 1. Request required electrical inspection by certified state electrical inspectors.
 - 2. Furnish inspection certificates, signed by electrical inspector, as part of Maintenance Manual submittals.

1.04 STORAGE AND HANDLING

- A. Protect control panel and other electrical components by storing off-site in heated environmentally controlled environment.
- B. Replace or touch up and refinish surfaces of original finishes that becomes chipped or scratched during shipment or installation.

1.05 EXISTING CONDITIONS

- A. Drawings do not purport to show actual field dimensions, but are intended only to establish location and scope of Work.
- B. Field-verify dimensions and assume full responsibility for their accuracy. Discrepancies will be reported in writing to Engineer.

1.06 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. Provide for ease of disconnecting equipment with minimum interference to other installations.
 - 2. Allow right-of-way for piping and conduit installed with a required slope.
 - 3. Connect raceway, cable, wireway, cable tray, and busway to be clear of obstructions and of working and access space of other equipment.

- B. Coordinate installation of support devices and set sleeves in cast-in-place concrete, masonry walls, or other structural components as they are constructed.
- C. Coordinate electrical testing so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underground Marking Tape:
 - 1. Inert plastic, 6 inches wide, yellow or orange colored with the words "Caution Buried Electric Line Below" repeatedly printed along length of tape.
 - 2. Tape shall be Griffolyn Company, "Terratape", or equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Organize Work so it will not interfere with or delay Work of other trades.
- B. Review Drawings and Specifications applying to other trades. Conflicts or interference with Work of other trades shall be brought to the attention of the Engineer, in writing, before beginning installation.
- C. Verify equipment will fit available space and conform to maintenance and code clearances. Do not tie electrical conduit longitudinally to steel reinforcement.
- D. Verify with local utility and pay for service connections, unless specified elsewhere.
- E. Main service switchboards, distribution panelboards, and motor control centers shall not have work performed on them unless completely de-energized.
 - 1. If, due to job conditions, equipment tests, or completion dates, it is necessary to work such equipment live, a written request shall be made to the Engineer.
 - 2. In this case, the following precautions shall be included with Contractor's procedure:
 - a. Install barrier to limit approach of unauthorized personnel.
 - b. Protect live parts and bus completely with insulating blankets.
- F. Obtain permission from Engineer before cutting structural members or finished materials, unless noted otherwise.

3.02 ELECTRICAL INSTALLATION

- A. Materials and Components:
 - 1. Install level, plumb, and parallel and perpendicular to other systems and components, unless otherwise indicated.
 - 2. Exposed parts of electrical wiring system will be square, straight and true with construction.
 - 3. Sleeves:
 - a. Furnish and set wall and floor sleeves required for electrical work.
 - b. Floor sleeves will project 1 inch minimum above floor surface and will be rigid conduit where exposed.
 - 4. Bushings: Install on both ends of communication sleeves for cables not in conduit.
 - 5. Patching: Leave no visible trace.
 - 6. Grouting: Allow weep holes to drain moisture.
- B. Drilling:
 - 1. Properly seal penetrations with an approval fire-rated seal.
- C. Equipment:
 - 1. Install to facilitate service, maintenance, and repair or replacement of components.

2. Provide for ease of disconnection with minimum interference with other installations.
 3. Provide right-of-way to raceways and piping.
 4. Provide raised concrete bases for floor-mounted equipment, including transformers, switchboards, distribution centers, floor-mounted motor starters, and motor control centers.
 - a. Coordinate base height with available space, with minimum width of 4 inches.
 - b. Base will not be less than 4 inches larger, in both directions, than supported unit.
 - c. Follow manufacturer's anchorage recommendations and templates for anchor bolt and tie locations.
 - d. Where a base raises switch handles beyond code limits, the base shall extend in front of equipment to provide for maintenance.
 - e. Where bus ducts pass vertically through floors or slabs, a 4-inch concrete curb will be provided around floor at each duct.
- D. Mounting Heights:
1. Confirm mounting height of electrical and telephone outlets, panels or device either in or on walls and casework.
 2. Prior to installation, verify that specified mounting heights are uniformly adhered to, and that any code-related ADA heights are not conflicting.
 3. Coordinate specified mounting heights with final on-site Record Drawings.
- E. Relocation of Existing Equipment: Remove, store, clean, reinstall, reconnect, and make operational.

3.03 IDENTIFICATION

- A. General Requirements:
1. Label following equipment with identifying names or numbers as specified. Inscriptions not specified shall be as directed by Engineer.
 - a. Motor control switches, disconnects, and starters.
 - b. Panelboards, transformers, cabinets, and pull boxes.
 - c. Time switches, relays, and contactors.
 - d. Switches controlling light fixtures located remote or out of sight of the switches.
 - e. Switches used to control receptacles.
 - f. Ballasts installed remote from lighting fixtures.
 - g. Communications, Computer, Point-of-Sale (POS), and Telephone outlet components.
- B. Labeling in Non-Finished Areas:
1. Switches, Starters, Relays, and Time Switches: 3/8-inch white letters on a black micarta plate.
 2. Pull Boxes: Stencil with 1/2-inch black letters.
 3. Panels and Terminal Cabinets with Doors: 1/2-inch white letters on a black micarta plate located on exterior of panel.
 4. Switchboards, Fusible Panels, and Motor Control Centers: 1/2-inch white letters on a black micarta plate with name of switchboard or motor control center and 3/8-inch white letters on black micarta plate on each switch or starter indicating use of device.
 5. Flush mounted device plates shall be machine engraved.
- C. Labeling in Finished Areas: Panelboard and terminal cabinet nameplates shall be same as above, only mount inside panel door.
- D. Panel Directions: Provide typed panel circuit directions for each new or modified panelboard.
- E. Conductors: Identify in panelboards, terminal cabinets or pull boxes in a neat, permanent manner, by typed directories in panelboards, or by use of tags, pressure sensitive tape or cable ties in terminal cabinets and pull boxes.
- F. Do not use printed or embossed tape.

3.04 DEMONSTRATION

- A. Operating Instructions:
 - 1. Furnish services of competent instructors to give complete instruction in care, adjustment, operation and maintenance of electrical controls, special systems, and communication systems to Owner's employees who are to have charge of equipment.
 - 2. Employ factory-trained instructors wherever possible.
 - 3. Provide instruction during regular work week and at a time just prior to Substantial Completion.

3.05 FIELD QUALITY CONTROL

- A. Test equipment to demonstrate its proper operation to Engineer.
 - 1. No equipment shall be tested or operated for any purpose until it has been fully prepared, connected, and made ready for normal operation.
 - 2. Restore or replace equipment damaged by improper or ill-timed operation or testing before final inspection and acceptance.
- B. Underground Marking:
 - 1. Mark underground electrical lines exterior to building by installation of continuous identifying tape buried in trench above line.
 - 2. Bury tape 6 inches below finished grade.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 PRODUCTS

2.01 CONDUCTORS AND CABLES

- A. Manufacture: Subject to compliance with requirements, provide products by one of the following:
 - 1. Belden Inc.
 - 2. Southwire Company.
 - 3. Alpha Wire Company.
 - 4. Cerro Wire LLC.
 - 5. General Cable Corporation.
 - 6. Senator Wire & Cable Company.
 - 7. Approved Substitution.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2, Type XHHW-2, and Type SO.
- D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for Type SO.

2.02 CONNECTORS AND SPLICES

- A. Manufacture: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney: EGGG Electrical Group LLC.

4. 3M: Electrical Products Division.
5. Tyco Electronics Corporation.
6. Approved Substitution.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.03 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 NFPA 70.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper, stranded. No solid wiring.
- B. Branch Circuits: Copper, stranded. No solid wiring. VFC cable shall be extra flexible stranded.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Feeders: Type XHHW-2, single conductors in raceway.
- C. Branch Circuits: Type THHN/THWN-2, single conductors in raceway.
- D. Cord Drops and Portable Appliance Connections: Type SO, hard service
- E. cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- F. VFD Output Circuits: Type TC-ER cable with braided shield.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "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 26 05 29 "Hangers and Supports for Electrical Systems."
- F. New cables shall be continuous, without splicing. Splice is only permitted to extend existing conductors where called out on drawings.

3.04 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 and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "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.

3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 - 1. 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.
 - a. Generator.
 - b. Transfer switch
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. 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.
- D. Cables will be considered defective if they do not pass tests and inspections.

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, apply to this Section.

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment, plus the following special applications:
 1. Service grounding.
 2. Underground distribution grounding.
 3. Foundation steel electrodes.
 4. Equipment grounding.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 1. Test wells.
 2. Ground rods.
 3. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 1. Include the following:
 - a. Instructions for periodic testing and inspection of grounding features at test wells grounding connections for separately derived systems based on NFPA 70B.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
- B. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- 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 UL 467 for grounding and bonding materials and equipment.

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.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

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.

2.04 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

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.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches (600 mm) below grade.

- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical equipment.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
- B. Provide grounding per detail on drawings.

3.03 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator. The ground connection shall be terminated at the ground bus in the electrical room.
- B. Transformer: Each low-voltage transformer shall have its neutral connection on the secondary side connected directly to the ground bus located in

3.04 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches (150 mm) from the foundation.

3.05 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. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.
- H. Metallic Fences: Comply with requirements of IEEE C2.
 - 1. Grounding Conductor: Bare copper, not less than No. 8 AWG.
 - 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
 - 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.06 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. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12 inches (300 mm) deep, with cover.
1. Test Wells: Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. 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.
- F. 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.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- I. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.07 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
- G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 29

HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.03 DEFINITIONS

- A. RMC: Rigid metal conduit.

1.04 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.

1.05 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.

1.06 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.07 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.

PART 2 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Stainless Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. 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 malleable iron.
- E. Stainless Steel for Fabricated Supports and Restraints.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 2. Concrete Inserts: Stainless steel slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Stainless Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 4. Through Bolts: Stainless steel, structural type, hex head, and high strength.
 - 5. Toggle Bolts: All-steel springhead type.
 - 6. Hanger Rods: Threaded stainless 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.

PART 3 EXECUTION

3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted 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.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, RMC may be supported by openings through structure members, as permitted in NFPA 70.

- C. 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).
- D. 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: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 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.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. 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.
- 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. Touchup: Comply with requirements in Painting section in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780

END OF SECTION

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SECTION 26 05 33

RACEWAYS & BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 1. Metal conduits, tubing, and fittings.
 2. Nonmetal conduits, tubing, and fittings.
 3. Metal wireways and auxiliary gutters.
 4. Boxes, enclosures, and cabinets.
 5. Handholes and boxes for exterior underground cabling.

1.03 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Source quality-control reports.

PART 2 PRODUCTS

2.01 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- D. FMC: Comply with UL 1; zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 2. 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.
 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.

- G. Joint Compound for GRC: 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, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. LFNC: Comply with UL 1660.
- D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: Comply with UL 514B.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufactures: Subject to compliance with on for the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Mono-system, Inc.
 - 4. Square D.
- B. Anamet Electrical, IncDescription: Sheet metal, complying with UL 870 and NEMA 250, Type 3R unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- C. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

- H. 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.
- I. Cabinets:
 - 1. NEMA 250, Type 1, Type 4, Type 3R 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. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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.
- 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: Molded lettering, "ELECTRIC."
 - 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.

2.06 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. 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.

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: PVC-Coated GRC.
 - 2. Concealed Conduit, Aboveground: GRC.

3. Underground Conduit: PVC-Coated GRC.
 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.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed (non-chemical rooms): GRC.
 2. Chemical rooms: RNC
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 4. Damp or Wet Locations: PVC-Coated GRC.
 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
 6. FMC may be used only for light fixture connections above acoustical ceiling grids. No other locations are approved.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size, 1/2-inch FMC is acceptable.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
 3. All fittings shall be steel, no cast fittings.

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 NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. 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.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. 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.
- G. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- I. Raceways Embedded in Slabs:
 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 5. Change from ENT to GRC before rising above floor.

- J. 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.
- K. 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.
- L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- M. 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.
- N. 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.
- O. 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.
- P. 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.
- Q. 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. Where otherwise required by NFPA 70.
- R. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- S. Expansion-Joint Fittings:
 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg 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 deg F (55 deg 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:
 3. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 4. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 5. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 6. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg 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 deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
 7. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 8. 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.

- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- U. 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.
- V. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- W. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- X. Locate boxes so that cover or plate will not span different building finishes.
- Y. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Z. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 23 33 – Trench Excavation and Backfill for pipe less than 6 inches (150 mm) in nominal diameter.
 - 2. Install backfill as specified in Section 31 23 33 – Trench Excavation and Backfill.
 - 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 as specified in Section 31 23 33 – Trench Excavation and Backfill.
 - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - 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.
 - 5. Underground Warning Tape: Comply with requirements in Section 26 05 53 "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 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

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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, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 1. Identification of power and control cables.
 2. Identification for conductors.
 3. Underground-line warning tape.
 4. Warning labels and signs.
 5. Instruction signs.
 6. Equipment identification labels.
 7. Miscellaneous identification products.

1.03 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. 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 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- C. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.02 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.03 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.04 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- C. Tag: Conductive:
 - 1. 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.
 - 2. Overall Thickness: 5 mils (0.125 mm).
 - 3. Foil Core Thickness: 0.35 mil (0.00889 mm).
 - 4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - 5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).

2.05 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2.06 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.07 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Black letters on a white background. Minimum letter height shall be 3/8 inch (10 mm).

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 (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 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 (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F ((23 deg C)), According to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select 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 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall. Tape shall be conductive unless otherwise identified on drawings.
- H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.02 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. Control Circuit Conductor Identification, 600 V or Less:
 - 1. Color-Coding for Identification, 600 V or Less: Use colors listed below.
 - a. Color shall be factory applied.
 - b. Red for switched control wiring.
 - c. White for neutral.
 - d. Yellow for foreign voltage.
 - e. Blue for 24 vdc supply (+) and switched.
 - f. Blue with white stripe for 24 vdc com (-).
- C. 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. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - a. Color shall be factory applied.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 240/120-V, 1-phase, 3-wire Circuits:
 - 1) Phase "L1": Black.

- 2) Phase "L2": Red.
 - d. Colors for 240/120-V, 3-phase, 4-wire Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Orange.
 - 3) Phase C: Blue.
 - e. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - f. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- E. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- G. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation.
- H. 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.
- I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- K. 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.
- L. 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.

- M. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.
- N. 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. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label or Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment to Be Labeled, as applicable:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be 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 shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - g. Emergency system boxes and enclosures.
 - h. Motor-control centers.
 - i. Enclosed switches.
 - j. Enclosed circuit breakers.
 - k. Enclosed controllers.
 - l. Variable-speed controllers.
 - m. Push-button stations.
 - n. Power transfer equipment.
 - o. Contactors.
 - p. Remote-controlled switches, dimmer modules, and control devices.
 - q. Battery racks.
 - r. Power-generating units.
 - s. Monitoring and control equipment.
 - t. UPS equipment.

END OF SECTION

SECTION 26 09 00

CONTROLS AND INSTRUMENTATION

PART 1-GENERAL

1.01 SUMMARY

- A. Related Sections and Divisions: Applicable provisions of Division 01 shall govern work in this section.

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1.02 SYSTEM DESCRIPTION

- A. The work includes furnishing, delivering, installing all items furnished, and placing in operation the Supervisory Control and Data Acquisition (SCADA) System for the City of Madison, Wisconsin, Truax Pumping Station 16.
- B. System Supplier shall be defined as the fabricator, assembler, and supplier of all system components. This shall include, but not be limited to, all instrumentation as specified, all PLC cabinets, and required interface hardware and internal wiring, hardware, system drawings,

system software, new motor starters at the pumping station. See paragraph 1.08 for other System Supplier requirements. OWNER will provide all PLC and OIP programming and the SCADA System radio in the SCS.

- C. CONTRACTOR shall inspect all work. The Bid shall include everything necessary to obtain a complete installation operating in accordance with these specifications and the Bidder's proposal, whether necessary items and equipment are contained in, or are remote from the enclosures furnished under this Contract. All responsibility for this system ultimately lies with CONTRACTOR.
- D. CONTRACTOR shall be responsible for the placing of circuits and making of electrical and hydraulic connections in accordance with System Supplier-furnished drawings, instructions, and field supervision to provide proper connection. CONTRACTOR shall include the services of a System Supplier factory engineer to supervise making of connections to power supplies, motor leads, communication circuits, existing control equipment, and any other connections external to the new control equipment; adjust the equipment; initiate and check operation; instruct OWNER's electrician on operation and maintenance of the equipment; and place the equipment in operation in an acceptable manner. This shall include on-site review of software/hardware controls from the central control point.
- E. Any auxiliary interface relays and controls needed for completion of this project, if not specifically called for, shall be by System Supplier. All switches and control and indicating lights associated with the control panels shall be new and installed in the starter panels. All new controls shall be installed in new supervisory control panels as necessary by System Supplier at locations where space allows for the new equipment in the pumping station.

1.03 QUALITY ASSURANCE

- A. System Suppliers: Firms regularly engaged in the design and manufacture of SCADA systems of the size and complexity specified herein, and whose systems have been in satisfactory use in similar service for not less than 10 years.
- B. Installer: A firm with at least 10 years of successful installation experience on projects with SCADA System design and installation work similar to that required for the project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide control panels, power supplies, controllers, relays, wire, and connectors that have been listed and labeled by Underwriters Laboratories.
- E. NECA Standards: Comply with applicable portions of National Electrical Contractor's Association's Standard of Installation.

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.
- B. Submit shop drawings and product data in accordance with provisions of Section 01 33 00-Submittals.

- C. Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.
- D. Shop drawing submittals shall be assembled in two phases; in the first submittal, the following information shall be provided in booklet form:
 - 1. Detailed catalog information, descriptive literature, and specifications of hardware. All items being provided must be specifically noted on this literature.
 - 2. All field devices and instruments.
 - 3. Project implementation plan, including information on project organization, project management, engineering, programming, configuration, training, startup, and maintenance services. Plan shall include key personnel on project, point of contact, and communication protocol.
 - 4. Overall network schematic showing all controllers, radio, and hardware addresses applicable to the system.
 - 5. Wiring diagrams for all SCSs, control panels, and motor starters, including field termination wiring with terminal identification.
 - 6. PLC I/O Listing.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provision of Section 01 33 00–Submittals.
- B. Include spare parts data listing, source and current prices of replacement parts and supplies, and recommended maintenance procedures and intervals.
- C. Submit Operation and Maintenance Manuals in accordance with Division 01. The following additional information shall apply. Manuals shall contain, but not be limited to, the following:
 - 1. Safety precautions, physical description, functional description, operating procedures, theory of operation, maintenance instructions, checkout procedures, troubleshooting procedures, servicing, and removal and replacement procedures.
 - 2. Wiring schematic and logic diagrams, parts list, and point-to-point wiring.
 - 3. Listing of all hardware timers installed in motor starters and SCSs, as well as the ranges set on each timer. Listing shall also include actual timer setting after completion of startup.
- D. Provide final drawings in electric AutoCAD format. Drawings shall become property of OWNER.

1.06 DELIVERY, STORAGE, AND HOLDING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to SCS components, enclosure, and finish.

1.07 COORDINATION WITH OWNER AND OWNER-FURNISHED ITEMS

- A. The Station Control System (SCS) panel and each motor starter shall be completely assembled and tested at the System Supplier's factory as specified herein. System Supplier shall provide all items specified, and OWNER will provide the following scope of work.
 - 1. Programming of SCS PLC and the Operator Interface Panel (OIP).
 - 2. Factory testing of control algorithms associated with the PLC and OIP. ENGINEER and OWNER shall also be involved in factory testing of overall system.
 - 3. Start-up and checkout of station controls associated with the PLC and OIP. ENGINEER and OWNER shall also be involved in final checkout of overall system.
- B. During the manufacturing phase and prior to the Factory Acceptance Test for the SCS, System Supplier shall schedule with OWNER, intermediate panel inspection and programming test dates at 50% and 90% completion. Dates shall be scheduled a minimum of two weeks in advance and be used for purposes of reviewing panel construction and to allow coordination with OWNER'S programming and physical equipment to be installed in the SCS.

1.08 CONTRACTOR AND SYSTEM SUPPLIER GENERAL REQUIREMENTS

- A. This specification, along with the Contract drawings, defines the requirements of a PLC-based process monitoring and control system. System Supplier shall construct a process monitoring and control system specifically for the demanding requirements of a real-time municipal wastewater pumping station.
- B. It is the intent of this specification to define a fully integrated open-type process monitoring and control system, factory-tested, delivered to the site, ready to function upon connection of power source and field instrument wiring. Components, peripherals, interconnections, cabling, power supplies, and services necessary to form a complete, integrated system shall be identified and provided by CONTRACTOR. CONTRACTOR shall be responsible for reviewing the wiring diagrams and control sequences for equipment provided under other divisions of these specifications and coordinating all interface requirements. CONTRACTOR shall submit to ENGINEER, in writing, any deficiencies noted during this review. Any changes required by CONTRACTOR because of failure to complete this review shall be the responsibility of CONTRACTOR, at no increase in cost to OWNER.
- C. CONTRACTOR shall be responsible for complete coordination in providing all equipment, sensors, and meters supplied with input and output signals, and contacts that are compatible with the systems as specified herein. CONTRACTOR shall also be responsible for complete coordination with manufacturers of other systems specified in other divisions of these specifications with which an interface is required. The Contract drawings and I/O Listing are symbolic representatives of the required work. It is not intended that the drawings show all appurtenances. CONTRACTOR shall provide a complete and working system according to the true intent and meaning of the drawings, specifications, and standard industry practices.
- D. To provide a complete and totally integrated system, a single manufacturer who has experience in furnishing similar networked PLC-based monitoring and control systems of the same complexity and size for municipal wastewater pumping facilities shall provide specified equipment and services. The system proposed to meet this specification shall be of field-proven design, incorporating manufacturer's standard equipment and software. Service of all peripheral devices shall be provided by the manufacturer of the process monitoring and control system.

- E. Design and specification of devices and completed system shall conform to applicable portions of the latest edition of the National Electrical Code (NEC).
- F. Control panels shall bear a serialized UL label indicating that it is UL approved as an assembled unit. Panels that have individual components that are UL labeled, but do not have UL approval as an assembled unit are not acceptable.
- G. Training Program:
 - 1. Submit training plan including course syllabus, personnel who will be conducting the training, and schedule at least two weeks prior to scheduled training days.
 - 2. Provide materials, instructors, and workbooks to complete the training.
 - 3. Training courses shall include:
 - a. Operator training. Course length minimum 4 hours. Training shall utilize equipment specified herein following installation and field testing. One 4-hour session shall be provided at the pumping station.
 - b. Maintenance training. Course length minimum 4 hours. One 4-hour session shall be provided at the pumping station.
 - 4. Manufacturer's training shall be directed to system and equipment operation, maintenance, troubleshooting, and equipment and system-related areas other than the process itself.
- H. System Supplier shall meet the following minimum requirements:
 - 1. System Supplier shall have a full-time staff of qualified programmers who are knowledgeable in the configuration of networked computer systems and the PLCs being provided.
 - 2. System Supplier shall have a minimum of one Microsoft-certified engineer.
 - 3. System Supplier shall have training capabilities and shall have conducted training courses in programming and maintenance.
 - 4. System Supplier shall have an adequate inventory of spare parts.
 - 5. System Supplier shall have a full-time staff of qualified service technicians.
 - 6. System Supplier shall be responsible for the programming and documentation of the system.
 - 7. System Supplier shall be responsible for all details that may be necessary to properly install, wire, adjust, and place in operation a complete and working system.
 - 8. System Supplier shall be responsible for all coordination between the system and the field devices, instrumentation equipment, motor control centers, and equipment furnished with other divisions of this specification. This shall include interface with existing equipment.
 - 9. System Supplier shall have a UL panel shop located inside the System Supplier's own facilities.
- I. All components shall be standard make acceptable to OWNER, with one manufacturer to provide all similar components. The Base Bid System Supplier shall be EvoLogic Industrial Automation, (563) 556-2144, Wunderlich-Malec Engineering, (952) 933-3222, Integrated Process Solutions, (608) 849-4375, or *Altronex Control Systems*, (608) 222-8622. See General Conditions and Supplementary Conditions regarding substitutions to the Base Bid system suppliers.

1.09 FACTORY ACCEPTANCE TESTING, SYSTEM STARTUP, AND SUPPORT SERVICES

- A. Permit ENGINEER and OWNER to observe vendor's staging records or other quality assurance records relating to system(s) supplied. System Supplier shall assemble the system components as a complete process monitoring and control system and demonstrate that the system (SCS and motor starters) is operational before shipment from System Supplier factory to the job site. This testing shall be as an integrated assembly by simulating each of the specified I/O points and all OWNER-programmed PLC algorithms. This test shall be witnessed by OWNER and ENGINEER (three personnel). System Supplier shall provide lodging, meals, and transportation for one day and one night as a minimum for this witness test in the Bid. All problems, errors, insufficiencies, and failures identified during testing shall be resolved before shipment. In the event the equipment does not operate in accordance with the specifications, programming of controllers/computers is incomplete, or setup of equipment is incomplete, there shall be deducted from payments due CONTRACTOR the amount of \$1,500 per day each for ENGINEER's and OWNER's time plus travel and expenses, for all additional factory acceptance testing and office time spent by ENGINEER.
- B. On-Site Functional Acceptance Testing:
1. After all equipment has been installed and is placed in full-time operation, CONTRACTOR and System Supplier shall demonstrate that all equipment and controls operate in compliance with the Contract Documents. For each piece of equipment being tested, all systems associated with the operation of the equipment (e.g., controls, supply/discharge piping, etc.) shall be installed and be in full operating condition so that all equipment functions are able to be completely tested without delay using real-time process I/O.
 2. All control wiring, hardwired interlocks, etc., shall be checked out and functionally tested by System Supplier prior to ENGINEER's on-site functional acceptance testing. All functional errors shall be corrected prior to ENGINEER's on-site functional acceptance testing.
 3. Coordination Teleconferences:
 - a. CONTRACTOR shall schedule and conduct an initial functional acceptance testing coordination teleconference at least one month prior to the anticipated functional acceptance testing. Meeting shall include CONTRACTOR, System Supplier, Division 26 contractor, OWNER, and ENGINEER, and all other parties responsible for the equipment and controls scheduled for functional acceptance testing.
 - b. CONTRACTOR shall provide the following information in written form at the teleconference.
 - (1) Equipment installation and manufacturer's startup schedule.
 - (2) Status of all power and control system wiring for the equipment scheduled for functional acceptance testing.
 - (3) Schedule and status of System Supplier's on-site checkout and functional testing.
 - (4) Anticipated delays and the cause of each delay.
 - (5) Conflicts with OWNER's operation of the facility.
 - (6) Proposed dates for acceptance testing of all equipment and controls.
 4. After being notified by CONTRACTOR that the equipment has been installed and is in full operating condition and ready for ENGINEER's functional acceptance testing, ENGINEER will make one 1-day trip to check operation. CONTRACTOR and System Supplier shall be on-site during testing to adjust equipment, correct erroneous wiring, and make modifications to control equipment, as necessary. If the equipment and controls do not operate according to the Contract Documents, or if CONTRACTOR and System Supplier are not present during the scheduled testing, there will be deducted

from payments due to CONTRACTOR the amount of \$1,500 a day for ENGINEER's time plus travel and expenses, and for all additional field and office time spent by ENGINEER checking equipment. OWNER will deduct the amount of these charges from payments made to CONTRACTOR.

5. System Supplier shall provide functional acceptance testing support through one or more on-site field service engineers. Time for the on-site field service engineers scheduled for functional acceptance testing shall be dedicated to the functional acceptance testing process and shall not be interrupted for other construction-related activities.
- C. Final acceptance and payment will not be made until the system has operated satisfactorily for a minimum of 30 consecutive days. CONTRACTOR shall include in Bid field follow-up to provide proper adjustments and operation during the first year following project final completion. Prior to beginning the 30-day test, the following criteria shall be met:
1. Satisfactory operation of peripheral equipment.
 2. Wet well level sensing is reliable.
 3. Motor controls are operational.
 4. Checking and calibrating of systems have been completed.
- D. CONTRACTOR, through System Supplier, shall provide the following support services:
1. Field Service Engineer: Field service engineer shall be present at the factory acceptance test and be present for startup of all systems and available throughout the entire construction process until final completion. Service technicians sent for system startup will not be acceptable. Support shall include on-site time. Services shall include, but not be limited to:
 - a. Commissioning, installation, startup, and testing of equipment.
 - b. Revising or rewriting manuals to incorporate an installed and accepted system.
 - c. On-site training.
 - d. Assistance to OWNER for startup and checkout of OWNER-provided PLC and OIP programming.
 2. In-factory support shall include consultation following the acceptance testing and shipment. Services shall include, but not be limited to:
 - a. Researching and answering questions related to the system operation, documentation, and system use and functions.
 - b. Revising or rewriting manuals.
 3. Post-startup support shall include follow-up services during the 1-year period following final acceptance. Service shall include follow-up recalibration and replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include 8 hours for work on-site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve the operation of the system. It shall be assumed that these 8 hours include one trip to the site.

1.10 EQUIPMENT ENCLOSURES

- A. New enclosures shall be front access only, minimum No. 12 gauge steel, and hinged doors, rotating lockable handle. Provide door stop kit for all panel doors and data pockets for wiring diagrams. Painting shall include phosphate treatment, zinc chromate iron oxide primer, baked rust-inhibiting enamel, gray interior, and OWNER-selected exterior color. All doors and panels shall be gasketed. All louvers shall be

filtered with forced-air cooling as necessary by the supplier for conditions where installed. New enclosures shall be manufactured by Hoffman or Saginaw. MCC structures are not acceptable.

- B. Indicating devices shall be at eye level, minimum 48 inches, maximum 60 inches, from floor to bottom of device.
- C. Provide wiring troughs on both sides of terminal strips. Plastic wiring troughs shall have removable covers. Maximum fill for wiring troughs shall be 60%. All wiring in supervisory enclosures and control panels not in wiring troughs shall be bound with continuous-type spiral windings. Terminal strips located adjacent to wiring troughs shall have a minimum of 1 1/2 inches between terminal strip and wiring trough. All wiring labels shall be able to be read without removing wiring trough covers.
- D. Tubing and instruments containing water shall be in separate compartments located and constructed so that leakage or spray at 100 psi pressure cannot touch electrical conductors or devices. Leakage shall be conducted to the floor in duct or pipe.
- E. All wiring for new panels shall be done in the factory, Class II, Type C with master terminal strips for exterior connections. Terminal strips shall be located either at the bottom or on the side of the enclosure, depending on where the I/O conduits penetrate the enclosure. Wiring troughs shall be provided for all field wiring. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation, and if enclosures are shipped in sections, all wiring and connections between sections shall be done by CONTRACTOR. All wiring shall be labeled at each end with corresponding numbers. This numbering shall be shown on the shop and record drawings.
- F. All door-mounted devices shall be furnished flush-mounted, and an exterior-engraved phenolic nameplate worded by OWNER (upon receipt of shop drawings) shall be provided for each compartment, device, and light. All components within the enclosures shall be identified with interior-mounted engraved labels. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.
- G. All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.
- H. In addition to spare I/O specified herein, provide a minimum of 25% spare hot and neutral terminals wired to terminal strips. Spares shall be provided for all voltage sources within the panel (e.g., 120 V, 24 V).
- I. Enclosures that include motor controllers shall have a main disconnect for the enclosure. Motor controller disconnects shall have a padlockable hasp.

1.11 COMMON REQUIREMENTS ALL EQUIPMENT

- A. All indicating and recording devices shall be electric or electronic.

- B. All indicating and control devices mounted on control panels and standalone starter, enclosure doors (e.g., meters, gauges, electronic indicators, pilot lights, selector switches, OIPs, etc.) shall be located at eye level, minimum 48 inches, maximum 60 inches, from floor to bottom of device. All pushbuttons, 2-position switches and 3-position switches shall be Allen Bradley Series 800T, 30mm, with LED indicators where applicable.
- C. All motor control power shall be 120 volts with suitable circuit protection (fuses or breakers). Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown.
- D. Devices powered at 120 volts from SCS panels shall be fused. This shall include, but not be limited to, solenoid valves, motor-operated valves, motorized ball valves, and transducers.
- E. Provide lightning protection, isolation transformers, and fused disconnects at each end of each power circuit, supervisory circuit, and local supervisory circuit with transformers and relays, if necessary, to obtain supervisory power. 120-volt power shall be available at all control points. Lightning protection shall be completely solid-state and self-healing and shall not require the use of fuses.
- F. If enclosure and panel space is needed for future installation of devices and lights, the enclosure and panel shall be constructed for such installation. Supports shall be provided for future equipment, and panel openings shall be made and covered with neat cover plates matching the panel.
- G. Where equipment is necessary to perform a function as called for in one part of this specification, it shall be provided, even though the detailed enumeration at various control points may omit listing that equipment.
- H. Where a certain accuracy of sensing and transmitting levels and controlling operations are called for, means must be provided to read or determine that the levels are within the limits or accuracy specified of the sensing, transmitting, and controlling devices. Where no accuracy is specified, but a knowledge of levels is necessary to set operating points, an indicating device of accuracy consistent with the operation of the system is required.
- I. All control and auxiliary relays shall have indicating LEDs. All timing relays shall have On and timing Out LEDs. Flag indicators are acceptable.

1.12 WARRANTY

- A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from the date established for Substantial Completion of the project.

PART 2-PRODUCTS

2.01 INDUSTRIAL CONTROL AND POWER RELAYS

- A. Industrial control and power relays shall be installed in supervisory control centers, motor control centers, industrial control panels, and where required by System Supplier. Relays used to interface with PLC I/O shall be terminal style, interposing/isolation relays. Relays for motor control circuits, hardwired control logic, and for loads less than 10 amps shall be

general purpose, industrial, square base relays. Relays for lighting circuits and small motor loads shall be industrial, electrically held power relays.

- B. Relays shall meet the following requirements:
1. Interposing/isolation relays:
 - a. Configuration: SPDT or DPDT as required by System Supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 Vac, or as required by System Supplier.
 - d. Contact rating: 8 A (DPDT), 16 A (SPDT).
 - e. Operating life: 10 million cycles.
 - f. Status: On-Off flag-type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700-HK, or equal.
 2. General purpose relays:
 - a. Configuration: DPDT or 3PDT as required by System Supplier.
 - b. Mounting: DIN rail with screw terminal base socket.
 - c. Voltage: 120 Vac.
 - d. Contact rating: 15 A, minimum; 3/4 hp.
 - e. Operating life: 10 million cycles.
 - f. Status: On-Off flag-type or LED indicator.
 - g. UL listed.
 - h. Manufacturer: Allen-Bradley, 700-HB, or equal.
 3. Power relays:
 - a. Configuration: Electrically held, 2-12 poles.
 - b. Mounting: DIN rail, square base.
 - c. Voltage: 120 Vac.
 - d. Contact rating: 20 A continuous; 1 hp.
 - e. Operating life: 100 million cycles.
 - f. UL listed.
 - g. IEC (15 amps) or NEMA (20 amps) rated.
 - h. Manufacturer: Allen-Bradley, 700-CF for 15-amp loads and 700-PK for 20-amp loads, or equal.

2.02 PLC SUPERVISORY CONTROL SYSTEM (SCS) ENCLOSURES

- A. All control signals, status signals, alarm, and variable analog data shall be transmitted and received between the master data gathering site (at the WWTP) via OWNER's existing SCADA system. All PLC programming shall be provided by OWNER.
- B. It shall be the responsibility of System Supplier to ascertain that all field devices are compatible and consistent with the new system design. This includes reviewing drawings and data to ascertain the compatibility and consistency of the system with the field devices on such considerations as:
1. Power levels.
 2. Power sources.
 3. Logic schemes.
 4. Signal types and levels.
 5. Interface devices where required.
 6. All other aspects of field devices impacting on the design of the system.

- C. PLC Systems:
1. System Supplier shall provide all the equipment necessary for data gathering, monitoring, and control as required to meet this specification and in accordance with the drawings. The PLC system equipment shall include, but not necessarily be limited to, the following:
 - a. PLC consisting of CPUs with adequate memory and instructions, local and remote I/O mounting racks, power supplies, I/O modules, communications modules and hardware, and all other components required to make the PLCs perform all the functions required in this specification. The PLCs shall be mounted in NEMA 12 enclosures as specified herein or as shown on the drawings; see Equipment Enclosures. The new PLC enclosures shall be completely assembled, prewired, and tested at System Supplier's factory. PLC programming shall be provided by OWNER.
 2. Engineering:
 - a. System Supplier shall provide all engineering necessary to accomplish and document the requirements of this specification and in accordance with the system configuration. The engineering to be performed by System Supplier on this project shall include, but not be limited to, the following categories:
 - (1) PLC system layouts.
 - (2) Panel layouts.
 - (3) I/O configuration and wiring drawings.
 - (4) Network layout.
 - b. Submittals: In addition to submittals previously described provide:
 - (1) Shop drawing and product data.
 - (2) Recommended spare parts lists.
 - c. Installation: CONTRACTOR shall install all system equipment including the PLC and local I/O enclosures, and interconnecting cabling as required.
 3. The PLC shall be a microprocessor-based controller.
 4. The PLC processor shall meet the following minimum general specifications:
 - a. Voltage: 85 to 265 volts AC.
 - b. Frequency: 47 to 63 Hz.
 - c. Temperature: 0 to 60°C.
 - d. Humidity: 5 to 95% noncondensing.
 - e. RFI: MIL-STD-461B.
 - f. EMI: IEEE 472-1974.
 5. The PLC processor shall have the following minimum features:
 - a. 2 MB of battery-backed static RAM.
 - b. 1 GB of nonvolatile memory (Secure Digital).
 - c. Utilize 32-Bit architecture.
 - d. Solve 1K words of logic in 0.9 milliseconds.
 - e. I/O scan time of 0.225 milliseconds per I/O rack.
 - f. Real-time clock.
 - g. Selectable timed interrupts.
 - h. Local I/O capability of 16 modules.
 - i. Memory protection.
 - j. Two Ethernet/IP communications ports (up to 32 nodes) and one USB port for temporary use.
 - k. Remote I/O capability.
 - l. Status indicators.
 6. The PLC must be capable of performing the necessary logic to control the system. PLC capabilities shall include, but not be limited to, the following:
 - a. Discrete I/O (120 Vac, isolated, or 24 Vdc with DC battery controller, as required).

- b. Isolated analog input (4-20 mA).
 - c. Isolated analog output (4-20 mA).
 - d. Timers.
 - e. Latch/unlatch relays.
 - f. Counters.
 - g. Comparators (setpoints for analog level).
 - h. Relay ladder logic.
7. The PLC must be capable of self-diagnosing the following error conditions resulting in orderly shutdown of the unit and annunciation of an error condition.
 - a. Memory parity error.
 - b. Loss of signal communication between master and I/O.
 - c. Loss of logic power.
 - d. Halt or interrupt of memory scan.
 - e. Detection of incomplete relay ladder rungs in memory.
 8. The PLCs shall be of the modular hardware style as manufactured by Allen-Bradley CompactLogix 5380, catalog number 5069-L306ER, no equal, with all accessories required to perform the operations described herein. Firmware shall be RSLogix 5000, version 30.
 9. Environmental ratings for all components of the PLC system shall meet or exceed the following requirements:
 - a. Humidity rating of 0% to 95% relative humidity.
 - b. Ambient temperature rating 0° to 55°C.
 10. The vendor shall be able to attest that the PLC system has been designed and tested to operate in an industrial environment with all its associated electrical noise.
 11. All components comprising the PLC system shall be manufactured by a company regularly engaged in the manufacture of programmable controllers.
 12. The power supply shall be protected against short circuits.
 13. The power supply shall contain its own overcurrent and overvoltage protection.
 14. In the event of power loss, register or ladder information shall be retentive.
 15. To allow monitoring of a malfunctioning machine or process, it shall be possible to connect or disconnect programming equipment at all times, even when the system is running.
 16. The PLC enclosure shall include, but not be limited to, the following equipment:
 - a. Main PLC processor.
 - b. Provide dedicated 24vdc power supply.
 - c. I/O modules shall be isolated-type and have status LEDs.
 - d. Computer-grade transient and spike suppressor.
 - e. Rail mounted terminal blocks for field wiring terminations. Terminal blocks shall be Allen Bradley 1492-J4 or equal.
 - f. Plastic wiring ducts sized for 20 percent spare capacity, minimum 1.5-inches by 3-inches.
 - g. General purpose duplex GFCI receptacle.
 - h. 20A, 120/240 VAC, circuit breakers for incoming lighting panel branch circuit wiring.
 - i. Other accessories required to provide a complete and working PLC system.
 - j. True on-line UPS backup for the SCS.
 - k. Relocated radio.
 - l. Network switch.
 17. The PLC processor shall be fed from dedicated 15 ampere circuit breakers through transient and spike suppressors.

- D. System Supplier shall provide a complete list of spare parts required and where they may be obtained for operating the system for 3 years from startup.
- E. The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.
 - 1. All wiring within the enclosure shall be through the plastic wiring ducts. All wiring not in ducts shall be in plastic spiral bindings. All I/O devices shall be wired to rail mounted terminal blocks.
 - 2. All field wiring shall terminate at the rail mounted terminal blocks that shall be mounted either at the bottom or on the side of the enclosure back panel depending on where the I/O conduits penetrate the enclosure.
 - 3. The field wiring terminals shall be clearly identified as to which I/O terminals they are wired.
 - 4. Jumpers between adjacent terminal blocks shall be copper jumper bars supplied by the terminal block manufacturer.
 - 5. Self-drilling/tapping screws are not acceptable for mounting equipment within enclosures. All bolt holes shall be drilled and tapped.
 - 6. Provide all applicable finger-safe guards and covers.
- F. Refer to Section 26 05 53–Electrical Identification for the control panel and field wiring color code.
- G. 24-volt DC power supplies shall be provided and installed in the enclosures for powering all analog input signals where required.
- H. Manufacturer of accessories (not previously specified):
 - 1. The plastic wiring duct shall be Electrovert "Electro-Duct," Panduit, or equal.
 - 2. Wire markers shall meet the requirements of Section 26 05 53–Electrical Identification.
 - 3. Circuit breakers shall be Allen Bradley 1606-XL, Bulletin 1489–M with the appropriate mounting rail.
 - 4. Power supplies shall be Allen Bradley, rail mount.
 - 5. Signal conditioners shall be Action Instruments, DIN rail mount, or equal.
- I. Provide a 120-volt AC true on-line UPS backup in the SCS that will provide continuous power to the following equipment for at least 30 minutes following a power failure.
 - 1. UPS power shall be provided, at a minimum, to the following equipment:
 - a. PLC and I/O cards, controllers, and OIP.
 - b. Radio, network switch, signal converters, and other communication devices.
 - c. Power fail and communication indicating lights and alarm devices.
 - d. Power supplies for loop-powered instruments.
 - e. Intrusion detection system devices.
 - f. UPS shall be installed outside the SCS on a shelf adjacent to the control panel.
 - 2. UPS power supply should be derived from SCS control power circuit. Plug UPS into simplex outlet labeled "Station UPS Only". Mount UPS on shelf adjacent to SCS.
 - 3. Each UPS shall be provided with a relay card that provides a dry contact output to the SCADA System in the event that the UPS batteries need replacement.

4. UPS shall be APC with relay I/O module, Liebert GXT5 with relay card, or Eaton 9SX. Provide a stand or shelf within each SCS panel for the UPS so that the UPS does not sit on the bottom of the enclosure and shall not cover or extend over control devices or terminal blocks.

2.03 FLOAT SWITCHES

- A. Station/building flooding alarms where called for shall be Siemens 101G, float switches, or equal.

2.04 LIMIT SWITCHES

- A. Limit switches (door switches) where called for on the drawings shall be GE Model 2507A for man doors. CONTRACTOR shall provide head and body style to fit application.
- B. Limit switches for sensing the position of swing arm check valves shall be Allen Bradley, Bulletin 802T, or equal. Switch shall include enclosure rated for the space installed, cat whisker sensor in length required for the application, and mounting hardware for check valve swing arm and flexible cable to junction box.

2.05 OPTICAL FLOAT SWITCH SYSTEM

- A. The floats shall use fiber optic cable to transmit a beam of light from a transmitter in the control panel to the float where the beam makes and breaks depending on the tilt of the float. The float shall have no electrical components or metallic wires that could cause arcs and sparks in an explosive environment. An optical receiver installed in the SCS shall detect the presence or absence of light and operate a relay in the receiver. The entire float system shall be by a single manufacturer. Provide float switch quantity as shown on the Drawings and all accessories required for a complete float switch system.
- B. The float switch shall be mercury and lead free and shall be made of recyclable materials. The float switch housing shall be polypropylene. the beam eclipser shall be stainless steel in an inert non-toxic dampening fluid that prevents chatter due to wave action. The viscosity of the fluid shall not change significantly over the range of -50°F to 155°F (-45°C to 70°C). the floats shall operate in liquid temperatures of 32°F to 130°F (0°C to 55°C). Floats shall be model OPTI-F160 by Cox Research, or equal.
- C. The transmitter and receiver shall be contained in a combination transceiver unit capable of connection to two floats each and be DIN-rail mounted. The transceivers shall operate in ambient temperatures of -15°F to 130°F (-25°C to 55°C). The transceivers shall operate at 12 VDC and shall be protected against accidental polarity reversal. The system shall operate in the visible and infrared light region with wavelengths between 400 nm and 1200 nm. The transceivers shall have a green LED power-on light and red LED lights on each channel indicating that the light beam is being received (float tilted up). The transceivers shall include one output relay for each connected float. Each relay shall be SPDT, rated 3A at 240 VAC, and capable of being connected normally open or normally closed. Transceivers shall be model MINI-TR3 by Cox Research, or equal. Provide power supplies in the SCS control panel as required by the float system manufacturer, model MINI-PS2 by Cox Research, or equal.

- D. The fiber optic cable shall be custom made for the float and shall consist of dual plastic fibers with an overall specialty blended PVC sheath for flexibility. The cable shall be connected and sealed at the float housing using a double seal method that will prevent water from entering the float even if the outer sheath is damaged. The cable shall be capable of splicing with tubular splices with cinch nuts on each end. Provide cable length as required to extend from the transceiver to the float without splicing.
- E. Provide mounting bracket model OPTI-UAB1 by Cox Research, or equal, and attachment hardware (two clips per float switch) model 3177T5 as manufactured by McMaster Carr, no equal, for fastening fiber optic float cable to mounting bracket.

2.06 OPERATOR INTERFACE PANEL

- A. Not used.

2.07 THERMOSTATS

- A. Thermostats associated with the SCADA System as specified in Section 26 09 90–SCADA System I/O Listing shall be provided by System Supplier as specified in Section 26 27 26–Wiring Devices. Thermostats shall be provided by System Supplier as specified in Section 26 27 26–Wiring Devices.

2.08 TVSS DEVICES FOR CONTROL PANELS AND INSTRUMENTATION EQUIPMENT

- A. Each incoming power supply in the SCS control panel shall be protected with a transient voltage surge suppression (TVSS) device. TVSS unit shall be as manufactured by Allen-Bradley Model 4983-DSX, or equal. Surge protection shall be provided for all phases and neutral.

2.09 INDUSTRIAL ETHERNET SWITCHES

- A. Unmanaged Ethernet switches shall be provided where shown on the drawings. Unmanaged switches shall be as manufactured by Allen Bradley Stratix 2000, no equal, and include copper ports as specified herein. Each switch shall include the following.
 1. Full/half-duplex operation.
 2. Auto-sensing speed and flow control and crossover cable connection.
 3. IEEE 802.3 compliance.
 4. Operating temperature: -40°C to 60°C.
 5. DIN rail mounting.
 6. Store and forward switching.
 7. Minimum of 8 copper ports.

PART 3-EXECUTION

3.01 PUMP P-01 AND P-02 PUMP CONTROL SUB PANELS

- A. Provide NEMA size 2 RVSS starters in NEMA 12 enclosures (one enclosure per each pump), each with 60-amp, three pole main circuit breaker disconnects. Provide amber "Overtemperature" and amber "Seal Fail" pilot lights on the enclosure doors. Also provide a reset pushbutton on SCS, interlocked with overtemp latch circuit. Reset pushbutton required only if motor starter does not have HMI or ability to reset overload without opening enclosure door. Provide terminal blocks for all remote signals being monitored at the pump

station PLC as listed in the System I/O Listing at the end of this Section.

1. RVSS Starters:
 - a. ABB PSTX or Allen Bradley Powerflex.
 - b. Provide communication card/adaptor capable of EthernetIP communications.
 - c. Provide keypad or HMI for monitoring of RVSS. HMI shall be mounted on enclosure door.
2. Each pump motor has internal thermostats, which shall shut down the motor in the event of over-temperature (Hand and Auto modes). Manual reset shall be required to restart the motor. Motor also has internal moisture detection, which shall be for indication at the starter and SCADA only. This shall not shut down the motor. There is a 120 VAC control module (MiniCAS Unit) furnished as specified in Division 33 for thermal and moisture detection, which shall be installed in the starter by the CONTRACTOR. Provide controlpower transformer for control module as required.
3. Each motor disconnect has auxiliary contacts that shall be wired to the starter such that control power is disconnected when the disconnect is in the Off position.
4. All the above controls shall be hardwired and not through the PLC.
5. Pump controls shall contain the logic and wiring just for pump operation, not process operation.

3.02 STATION CONTROL SYSTEM (SCS-TRUAX) CONTROL SUB PANEL AND GENERAL REQUIREMENTS

- A. The Station Control System sub panel (SCS-Truax) shall be sized as required. Provide a CompactLogix PLC, and appurtenances as specified herein. This panel shall be used as a termination point for all transmitting and receiving equipment associated with each pumping station starter, and the standby power system. Refer to the System I/O Listing at the end of this section for all required I/O that shall interface with this SCS. A minimum of 10% spares shall be provided for each type of input and output used. All spare inputs and outputs shall be wired to terminal blocks.
 1. Provide H-O-A selector switches for each pump:
 - a. With the H-O-A selector switch in the "Hand" position, the motor shall start and run continuously bypassing all controls, unless noted otherwise. HOA switch shall be hardwired so that if PLC fails or power is tuned off to SCS, switch in Hand will still operate the pump.
 - b. With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
 - c. With the H-O-A selector in the "Auto" position, the motor shall be controlled from the hardwired float switches as follows:
 - (1) The pumps shall be controlled from the lead start (LS-02), lag start (LS-03), and common off (LS-01) float switches. If the level falls below the low level alarm float switch (LSL-01), all running pumps shall shutdown and alarm shall be activated at the SCADA system. If the level rises to the high level alarm float switch (LSH-01) both pumps shall start and run, and an alarm shall be activated at the SCADA system. Provide an adjustable time delay so that the pumps do not start simultaneously.
 2. Provide red Pump Run light for each pump.
 3. Provide amber Pump Fail light for each pump.
 4. Provide elapsed Time Meter for each pump.
 5. Provide motor overload and overtemperature indicator lights for each pump.
 6. Provide In Service- Out of Service 2 position switch on SCS for each pump.
 7. Provide a 3 position switch to control pump alternation wired to PLC inputs.

8. Provide indicator lights on the SCS enclosure for Wet Well Low Level, Wet Well High Level, Genset Fail/Not in Auto, Power Fail, UPS Common Alarm, Building flooding, and PLC Active signals controlled by PLC outputs.
 9. Provide Alarm Reset push button wired to a PLC input.
 10. Provide 2 each E-Stop switches on SCS enclosure, hardwired with each pump control circuit.
 11. Pumps are normally controlled via float switches through PLC logic. Switch shall be labeled 1-2/Auto/2-1. Pump alternation shall be through the PLC and shall not be associated with hardwired backup float control.
 12. Provide a "PLC Active" signal to hardwired backup float relay logic in the SCS used to fail controls over automatically on loss of PLC. Backup float relay logic shall be hardwired to sequence pumps 1-2 with no alternation.
 13. Provide a "Reset" pushbutton on the SCS to restore "PLC Active" signal. Manual reset shall be required to go from hard wired backup float control to PLC float control.
- B. There shall be one circuit wired to the SCS panel to provide dedicated power to the following equipment.
1. SCS UPS, PLC, I/O devices, radio, OIP, network switch, and DC power supplies.
- C. The following hardware installed in the SCS panel shall be powered from the UPS through circuit breakers, Allen Bradley Model 1489-M, no equal.
1. All SCS panel circuits, as specified above.
 2. PLC.
 3. Network switch.
 4. Radio power supply.
 5. SCS mounted OIP and programming-port receptacles.
 6. DC power supplies.
- D. Relocate the existing GE MDS SD9 radio from existing RTU panel. Provide power supplies as required.
- E. Provide 12-volt DC power supplies for the optical float switch transceivers, quantity as required, Cox Research Model MINI-PS2, no equal.
- F. The control panel shall have an exterior panel-mounted receptacle and programming port for the Ethernet network, mounted to the door of the panel. Receptacle and programming port shall be provided to allow for PLC, OIP, and radio programming via laptop without opening the panel door.
- G. Equipment controls and Operator Interface Panel programming will be provided by OWNER. CONTRACTOR shall coordinate I/O wiring and testing with OWNER as specified herein.
- H. The door switch (ZS-03) shall be monitored by the PLC for indication of building entry at the SCADA system.
- I. UPSs installed in all SCSs shall be configured to provide a dry contact output to the PLC in the event of a UPS common alarm. The common alarm shall include, but not be limited to, "UPS Fault" and "Replace Battery" alarms. Indication of a "UPS Common Alarm" shall be provided at the SCADA System for each UPS.
- J. Provide a control power fail relay in the SCS that shall be used to indicate an incoming control power fail alarm at the SCADA System. Wire power indication to PLC input.

- K. Provide a 20 amp, two-pole contactor (one pole for status indication back to the PLC) in the SCS wired to field terminals for interface with the associated lighting panel circuit for control of the exterior light fixtures. Provide an On-Off-Auto selector switch on the front door of the SCS enclosure for control of the light fixtures as follows:
 - 1. With the O-O-A selector switch in the "On" position, the light fixtures shall be energized.
 - 2. With the O-O-A selector switch in the "Off" position, the light fixtures shall be deenergized.
 - 3. With the O-O-A selector switch in the "Auto" position, the light fixtures shall be controlled from the PLC.

- L. Provide a thermostat on the front door of the SCS wired to the PLC to activate a low building temperature alarm at SCADA system.

3.03 VOLTAGE MONITORING ENCLOSURE

- A. Provide a three-phase voltage monitor, Time Mark Model 269, or equal, in a NEMA 12, wall-mounted enclosure. Provide a fused disconnect for voltage sensing wiring from the ATS and terminal blocks for signal wiring to the SCS panel. Mount enclosure on the wall adjacent to the ATS.

END SECTION

SECTION 26 09 00

PLC I/O LIST

DESCRIPTION	FUNCTION	TYPE	ID
DISCRETE INPUTS			
WET WELL LOW LEVEL ALARM	ALARM	FLOAT SWITCH	DISCRETE INPUT
PUMPS OFF	LIQUID LEVEL	FLOAT SWITCH	DISCRETE INPUT
LEAD PUMP ON	LIQUID LEVEL	FLOAT SWITCH	DISCRETE INPUT
LAG PUMP ON	LIQUID LEVEL	FLOAT SWITCH	DISCRETE INPUT
WET WELL HIGH LEVEL ALARM	ALARM	FLOAT SWITCH	DISCRETE INPUT
PUMP NO. 1 MOTOR HIGH TEMP	ALARM	PUMP SENSOR	DISCRETE INPUT
PUMP NO. 2 MOTOR HIGH TEMP	ALARM	PUMP SENSOR	DISCRETE INPUT
PUMP NO. 1 RUNNING	STATUS	RVSS	DISCRETE INPUT
PUMP NO. 2 RUNNING	STATUS	RVSS	DISCRETE INPUT
PUMP NO. 1 SEAL FAIL	ALARM	PUMP SENSOR	DISCRETE INPUT
PUMP NO. 2 SEAL FAIL	ALARM	PUMP SENSOR	DISCRETE INPUT
CONTROL POWER AVAILABLE	STATUS	SCS	DISCRETE INPUT
STATION LOW TEMPERATURE	STATUS	SCS	DISCRETE INPUT
UPS POWER AVAILABLE	STATUS	SCS	DISCRETE INPUT
UPS COMMON ALARM / REPLACE BATTERIES	STATUS	SCS	DISCRETE INPUT
EMERGENCY STOP	STATUS	SCS	DISCRETE INPUT
RESET PUSHBUTTON	STATUS	SCS	DISCRETE INPUT
PUMP 1 IN HAND	STATUS	SCS	DISCRETE INPUT
PUMP 2 IN HAND	STATUS	SCS	DISCRETE INPUT
PUMP 1 IN AUTO	STATUS	SCS	DISCRETE INPUT
PUMP 2 IN AUTO	STATUS	SCS	DISCRETE INPUT
PUMP 1 IN / OUT OF SERVICE	STATUS	SCS	DISCRETE INPUT
PUMP 2 IN / OUT OF SERVICE	STATUS	SCS	DISCRETE INPUT
PUMP 1 – 2 / PUMP 2 – 1 / ALTERNATE	STATUS	SCS	DISCRETE INPUT
GENERATOR IN AUTO	STATUS	GENERATOR SENSOR	DISCRETE INPUT
GENERATOR RUNNING	STATUS	GENERATOR SENSOR	DISCRETE INPUT
GENSET FAIL / NOT IN AUTO	ALARM	GENERATOR SENSOR	DISCRETE INPUT
STATION POWER NORMAL	STATUS	POWER MONITOR	DISCRETE INPUT
POWER FAIL	ALARM	ATS SENSOR	DISCRETE INPUT
TRANSFER SWITCH IN AUTO	STATUS	ATS SENSOR	DISCRETE INPUT
TRANSFER SWITCH IN EMERGENCY	STATUS	ATS SENSOR	DISCRETE INPUT
DISCRETE OUTPUTS			
PUMP NO. 1 CALL TO RUN	START	COMMAND	DISCRETE OUTPUT
PUMP NO. 2 CALL TO RUN	START	COMMAND	DISCRETE OUTPUT
WET WELL LOW LEVEL ALARM	ALARM	RELAY	DISCRETE OUTPUT
WET WELL HIGH LEVEL ALARM	ALARM	RELAY	DISCRETE OUTPUT
PUMP NO. 1 FAIL	ALARM	RELAY	DISCRETE OUTPUT
PUMP NO. 2 FAIL	ALARM	RELAY	DISCRETE OUTPUT

DESCRIPTION	FUNCTION	TYPE	ID
UTILITY POWER FAIL	ALARM	RELAY	DISCRETE OUTPUT
GENERATOR FAIL	ALARM	RELAY	DISCRETE OUTPUT
TRANSFER SWITCH FAIL	ALARM	RELAY	DISCRETE OUTPUT
UPS FAIL	ALARM	RELAY	DISCRETE OUTPUT
TRANSFER SWITCH EXERSIZE ROUTINE	ACTIVATE	COMMAND	DISCRETE OUTPUT
EXTERIOR GENERATOR ENCLOSURE LIGHT	ON	COMMAND	DISCRETE OUTPUT
PLC ACTIVE	ON	RELAY	DISCRETE OUTPUT

SECTION 26 27 13
ELECTRICITY METERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. Section includes equipment for electricity metering by utility company.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Dimensioned plans and sections or elevation layouts.

1.4 QUALITY ASSURANCE

- 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.

1.5 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 - 1. Comply with requirements of utilities providing electrical power services.
 - 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Meter Sockets: Contractor to terminate and supply meter sockets. They shall comply with requirements of electrical-power utility company.
 - 1. Meter socket shall be 200 amp single position 7-terminal with lever operated bypass and lockable cover.
- C. Wire: Utility to provide secondary wire, from the pole mounted utility transformers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.
 - 2. Equipment Identification Labels: Adhesive film labels with clear protective overlay. For residential meters, provide an additional card holder suitable for typewritten card with occupant's name.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 2. Twist-locking receptacles.
 3. Receptacles with integral surge-suppression units.
 4. Isolated-ground receptacles.
 5. Tamper-resistant receptacles.
 6. Weather-resistant receptacles.
 7. Snap switches and wall-box dimmers.
 8. Wall-switch and exterior occupancy sensors.
 9. Communications outlets.
 10. Cord and plug sets.

1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.06 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Produces provided by one of the following manufactures:
 - 1. Cooper Wiring Devices, Inc.; Division of Cooper Industries, Inc.
 - 2. Hubbell Incorporated; wiring devices-Kellems
 - 3. Leviton Manufacturing Co. Inc.
 - 4. Pass & Seymour/Legrand (Pass & Seymour)
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, 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 NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.03 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.04 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
- C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 20 A:

2.05 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
 - 1. Single Pole:
 - 2. Two Pole:
 - 3. Three Way:
 - 4. Four Way:
- C. Pilot-Light Switches, 20 A:

1. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."

2.06 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel.
 3. Material for Unfinished Spaces: Galvanized steel.
 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.07 FINISHES

- A. Device Color:
 1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Emergency Power System: Red.
 3. TVSS Devices: Blue.
 4. Isolated-Ground Receptacles: Orange.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 8. Tighten unused terminal screws on the device.
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

3.02 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles.

3.03 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.04 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

SECTION 33 32 10

WET PIT SEWAGE LIFT STATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Precast concrete wet well and valve vault.
 - 2. Submersible wastewater pumping units and appurtenances.
 - 3. Pump access equipment.
 - 4. Internal piping and associated external piping.
 - 5. Lift Station Control Panel.
 - 6. Emergency generator.
- B. Basis of Payment:
 - 1. Payment for all work in this section shall be as a lump sum.

1.02 REFERENCES

- A. AFBMA:
 - 1. 9 - Load Ratings and Fatigue Life for Ball Bearings
 - 2. Standard Specifications for Sewer and Water Construction in Wisconsin.
- B. ASTM:
 - 1. A36 - Standard Specification for Carbon Structural Steel
 - 2. A48 - Standard Specification for Gray Iron Castings
 - 3. A126 - Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 4. C789 or C850 - Standard Specification for Precast Concrete Box Sections
- C. UL 778 - UL Standard for Safety Motor-Operated Water Pumps

1.03 DEFINITIONS

- A. DFT: Dry film thickness.

1.04 DESCRIPTION

- A. Submersible pumping units installed directly in a wet pit.
- B. Units can be easily raised or lowered along vertical guide bars without operator entering the pit or manually disconnecting any piping.
- C. Units can be raised to ground level for inspection and repairs.
- D. Units automatically connect to discharge connection when lowered into place.
- E. Number of Pumping Units: 2.
- F. Pumping units and discharge connection shall be supplied by the same manufacturer.
- G. Lift Station Control Panel.

1.05 SUBMITTALS

- A. Shop Drawings:
 - 1. Certified dimensions of pumps, valves, and appurtenances.
 - 2. Anchor bolt details.

3. Precast concrete wet well details and dimensions.
 4. Equipment assemblies.
 5. Instrumentation and wet well level sensors
 6. Control panel drawings and SCADA diagrams.
 7. Dimensioned outline plan and elevation drawings of engine-generator set.
 8. Automatic transfer switch diagrams and schematics.
 9. Wiring diagrams and schematics.
- B. Product Data:
1. Manufacturer's installation instructions.
 2. Certification of explosion-proof pumping units.
 3. Motor information.
 4. Coating data sheets.
 5. Certified pump curve, including head, capacity, horsepower, wire to water efficiency.
 6. Certified bearing life calculations.
 7. Motor performance chart showing curves for torque, current, power factor, input/output kw and efficiency. Include data on starting and no-load characteristics.
 8. Engine-generator set product data, including rated capacity, operating characteristics, furnished specialties, and accessories. Also include thermal damage curve for generator, time-current characteristic curves for generator protective device, and sound test data.
 9. Statement of compliance that the proposed engine-generator set is certified to the emissions standards required by the location for EPA, stationary emergency application.
 10. Operating and maintenance data in accordance with Section 01 78 23.
 11. Warranty for pumping units and appurtenant equipment.
- C. Certified installation inspection and start-up report.
- D. Name and address of factory-approved service facility.

1.06 QUALITY ASSURANCE

- A. Factory-approved service facility with certified mechanics shall be located within 300 miles of the installation.

1.07 WARRANTY

- A. Provide written guarantee of operation for pumping units and appurtenant equipment for a period of 12 Months from date of initial service. Provider is to provide an additional guarantee of up to one-year of storage following delivery of the pumps to OWNER for storage – before the installation guarantee starts.
- B. Manufacturer of the Control Module shall furnish a limited warranty of 12-months from start-up that all equipment shall be free from defects in design, materials, and workmanship. The manufacturer shall furnish replacement parts for any component proven defective within the provided equipment, whether assembled by them or other manufacturer during the warranty period, excepting only those items which are normally consumed in service
- C. Provide written guarantee of operation for the emergency generator for a period of 12 months from date of initial service. Guarantee excludes normal use items.
- D. Include list of parts and services under warranty.

1.08 MAINTENANCE

- A. Extra Materials: None required.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Pumping units and appurtenances shall be manufactured by one of the following:
 - 1. Flygt.
 - 2. KSB.
 - 3. Fairbanks Morse / Hydromatic.

- B. Emergency Generator and ATS:
 - 1. Cummins.
 - 2. Kohler.
 - 3. Generac.
 - 4. Or Equal.

2.02 MANUFACTURED UNITS

- A. Precast Concrete Wet Well and Valve Vault:
 - 1. ASTM C789 or C850.
 - 2. Provide access covers for wet well over incoming gravity sewer, as manufactured by USF Fabrication, Inc. or approved equal. Provide 300 lbs/sf loading.
 - a. For pumps removal, one two-door aluminum access cover. Cover to be rated 300 lbs per square feet. Class 316 stainless steel nuts and bolts with safety grate to be painted with safety orange powdercoat, and water tight stainless steel slamlock.
 - 3. Interior Surfaces:
 - a. Coat surfaces with coal tar epoxy.
 - b. Shop apply in 2 coats.
 - c. DFT: 6 to 8 mils.
 - 4. Size: Circular, 8 feet inside diameter.

2.03 EQUIPMENT

- A. Pumping Units:
 - 1. Totally submersible.
 - 2. Discharge Size: 6-inch minimum.
 - 3. Capable of handling raw unscreened sewage with soft solids up to 3.1-inch diameter.
 - 4. Deliver 1,450 gallons per minute against a total dynamic head of 44 feet.
 - 5. Motor shall be fully non-overloading throughout the entire pump curve.
 - 6. Explosion Proof in accordance with NEC requirements for Class 1, Divisions 1 and 2.
 - 7. Exterior Shop Coating: Epoxy.
 - 8. Pump Design and Construction:
 - a. Major components: ASTM A48 gray cast iron, Class 30 minimum.
 - b. Exposed hardware: 316 stainless steel.
 - c. Provide watertight seal between pump and discharge elbow.
 - d. Provide mechanical mating surfaces with viton or nitrile O-rings.
 - e. Mating surfaces shall provide for controlled compression of O-rings without specific torque requirements.
 - f. Pump design shall provide for starting and operation without submerging the motor.
 - 9. Impeller and Shaft:
 - a. Impeller: The impeller shall be dynamically balanced, non-clog design. The impeller shall be locked to the shaft.
 - b. The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft. Shafts using mechanical couplings shall not be acceptable. The shaft shall be stainless steel.
 - 10. Mechanical Seal and Oil Chamber:
 - a. Each pump shall be provided with a dual, tandem mechanical shaft seal system consisting of two silicon carbide seal sets. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

- b. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.
 - c. A separate seal leakage chamber shall be provided so that any leakage that may occur will be captured prior to entry into the motor housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a leak detection switch.
11. Bearings:
- a. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.
 - b. Provide certified bearing life calculations based on design conditions.
12. Motor and Power Cable:
- a. Motor:
 - 1) Sealed, submersible.
 - 2) 120/208 volt, 3 phase, 60 hertz.
 - 3) Service Factor: 1.15.
 - 4) Minimum horsepower: 25 hp.
 - 5) Maximum speed: 1800 rpm.
 - 6) Stator insulation: Class F, rated for 356 degrees F.
 - 7) Continuous duty handling of 104 degrees F pumped media.
 - 8) Capable of 30 starts per hour (minimum)
 - 9) Temperature rise at 104 degrees F shall not exceed 176 degrees F.
 - b. Cable: Size in accordance with NEC and ICEA standards.
 - c. Provide sufficient length to reach junction box without splicing.
 - d. Cable, entry system and motor shall maintain watertight integrity at a submergence of 65 feet.
13. Protection:
- a. Thermal switches:
 - 1) Furnish each winding with a thermal switch.
 - 2) Switches shall open at 125 degrees C, stop motor and activate alarm.
 - b. Leakage sensor:
 - 1) A separate seal leakage chamber shall be provided so that any leakage that may occur will be captured prior to entry into the motor housing. The leakage chamber shall be equipped with a leak detection switch.
 - c. Circuit breaker trip with ground fault interruption.
 - d. Alarms:
 - 1) High water alarm.
 - 2) Pump failure alarm.
 - 3) Power failure alarm.
 - 4) Seal failure alarm.
 - 5) Motor heat sensor alarm.
 - 6) Motor overload trip.

B. Lift Station Control Panel:

- 1. Summary. In accordance with the plans and specifications, Contractor shall provide and install a complete pre-fabricated, pre-tested lift station control panel including all required equipment, accessories wiring and adjusting as indicated in the project specifications, on the project plan, and installed in accordance with applicable National, State, and Local Codes. Refer to Section 26 09 00 for specific component provisions.
- 2. General:
 - a. All materials used and work performed under this section shall comply with rules and regulations of the latest edition of the State Electrical Code and local ordinances. As specified elsewhere within this Division and in accord with the Contract Documents, shop drawings and materials lists shall be submitted for equipment listed under this section.

- b. It will be the responsibility of Contractor to protect and maintain all materials and work furnished and installed under this section until acceptance.
- 3. The interior components of the lift station control panel shall be pre-installed prior to delivery. Panel shall be adequately sized to incorporate all controls specified herein and to include utility and standby power connections, indicating lights, selector switches, pump control logic, motor starters, alarm, etc., where specified to be associated with the lift station.
 - a. Airgap method ventilated panel bottom skirt pre-installed on module exterior.
 - b. Optical float switches for liquid level control.
 - c. Pump Protection Modules
 - d. Telemetry equipment
 - e. Pump Control Section pre-installed in panel
 - f. Automatic transfer switch.
- 4. Vented panel bottom skirt requirements:
 - a. Bottom skirt shall be provided pre-installed on control panel by manufacturer.
 - b. Drip shield top and seam-free sides, front, and back.
 - c. Quarter-turn latch and locking hasp.
 - d. Bottom skirt shall be a minimum of 18" High with proper venting in accordance with NFPA 820 requirements.
 - e. Bottom skirt to have open bottom to accommodate conduit stub-ups from wet well.
 - f. Contractor shall provide conduit stub-ups from wet well to bottom skirt with duct-putty seal.
 - g. Contractor shall use sealing cord-grip connector for all penetrations to provide a gas-tight seal. Refer to Control Module manufacturer drawings prior to stubbing-up conduits to terminate in bottom skirt to ensure proper location.
 - h. Lifting and Mounting
 - 1) The lift station control panel shall be provided with integral lifting eyes.
 - 2) Contractor shall coordinate delivery to the jobsite with the control panel manufacturer.
 - 3) Contractor shall be responsible for providing a properly sized crane for offloading and setting of the control panel onto the foundation.
 - 4) The control panel shall be provided with integral mounting brackets to be used to secure it to the concrete foundation.
 - 5) Contractor shall be responsible for securing the control panel to the foundation and provide the necessary anchors for proper installation. Contractor to contact control panel manufacturer to verify provisions required for proper installation prior to installation.
- 5. Electrical Equipment
 - a. Power distribution center:
 - 1) Provide a 200amp, 120/208V, 3 phase, 4 wire panel board.
 - 2) Panel board shall have copper busses and bolt on circuit breakers.
 - 3) See one-line drawing for information and layout. Manufacturer to verify configuration per equipment being installed.
 - b. Receptacles:
 - 1) Duplex, GFCI, 125V, 20A.
 - a) Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
 - b) Lockable and weather proof.
 - c) Standards: Comply with UL 498 and FS W-C-596
 - c. Enclosed switches
 - 1) UL Listed, heavy duty, 600 volts, 3-pole safety switches.
 - 2) Fusible or non-fusible as shown on the drawings.
 - 3) Ampere and horsepower rating required for connected load.
 - 4) Provisions for padlocking in the open and closed positions.
 - 5) NEMA 3R enclosure for outdoor switches.
 - 6) Fusible switches shall be provided with two sets of fuses.
 - d. Reduced Voltage Soft Starters to be wall provided in accordance with Section 26 09 00 and as shown on the Project drawings.

e. Automatic Transfer Switch (ATS):

1) General:

- a) The transfer switch shall be rated for the voltage and ampacity as shown on the plans and shall have 600 volt insulation on all parts in accordance with NEMA standards.
- b) The current rating shall be a continuous rating when the switch is installed in an unventilated enclosure, and shall conform to NEMA temperature rise standards.
- c) The unit shall be rated based on all classes of loads, i.e., resistive, tungsten, ballast and inductive loads. Switches rated 400 amperes or less shall be UL listed for 100% tungsten lamp load.
- d) As a precondition for approval, all transfer switches complete with accessories shall be listed by Underwriters Laboratories, under Standard UL 1008 (automatic transfer switches) and approved for use on emergency systems.
- e) The withstand current capacity of the main contacts shall not be less than 20 times the continuous duty rating when coordinated with any molded case circuit breaker established by certified test data. Refer to required withstand and close ratings as detailed in this specification.
- f) Temperature rise tests in accordance with UL 1008 shall have been conducted after the overload and endurance tests to confirm the ability of the units to carry their rated currents within the allowable temperature limits.
- g) Transfer switches shall comply with the applicable standards of UL, cUL, CSA, ANSI, NFPA, IEEE, NEMA.
- h) The transfer switches shall be supplied with a microprocessor based control panel, the controller's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, inherent serial communications capability. The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Sensing and control logic shall be provided on printed circuit boards. A fully programmable engine exerciser with seven independent routines to exercise the engine generator, with or without load on a daily weekly, bi-weekly, or monthly basis. Provide dry-type contacts in the transfer switch for: Transfer Switch in Emergency, Transfer Switch in Auto, Transfer Switch Alarm, Utility (or Normal Source) Power Fail. The transfer switch shall have an input that will initiate an generator/transfer switch exercise routine triggered from dry-type contact closure from the PLC. Provide RS-485 communications port.

2) Sequence of Operation:

- a) The ATS shall incorporate adjustable three phase under voltage sensing on the normal source.
- b) When the voltage of any phase of the normal source is reduced to 80% of nominal voltage, for a period of 0-10 seconds (programmable) a pilot contact shall close to initiate starting of the engine generator.
- c) The ATS shall incorporate adjustable under voltage and under frequency sensing on the emergency source.
- d) When the emergency source has reached a voltage value of 90% of nominal and achieved frequency within 95% of the rated value, the load shall be transferred to the emergency source after a programmable time delay.
- e) When the normal source has been restored to not less than 90% of rated voltage on all phases, the load shall be retransferred to the normal source after a time delay of 0 to 30 minutes (programmable). The generator shall run unloaded for 5 minutes (programmable) and then automatically shut down. The generator shall be ready for automatic operation upon the next failure of the normal source.
- f) If the engine generator should fail while carrying the load, retransfer to the normal source shall be made upon restoration of proper voltage (90%) on the normal source after a time delay of 0 to 30 minutes (programmable).
- g) Inspection and operational tests shall be conducted by the contractor in the presence of the engineer, to indicate that the switch satisfies the specifications.
- h) The transfer switch shall be equipped with a microprocessor based control panel. The control panel shall perform the operational and display functions of the

transfer switch. The display functions of the control panel shall include ATS position, source availability, sequence indication and diagnostics.

- i) The display shall be accessible without opening the enclosure door.
 - j) The control panel shall be provided with a simple user interface for transfer switch monitoring, control and field changeable functions and settings.
 - k) The control panel shall be opto-isolated from electrical noise and provided with the following inherent control functions and capabilities:
 - (1) Built-in diagnostic display.
 - (2) Capability for external communication and network interface.
 - l) Touch pad test switch with Fast Test/Load/No Load selection capability to simulate a normal source failure.
 - m) Time delay to override momentary normal source failure prior to engine start. Field programmable 0-10 seconds, factory set at 8 seconds.
 - n) Time delay on retransfer to normal source, programmable 0-30 minutes, factory set at 15 minutes. If the emergency source fails during the retransfer time delay, the transfer switch controls shall automatically bypass the time delay and immediately retransfer to the normal position.
 - o) Time delay on transfer to emergency, programmable 0-15 seconds, factory set at 10 seconds.
 - p) An in-phase monitor shall be provided. The monitor shall compare the phase angle difference between the normal and emergency sources and be programmed to anticipate the zero crossing point to minimize switching transients.
 - q) An exerciser timer shall be incorporated within the microprocessor and shall be capable of starting the engine generator set and transferring the load (when selected) for exercise purposes on a weekly basis. The exerciser shall contain a battery for memory retention during an outage.
 - r) Provide a momentary pushbutton to bypass the time delays on transfer and retransfer and programmable commit/no commit control logic.
- 3) Construction and Performance:
- a) The automatic transfer switch shall be of double throw construction operated by a reliable electrical mechanism momentarily energized. There shall be a direct mechanical coupling to facilitate transfer in 6 cycles or less.
 - b) The normal and emergency contacts shall be mechanically interlocked such that failure of any coil or disarrangement of any part shall not permit a neutral position.
 - c) For switches installed in systems having ground fault protective devices, and/or wired so as to be designated a separately derived system by the NEC, a 4th pole shall be provided. This additional pole shall isolate the normal and emergency neutrals. The neutral pole shall have the same withstand and operational ratings as the other poles and shall be arranged to break last and make first to minimize neutral switching transients. Add-on or accessory poles that are not of identical construction and withstand capability are not acceptable.
 - d) The contact structure shall consist of a main current carrying contact which is a silver alloy with a minimum of 50% silver content. The current carrying contacts shall be protected by silver tungsten arcing contacts on all sizes above 400 Amps.
 - e) The transfer switch manufacturer shall submit test data for each size switch, showing it can withstand fault currents of the magnitude and the duration necessary to maintain the system integrity. Minimum UL listed withstand and close into fault ratings shall be as follows:

<u>Size (Amps)</u>	<u>with Molded Case Circuit Breaker</u>
30	10,000A
70 - 200	22,000A
230	22,000A
260 - 400	42,000A
600	50,000A

*All values 480 volt, RMS symmetrical, less than 20% power factor.
 - f) ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in

- compliance with the specification requirements. A dielectric test at the conclusion of the withstand and closing (WCR) tests shall be performed.
- g) The automatic transfer switch manufacturer shall certify sufficient arc interrupting capabilities for 50 cycles of operation between a normal and emergency source that are 120 degrees out of phase at 480 volts, 600% of rated current at 0.50 power factor. This certification is to ensure that there will be no current flow between the two isolated sources during switching.
 - h) All relays shall be continuous duty industrial type with wiping contacts. Customer interface contacts shall be rated 10 amperes minimum. Coils, relays, timers and accessories shall be readily front accessible. The control panel and power section shall be interconnected with a harness and keyed disconnect plugs for maintenance.
 - i) Main and arcing contacts shall be visible without major disassembly to facilitate inspection and maintenance.
 - j) A manual handle shall be provided for maintenance purposes with the switch de-energized. An operator disconnect switch shall be provided to defeat automatic operation during maintenance, inspection or manual operation.
 - k) The switch shall be mounted in a NEMA 1 enclosure unless otherwise indicated on the plans.
 - l) Switches composed of molded case breakers, contactors or components thereof not specifically designed as an automatic transfer switch will not be acceptable.
 - m) The automatic transfer switch shall be protected by a one year warranty. The automatic transfer switch must be equipped with a solenoid protection scheme that removes any attempts of operating the solenoids after (3) consecutive trials until manual intervention by an operator.
 - n) The automatic transfer switch shall be ASCO Series 300 (3ATS) or equal.
- 4) Specifications:
- a) Standard dropout voltage is 80%, pickup 90% of nominal. Settings are adjustable. Specify pickup/dropout if other than factory standard is desired.
 - b) Automatic Transfer switches shall be in conformance with the applicable portions of:
 - UL 1008: Underwriters Laboratories standard for automatic transfer switches
 - CSA: C22.2 No. 178 certified at 600 VAC
 - NFPA 70: National Electrical Code including use in emergency and standby systems in accordance with Articles 517, 700, 701, 702
 - NFPA 99: Essential electrical systems for health care facilities
 - NFPA 101: Life safety code
 - NFPA 110: Standard for emergency and standby power systems
 - IEEE 241: I.E.E.E. recommended practice for electrical power systems in commercial buildings
 - IEEE 446: I.E.E.E. recommended practice for emergency and standby power systems
 - IEEE 472: (ANSI C37.90A): Ringing wave immunity
 - NEMA ICS10: AC automatic transfer switch equipment (supersedes ICS2-447)
 - UL 50/508: Enclosures
 - ICS 6: Enclosures
 - ANSI C33.76: Enclosures

NEMA 250:	Enclosures
EN55022	(CISPR11): Conducted and radiated emissions (Exceeds EN55011 & MILSTD 461 Class 3)
EN61000-4-2:	(Level 4): ESD immunity test Class B:
EN61000-4-3:	(ENV50140): Radiated RF, electromagnetic field immunity test
EN61000-4-4:	Electrical fast transient/burst immunity test
EN61000-4-5:	IEEE C62.41: Surge immunity test (1.2 x 50µs, 5 & 8 kV)
EN61000-4-6:	(ENV50141): Conducted immunity test
EN61000-4-11:	Voltage dips and interruption immunity
IEEE-693-2005:	Seismic certified at HIGH level with 2.5 amplification factor
IBC-2006:	Seismic certified at Ip=1.5 for z/h less than or equal to 1
OSHPD OSP-0035-10	Seismic testing in accordance with ICC-ES AC-156

- 5) In-phase monitor shall be inherently built into the controls. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The in-phase monitor shall be specifically designed for and be the product of the ATS manufacturer.
- 6) Terminals shall be provided and utilized to determine actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source.
- 7) The ATS shall be provided with dry contacts to be wired to the Generators Start/Call circuit.
- 8) Terminals shall be provided and utilized in conjunction with the pump controls to monitor a pre-transfer, load shed, signal from the ATS. The pump controls shall use this signal to provide orderly shutdown of any pumps in operation prior to ATS source transfer and properly coordinate the reinitiating of pump calls once it is determined that transfer is complete.
- 9) The ATS shall be factory installed and tested in the PCC prior to shipment and shall arrive at the jobsite wired to field-landing terminals.

6. Generator:

- a. Provide Emergency Standby Power (ESP): Per ISO 8528: The maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturers. The permissible average power output (Ppp) over 24 hours of operation shall not exceed 70 percent of the ESP unless otherwise agreed by the engine manufacturer.
- b. Cummins Power Generation, Model C60 N6, or equal.
- c. Environmental Conditions: Provide Level 2 sound attenuated enclosure. Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1) Ambient Temperature: 0.0 deg C (32.0 deg F) to 40.0 deg C (104.0 deg F).
 - 2) Relative Humidity: 0 to 95 percent.
 - 3) Altitude: 860 ft above MSL.
- d. Engine-Generator Set:

- 1) Alternator shall be capable of accepting maximum 75 kVA in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.
 - 2) Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component. The engine-generator nameplate shall include information of the power output rating of the equipment.
- e. Generator Set Performance:
- 1) Steady-State Voltage Operational Bandwidth: 1.0 percent of rated output voltage from no load to full load.
 - 2) Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.
 - 3) Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
 - 4) 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.
 - 5) Transient Frequency Performance: Not more than 15 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.
 - 6) Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
 - 7) Sustained Short-Circuit Current: (For engine-generator sets using a PMG-excited alternator) For a 3-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 8 seconds without damage to generator system components. For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.
 - 8) Start Time: Comply with NFPA 110, Level 1, Type 10, system requirements.
 - 9) Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.
- f. Engine:
- 1) Fuel: Natural Gas.
 - 2) Rated Engine Speed: 1800RPM.
 - 3) Lubrication System: The following items are mounted on engine or skid:
 - a) Lube oil pump: shall be positive displacement, mechanical, full pressure pump.
 - b) Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.
 - c) 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) Engine Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instructions.
 - 5) Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance:
 - a) Designed for operation on a single 120 VAC, Single phase, 60Hz power connection. Heater voltage shall be shown on the project drawings.
 - b) Installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss.
 - c) Provided with a 12VDC thermostat, installed at the engine thermostat housing.
 - 6) Governor: Adjustable isochronous, with speed sensing.

- 7) Muffler/Silencer: Selected with performance as required to meet sound requirements of the application (critical residential), sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. For generator sets with outdoor enclosures the silencer shall be inside the enclosure.
- 8) Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.
- 9) Starting System: 12 or 24V, as recommended by the engine manufacturer; electric, with negative ground:
 - a) Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified.
 - b) Cranking Cycle: As required by NFPA 110 for level 1 systems.
 - c) Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.
 - d) Battery Compartment: Factory fabricated of metal with acid-resistant finish.
 - e) Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
 - f) Battery Chargers: Unit shall comply with UL 1236, provide fully regulated, constant voltage, current limited, battery charger for each battery bank. It will include the following features:
 - (1) Operation: Equalizing-charging rate based on generator set manufacturer's recommendations 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.
 - (2) Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 20 deg C to plus 40 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
 - (3) Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - (4) 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.
 - g. Control and monitoring: Engine generator control shall be microprocessor based and provide automatic starting, monitoring, protection and control functions for the unit. Provide dry-type contacts for interconnection to the PLC. Status points shall include: Generator Running, Generator Alarm/Fail, and Generator in Auto.
 - h. Generator, Exciter, and Voltage Regulator:
 - 1) Comply with NEMA MG 1.
 - 2) Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
 - 3) Electrical Insulation: Class H.
 - 4) Temperature Rise: 120 / Class H environment.
 - 5) Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
 - 6) Shunt excitation.
 - 7) Enclosure: Drip-proof.
 - 8) Voltage Regulator: SCR type, separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.
 - 9) Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

- 10) Subtransient Reactance: 15 percent maximum, based on the rating of the engine generator set.
- i. Factory Testing: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110.

2.04 ACCESSORIES

- A. Access Frame and Cover:
 1. Double leaf.
 2. Frame: 1/4-inch extruded aluminum.
 3. Door Leaf: 1/4-inch aluminum diamond plate with aluminum stiffeners as required to withstand 300 psf live load.
 4. Safety grate – double leaf, coated with orange powder coat.
 5. Door shall automatically lock at 90 degrees.
 6. Provide vinyl grip handle to release cover for closing.
 7. Locking Device: Exterior hasp.
 8. Apply bituminous coating to frame exterior.
 9. Hardware: 316 Stainless steel.
- B. Pump Guide Bars and Brackets:
 1. Material: Schedule 40 316 stainless steel.
 2. Diameter: 2-inch.
 3. Length: As required to extend from lower guide holder or discharge connection to upper guide holder mounted on the access frame.
 4. Provide 2 guide bars for each pumping unit.
 5. Attach intermediate support brackets to discharge piping at minimum 10-foot intervals.
- C. Cable Holder:
 1. PVC coated.
 2. Manufacturer's standard configuration.
- D. Lifting Devices:
 1. Provide stainless steel chain to facilitate inspection and removal of each pumping unit in a single lift.
 2. Provide for connection to the submerged pumping units by means of a stainless steel clevis without entering the wet well.
 3. Cable and clevis assembly shall be rated for 150 percent of the pumping unit weight.
- E. Interior Piping:
 1. Pipe Material: Class 52 cement-lined ductile iron pipe.
 2. Joints: Flanged.
 3. Exterior Coating: Epoxy.
 4. Valves and piping within the valve vault shall be field assembled as shown on the drawings. The following 8-inch valves shall be provided:
 - a. Swing check valves (2 required): Golden Anderson APCO 100 series rubber flapper swing check valve, or equal.
 - b. Isolation valves (2 required): DeZurik PEC Eccentric Plug Valve or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pumping Units and Accessories: Install all components in accordance with the manufacturer's instructions.

- B. Precast Concrete Wet Well and Valve Vault:
 - 1. Construct vault, base and cover in accordance with Drawing details and elevations.
 - 2. Provide trench excavation, foundation, and backfill in accordance with City of Madison Standard Specifications for Public Works Construction.
 - 3. Place precast base slab on compacted granular subgrade.
 - 4. Set bottom precast barrel section in a full mortar bed on the base slab.
 - 5. Fill joints between barrel sections and around pipe connections with mortar or approved joint compound.
 - 6. Touch-up coating abrasions and joints after installation.

- C. It shall be the installing Contractor's responsibility to secure from the manufacturer – installation instructions prior to delivery. Contractor shall coordinate delivery with manufacturer at least 4 weeks prior to shipment of the lift station equipment to the jobsite. The Contractor shall study the instructions and drawings provided and direct any questions they have to the lift station equipment manufacturer representative for answers before proceeding with the station installation. The Contractor shall then install the lift station equipment in complete conformance with the manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

- A. Factory Testing: The completed assemblies and control panels shall be tested at the factory prior to shipment. Panels shall be energized at the main disconnect using the project specific voltage configuration. Controls shall be tested to confirm proper operation.

- B. Manufacturer's Field Service:
 - 1. Supervise installation of pumping units, discharge connection and piping, access equipment, and float switches.
 - 2. Inspect and approve final installation.
 - 3. Perform start-up of equipment and all necessary adjustments and calibrations in accordance with manufacturer's recommendations.
 - 4. Provide written report certifying the following:
 - a. Installation was inspected and found acceptable.
 - b. The required tests and inspections were performed and were found to be within the manufacturer's recommended tolerances.

- C. Testing:
 - 1. Perform the following tests and inspections at start-up:
 - a. Megger stator and power cables.
 - b. Check seal lubrication.
 - c. Check for proper rotation.
 - d. Check power supply voltage.
 - e. Check motor operating load and no load current.
 - f. Check level control operation and sequence.

3.03 DEMONSTRATION

- A. Devices requiring field calibration shall be calibrated in the presence of the Owner's representative and be documented.

3.04 STATION START-UP

- A. The Contractor shall include in their Bid Price the cost of a field installation inspection and equipment start-up trip performed by the equipment manufacturer's authorized representative. The authorized representative shall certify in writing to the Engineer that the installation is in accordance with the respective manufacturer's requirements and that the warranty is validated.

- B. The Contractor shall provide Operation & Maintenance manuals (including as-built wiring diagrams) for pumps, motors, controls, electrical, and instrumentation. The Operations and Maintenance manuals shall be submitted to and approved by the Contractor and then submitted to the Engineer. The manuals shall be complete at the time of the start-up. The Contractor shall also provide machine-

specific Lockout and Tag-out procedures for all station equipment. Owner's representative shall sign off on the start-up. Start-up shall include the respective representatives for the following:

1. Pumps
 2. Electrical Controls and Instrumentation
 3. Generator
 4. Owner
 5. Engineer
- C. Demonstrate proper operation of all system features and functions to the Owner's representative and Engineer. Coordinate installation and start-up scheduling with Owner and Engineer.

END OF SECTION

Appendix A - Geotechnical Report



Construction • Geotechnical
Consulting Engineering/Testing

May 20, 2021
C21051-4

Mr. Kyle Frank, P.E.
City of Madison – Engineering Department
210 Martin Luther King, Jr. Blvd., Room 115
Madison, WI 53703

Re: Geotechnical Exploration Report
Proposed Truax Lift Station Replacement
Madison, Wisconsin

Dear Mr. Frank:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the geotechnical exploration for the project referenced above. The purpose of this exploration program was to evaluate the subsurface conditions at the location of the proposed lift station and to provide geotechnical recommendations regarding wet well and valve vault design and construction. An electronic copy of this report is provided for your use, and a paper copy can be provided upon request. An electronic copy is also being forwarded to Al Bush at Short Elliot Hendrickson, Inc. (SEH).

PROJECT AND SITE DESCRIPTION

We understand that a new canned lift station and valve vault are planned adjacent to the existing pump station, which is to be removed. The lift station and valve vault would likely extend to depths of about 30 ft and 10 ft, respectively, below ground surface. A new prefabricated, single story control building, with a footprint measuring approximately 18 ft by 10 ft in plan, would also be placed on site. The control building would be supported by perimeter wall footings.

Based on preliminary plans provided to CGC, the base slab of the lift station will be at EL 855 ft, the base of the valve vault near EL 844.5 ft and the base of the wet well at 823.5 ft. The structures are anticipated to consist of manhole-type prefabricated concrete sections.

An existing pump station currently occupies the site. The planned new lift station is to be located adjacent to the existing pump station; the bottom of which is reportedly at a depth of approximately 22.5 ft below existing grade. Concrete pavement adjacent the existing building covers the central portion of the site, with grass lawn surrounded by a gravel drive over the remainder.

SUBSURFACE CONDITIONS

The subsurface exploration consisted of drilling one Standard Penetration Test (SPT) soil boring (B-1) to a planned depth of 50 ft below existing site grade at a location selected by the City and modified slightly in the field by CGC to avoid overhead lines. The boring was drilled on April 21,

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2021 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted rotary D-50 drill rig equipped with hollow-stem augers and an automatic SPT hammer. The boring location is shown in plan on the Soil Boring Location Map attached in Appendix B. A ground surface elevation at the proposed boring location was provided by the City. The elevation at the actual boring location was estimated based on the provided datum as well as from digital topographical information available via the Dane County DciMap Application and should thus be considered approximate.

The subsurface profile in the boring (B-1) can be described by the following strata (in descending order):

- 9 in. of *topsoil fill*; over
- About 2 ft of *fill* consisting of loose silty sand with gravel; followed by
- Approximately 2.5 ft of sedimentary to fibrous *peat*; over
- About 7.5 ft of very soft *clay* having trace sand; resting atop
- Medium dense to dense *fine to medium sand* with varying silt and gravel content, to the maximum depth explored.

The percent passing the No. 200 U.S. standard sieve (P200) of the sand layers was determined to be 35.0% near 15 ft below grade; 26.5% near 14 ft below grade, ranging from 5.0% to 6.1% between about 16 and 27 ft below grade, and 42.0% near 30 ft below grade. The resulting USCS classifications of the test samples range from SP-SM to SM. The particle size distribution test reports are included in Appendix B.

Groundwater samples were collected during drilling by City of Madison hydrogeologist Brynn Bemis to be analyzed for potential contamination. Results of said analysis are separate from this report.

Groundwater was encountered in the boring approximately 8.5 ft below existing site grade (approximately 846.5 ft) during drilling. Drilling procedures below the water table involved the addition of water in order to clean out the drill string prior to sampling thus subsequent groundwater readings would likely not have yielded accurate data. Groundwater levels should be expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, nearby Starkweather Creek stages, as well as other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Log attached in Appendix B.



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DISCUSSION AND RECOMMENDATIONS

Based on the subsurface exploration and project information, it is our opinion that a lift station near the boring location can be constructed using typical excavation and earth retention techniques provided appropriate dewatering measures are implemented to adequately control groundwater. *Significant undercutting will be necessary to remove the highly organic soils and very soft clays underlying the fill materials beneath the footprints of the planned control building and valve vault. The perimeter wall footings of the planned control building will need to bear on the medium-dense sands underlying the very soft cohesive soils.* Alternatively, recognizing the fairly deep over-excavation work anticipated, consideration could be given to supporting the planned control building and associated slab on helical piers. The piers would likely need to extend into the natural medium dense to dense sand strata. If desired, CGC can provide helical pier design parameters upon request. Our design and construction recommendations for site preparation and foundations are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. Wet Well & Valve Vault Excavation

After removal of the topsoil, fill materials and underlying peat, excavation to the base slab elevations for the wet well and vault may proceed. Since the excavation will be approximately 30 ft in depth for the wet well, the excavation should be designed by an appropriately qualified registered professional engineer. The method of excavation sloping and earth retention will depend on the proximity of the excavation to the nearby structure, and the means and methods are the responsibility of the contractor. We recommend that care be taken to protect the existing lift station if it is to remain in operation until the new facility is complete.

Due to the depth of the planned wet well, as well as the adjacent structure, an earth retention system will likely be required. It appears that sheet piling or soldier pile/wood lagging systems with tiebacks or internal bracing would likely be applicable. The dewatering system should be designed in conjunction with the earth retention system, and drainage provisions (e.g., three-dimension drainage board) should be provided behind the retention system to prevent the development of hydrostatic pressure. Earth retention systems should be designed by an appropriately qualified professional engineer.

Below about 8 to 9 ft, groundwater was encountered, so dewatering will be required in advance of excavation to reduce the risk of excavation instability. Based on groundwater drawdowns in excess of 2 ft, we anticipate that dewatering with well points or deep wells will be required. To prevent uplift at the base of the excavation, we recommend that the wells or well points extend to a depth of at least 35 ft so as to intercept the more permeable sand strata. Additional slightly shallower wells, which extend into the siltier sand on which the wet well will bear, may also be necessary. The discharge from the dewatering system should flow into a sedimentation basin prior to discharging to check for excessive sediment, which would suggest improperly sized well screens. Proper well



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screens are required to prevent the loss of soil and potential settlement of surrounding structures. Supplemental dewatering using submersible pumps in a clear stone layer at the bottom of the excavation may be required. *Dewatering means and methods are the responsibility of the contractor.*

Conventional sloping may prove challenging for the excavation due to the adjacent existing lift station, presence of groundwater and planned 30-foot excavation depth combined with the types of soils encountered. The sand strata containing variable silt contents are below the water table and thus generally classified as OSHA “Type C” soils where 1.5H:1V (or flatter) sloping is required. Therefore, the upper approximately 27 ft of the excavation could require flatter side slopes. The excavation slope determination should be made by the excavation design engineer, with the soil conditions evaluated by a competent person completing the excavation in the field. Excavation slopes should be protected from erosion using diversion berms at the top and plastic (e.g., visqueen) on the excavation face.

We recommend including a minimum 12-in. thick layer of compacted crushed clear stone at the base of the wet well and valve vault excavations to create fairly uniform bearing conditions for the base slabs. The stone should be enveloped in non-woven geotextile fabric (Mirafi 160N or equivalent). Minor sumping can also be accomplished from the clear stone layer as a supplement to the primary well point/deep well system, as mentioned earlier.

Once the wet well sections are installed, the annular space around the manhole units should be backfilled. On the sides of the manhole where overlying structures are not present and some settlement at the surface will be tolerable, the wet well can be backfilled with smaller size clear stone or pea gravel. Note that if uncompacted material is used as backfill, there is a risk that settlement may occur which can be minimized using vibratory methods during placement. Where overlying structures will be constructed and settlement needs to be minimized, backfilling in areas with limited space can be accomplished with flowable fill or similar low strength cementitious material. If space allows for compaction equipment, granular soil can be used as backfill in the upper part of the excavation. In pavement and landscape areas, the granular soil should be compacted to a minimum of 90% compaction (based on modified Proctor methods – ASTM D 1557) from the bottom of the excavation to within 3 ft of the surface, with 95% compaction in the upper 3 ft in pavement areas. *Where structures (e.g., valve vault) will be supported on the granular backfill, 95% compaction is recommended from the bottom of the excavation up to the foundation grade.*

2. Foundation/Base Slab Design

In our opinion, the wet well and valve vault bases should be supported on a stone layer constructed above the medium dense sand soil. A portion of the valve vault base may also be supported on engineered granular backfill. The proposed control building can be supported on reinforced concrete spread footing foundations bearing on the native medium dense granular soils, or compacted granular fill. *Based on the presence of unsuitable existing fill and very soft native clay soils to a*



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depth of about 12 ft below existing grade, significant undercutting will likely be required below perimeter frost depth footings associated with the control building. The following parameters should be used for foundation design:

- Maximum net allowable bearing pressure:
 - Wet well and valve vault base: 2,500 psf
 - Control building frost depth footings: 1,500 psf
- Minimum foundation widths:
 - Continuous wall footings: 18 in.
 - Column pad footings: 30 in.

We recommend that CGC be retained during construction to check that footing/base slab subgrades are suitable for their design bearing pressure or recommend corrective measures, if necessary. If loose or disturbed granular soils are detected, they should be recompact or stabilized with clear stone that is compacted into the subgrade until deflection ceases. Soils that cannot be adequately recompact should be undercut and replaced with engineered granular soil. Where undercutting is required, the base of the undercut excavations should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. Grade should be restored using granular fill compacted to 95 percent compaction (ASTM D 1557) or well-compacted 3-in. dense graded base or clear stone. Provided the foundation design/construction recommendations discussed above are followed, we estimate that total and differential settlements should not exceed 1.0 and 0.5 in., respectively.

3. Below-Grade Wet Well/Valve Vault Structure Design Parameters

We assume that the wet well and/or valve vault structure will consist of a cylindrical prefabricated concrete manhole-type unit supported on a base slab located about 30 ft or 10 ft, respectively, below existing grade. Assuming that the excavation is backfilled with granular soils similar to those encountered in the boring, the following parameters should be used for the design of the structure(s):

Table 1 – Lift Station Design Parameters (Granular Backfill)

Total Unit Weight of Soil Backfill (pcf):	125
Buoyant Unit Weight of Soil Backfill (pcf):	63
At-Rest Lateral Earth Pressure Coefficient (K_0):	0.5
Active Lateral Earth Pressure Coefficient (K_a):	0.3

The lateral earth pressure coefficients assume that granular material is used as backfill and compacted to a minimum of 95 percent of modified Proctor (ASTM D 1557). Hydrostatic pressures should be included for walls located below the water table, if applicable. Additionally, the buoyant unit weight should be used for soils below the water table for calculating resistance to hydrostatic

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uplift. If the base slab extends beyond the lift station walls, the dead weight of soil (submerged unit weight below the water table) located directly above the slab can be included in uplift resistance.

Where the sides of the deep wet well and/or valve vault excavation will encroach upon the zone of influence of existing or the proposed structures (assume a slope of 0.5H:1V from the outside edge of the foundation) that portion/side of the excavation should be backfilled with granular material compacted to a minimum of 95% modified Proctor or with clear stone or 3-in. dense graded base placed in maximum 12-in. loose lifts and compacted with a heavy vibratory compactor until deflection ceases.

4. Control Building Floor Slab

We anticipate that the soils exposed at floor slab subgrade within the proposed control building will consist of compacted granular backfill used to restore site grades following complete removal of the existing fill, peat and soft organic clay, as previously discussed. The slab subgrade should be recompacted with a smooth-drum compactor and then proof-rolled with a loaded truck or other heavy rubber tired. piece of construction equipment to check for loose/yielding areas. If loose/yielding areas are detected, they should be undercut/removed and restored with granular backfill that is compacted to at least a level of 95% compaction based on modified Proctor methods (ASTM D1557). As an alternative, yielding areas could potentially be stabilized with compacted 3-in. dense graded base (DGB).

Fill placement to establish design grades can then begin, where necessary. We recommend using granular soils as fill within the building footprint, which should be compacted to a minimum of 95% compaction based on modified Proctor methods (ASTM D1557). Periodic field density tests should be taken by CGC to document that the required compaction levels are being achieved.

In our opinion, a subgrade modulus of 100 pci may be used in slab design assuming the presence of a firm stable subgrade. To serve as a capillary break, the final 4 to 6 in. of soil placed below the slab should consist of well-graded sand or gravel with no more than 5 percent by weight passing a No. 200 U.S. standard sieve. Note that some structural engineers require a 4 to 6 in. thick layer of dense graded base (e.g., 1.25-in. crushed aggregate base course) below the slab to increase the subgrade modulus to 150 pci immediately below the slab. The slab should be structurally separate from the foundations and have construction joints and wire mesh for crack control.

5. Seismic Design Category

In our opinion, the average soil/rock properties in the upper 100 ft of the site (based on N-values generally greater than 15 blows/ft) can be characterized as a stiff profile. This characterization would place the site in Site Class D for seismic design according to the International Building Code and ASCE 7.



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CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties which could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of the on-site soils, we recommend that general site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.
- Earthwork construction during late fall through early spring could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.
- If the schedule requires that construction proceed during adverse weather conditions, typically encountered during fall through spring, the contingency for undercutting/ stabilizing disturbed soils should be increased.
- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards. Excavations deeper than 20 ft should be designed by an appropriately qualified professional engineer. Dewatering and earth retention will be important considerations during excavation.
- When excavating adjacent to the existing structure, take care to avoid undermining the existing foundations. Where excavations will encroach upon existing foundations or utilities that will remain, earth retention or underpinning will likely be required to support the existing structures. We can provide additional consultation, if desired.
- Based on observations made during the field exploration, groundwater infiltration into excavations should be expected and dewatering considerations were previously discussed. Additional water accumulating at the base of excavations as a result of precipitation or seepage should be controlled and quickly removed using pumps operating from filtered sump pits.

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RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceeds in accordance with our recommendations, the following operations should be monitored by CGC:

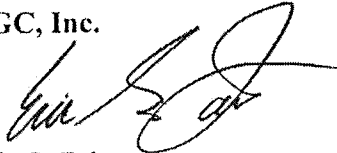
- Topsoil/fill removal/subgrade proof-rolling within the construction areas;
- Fill/backfill placement and compaction;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

* * * *

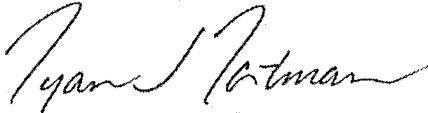
It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.



Eric S. Fair
Senior Staff Engineer/Geologist



Ryan J. Portman, P.E.
Consulting Professional

- Encl.: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Log of Test Boring (1)
Log of Test Boring-General Notes
Unified Soil Classification System
Particle Size Distribution Test Reports (4)
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications

Cc: Al Bush, SEH, Inc. – ABush@SEHInc.com

APPENDIX A
FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

One Standard Penetration Test (SPT) soil boring was drilled to a planned depth of 50 ft below existing site grade at a location selected by City personnel and modified slightly in the field by CGC. The boring was drilled on April 21, 2017 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted rotary D-50 drill rig equipped with hollow-stem augers and an automatic SPT hammer. The boring location is shown in plan on the Soil Boring Location Exhibit attached in Appendix B. The ground surface elevation at the boring location was interpolated from an elevation provided by the City and DCiMap.

Standard penetration test (SPT) soil samples were obtained at 2.5-foot intervals to 10 ft and then at 5-ft intervals to the termination depth. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

The boring is extended downward, between samples, by a hollow-stem auger to a depth of 10 ft; then by mud rotary drilling techniques (3 7/8-in. roller bit and drilling mud) to the maximum depth explored.

2. Standard Penetration Test and Split-Barrel Sampling of Soils
(ASTM Designation: D 1586)

This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of boring and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. *Samples of groundwater were collected by City of Madison hydrogeologist Brynn Bemis to be analyzed for potential contamination. Results from said sampling are separate from this report.* Water level observations were made in the boring during drilling and are shown at the bottom of the boring log. Upon completion of drilling, the boring was backfilled to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soils were visually classified by CGC using the Unified Soil Classification System. The final log prepared by the engineer and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

**SOIL BORING LOCATION MAP
LOG OF TEST BORING (1)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM
PARTICLE SIZE DISTRIBUTION TEST REPORTS (4)**



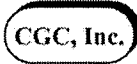
Legend

⊕ Denotes Boring Location

Notes

1. Boring location is approximate
2. Soil Boring performed by Badger State Drilling in April 2021

Scale: Reduced

Job No. C21051-4		SOIL BORING LOCATION MAP Truax Lift Station Replacement Madison, Wisconsin
Date: 5/2021		



LOG OF TEST BORING

Project Truax Lift Station
 Location Madison, WI

Boring No. 1
 Surface Elevation (ft) 855±
 Job No. C21051-4
 Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	w	LL	PL	LI
1	10	M	6	0	9 in. TOPSOIL					
					FILL: Loose Brown Silty Sand with Gravel					
2	12	M	9	5	Loose, Dark Brown Sedimentary to Fibrous PEAT (PT)					
3	18	M	1	7	Very Soft, Gray Organic to Lean CLAY, Trace Sand (OH/CL)	(<0.2)				
4	18	W	0	10		(<0.2)				
5	18	W	19	15	Medium Dense, Gray Fine to Medium SAND, Some Silt, Scattered Clay Seams and Lenses (SM) P200= 35.0%					
6	12	W	30	20	Medium Dense to Dense, Light Brown Fine SAND, Little Silt (SP-SM) P200= 5.0%					
7	8	W	32	25	Dense, Brown Fine to Medium SAND, Little Gravel and Silt (SP-SM) P200= 6.1%					
8	18	W	17	30	Medium Dense, Grayish-Brown Silty Fine SAND (SM) P200= 42.0%					
9	10	W	22	35	Medium Dense, Brown Fine SAND, Trace Silt (SP)					
10	0	W	31	40	Medium Dense to Dense, Brown Fine to Medium SAND, Trace Silt and Gravel (SP)					
11	10	W	29	45						
12	12	W	41	50						
End Boring at 50 ft										
Borehole Backfilled with Bentonite Chips										

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	∇	8.5'	Upon Completion of Drilling		Start	4/21/21	End	4/21/21	
Time After Drilling					Driller	BSD	Chief	MC	Rig CME-55
Depth to Water					Logger	DB	Editor	ESF	
Depth to Cave in					Drill Method	2.25" HSA; Autohammer			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.									

CGC, Inc.

LOG OF TEST BORING
General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse.....	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse.....	2.00 mm to 4.76 mm.....	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm.....	#200 to #40
Silt.....	0.005 mm to 0.074 mm.....	Smaller than #200
Clay.....	Smaller than 0.005 mm.....	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
 Color, moisture, grain shape, fineness, etc.
Major Constituents
 Clay, silt, sand, gravel
Structure
 Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
 Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose.....	0 - 4
Loose.....	4 - 10
Medium Dense.....	10 - 30
Dense.....	30 - 50
Very Dense.....	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace.....	0% - 5%
Little.....	5% - 12%
Some.....	12% - 35%
And	35% - 50%

Consistency

Term	q _u -tons/sq. ft
Very Soft.....	0.0 to 0.25
Soft.....	0.25 to 0.50
Medium.....	0.50 to 1.0
Stiff.....	1.0 to 2.0
Very Stiff.....	2.0 to 4.0
Hard.....	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic.....	Less than 4%
Organic Silt/Clay.....	4 - 12%
Sedimentary Peat.....	12% - 50%
Fibrous and Woody Peat...	More than 50%

Plasticity

Term	Plastic Index
None to Slight.....	0 - 4
Slight.....	5 - 7
Medium.....	8 - 22
High to Very High ..	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

Drilling and Sampling

- CS – Continuous Sampling
- RC – Rock Coring: Size AW, BW, NW, 2"W
- RQD – Rock Quality Designation
- RB – Rock Bit/Roller Bit
- FT – Fish Tail
- DC – Drove Casing
- C – Casing: Size 2 ½", NW, 4", HW
- CW – Clear Water
- DM – Drilling Mud
- HSA – Hollow Stem Auger
- FA – Flight Auger
- HA – Hand Auger
- COA – Clean-Out Auger
- SS - 2" Dia. Split-Barrel Sample
- 2ST – 2" Dia. Thin-Walled Tube Sample
- 3ST – 3" Dia. Thin-Walled Tube Sample
- PT – 3" Dia. Piston Tube Sample
- AS – Auger Sample
- WS – Wash Sample
- PTS – Peat Sample
- PS – Pitcher Sample
- NR – No Recovery
- S – Sounding
- PMT – Borehole Pressuremeter Test
- VS – Vane Shear Test
- WPT – Water Pressure Test

Laboratory Tests

- q_a – Penetrometer Reading, tons/sq ft
- q_u – Unconfined Strength, tons/sq ft
- W – Moisture Content, %
- LL – Liquid Limit, %
- PL – Plastic Limit, %
- SL – Shrinkage Limit, %
- LI – Loss on Ignition
- D – Dry Unit Weight, lbs/cu ft
- pH – Measure of Soil Alkalinity or Acidity
- FS – Free Swell, %

Water Level Measurement

- ▽ - Water Level at Time Shown
- NW – No Water Encountered
- WD – While Drilling
- BCR – Before Casing Removal
- ACR – After Casing Removal
- CW – Cave and Wet
- CM – Caved and Moist
















Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

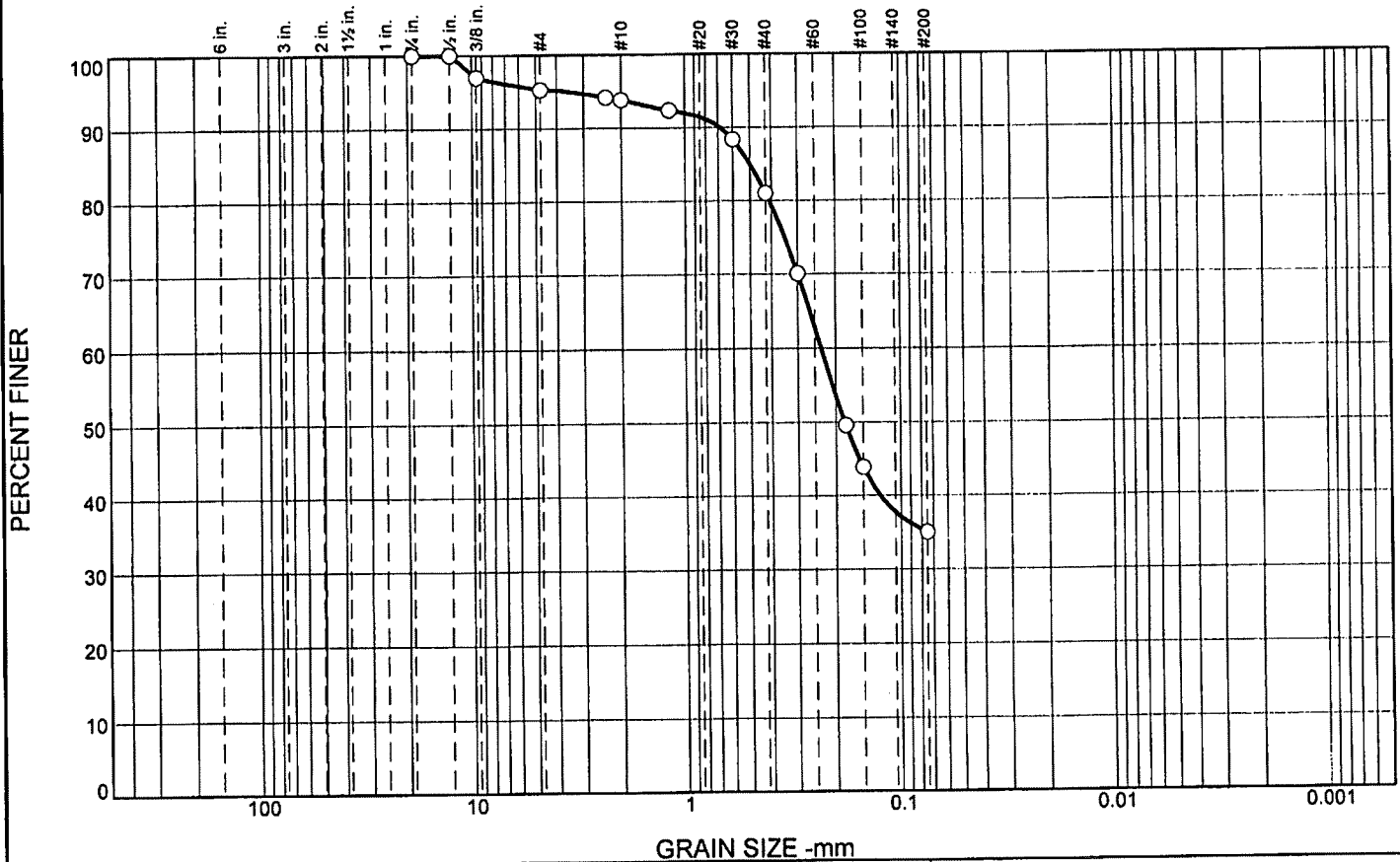
UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size)		
Clean Gravels (Less than 5% fines)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size		GW Well-graded gravels, gravel-sand mixtures, little or no fines
		GP Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
		GM Silty gravels, gravel-sand-silt mixtures
		GC Clayey gravels, gravel-sand-clay mixtures
Clean Sands (Less than 5% fines)		
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size		SW Well-graded sands, gravelly sands, little or no fines
		SP Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
		SM Silty sands, sand-silt mixtures
		SC Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%		ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH Inorganic clays of high plasticity, fat clays
		OH Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line or P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	
Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent GW, GP, SW, SP More than 12 percent GM, GC, SM, SC 5 to 12 percent Borderline cases requiring dual symbols		
<h4>PLASTICITY CHART</h4> <p>The Plasticity Chart plots Plasticity Index (PI) in percent on the y-axis (0 to 60) against Liquid Limit (LL) in percent on the x-axis (0 to 100). A diagonal line labeled 'A LINE: PI=0.73(LL-20)' separates the clay region (above) from the silt region (below). The chart is divided into regions: CH (Clay of High Plasticity) above the A-line and to the right of LL=40; CL (Clay of Low Plasticity) above the A-line and to the left of LL=40; ML&OL (Silt of Medium to Low Plasticity) below the A-line and to the left of LL=40; and (CL-MH) (Clay of Low to Medium Plasticity / Silt of High Plasticity) below the A-line and to the right of LL=40. A shaded zone exists between LL=40 and LL=60, bounded by the A-line and a horizontal line at PI=4.</p>		

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.7	1.4	12.9	46.0	35.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	97.0		
#4	95.3		
#8	94.2		
#10	93.9		
#16	92.4		
#30	88.4		
#40	81.0		
#50	70.1		
#80	49.6		
#100	43.9		
#200	35.0		

Material Description

Brown Silty Fine to Medium Sand, Trace Gravel

PL=	Atterberg Limits	PI=
	LL=	

D ₉₀ = 0.6844	Coefficients	D ₆₀ = 0.2337
D ₅₀ = 0.1819	D ₈₅ = 0.5006	D ₁₅ =
D ₁₀ =	D ₃₀ =	C _c =
	C _u =	

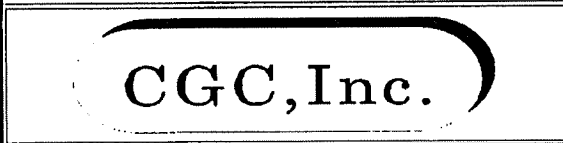
USCS= SM	Classification
	AASHTO=

Remarks

* (no specification provided)

Sample Number: B1: S5

Date: 5/12/21



Client: City of Madison
Project: Truax Lift Station

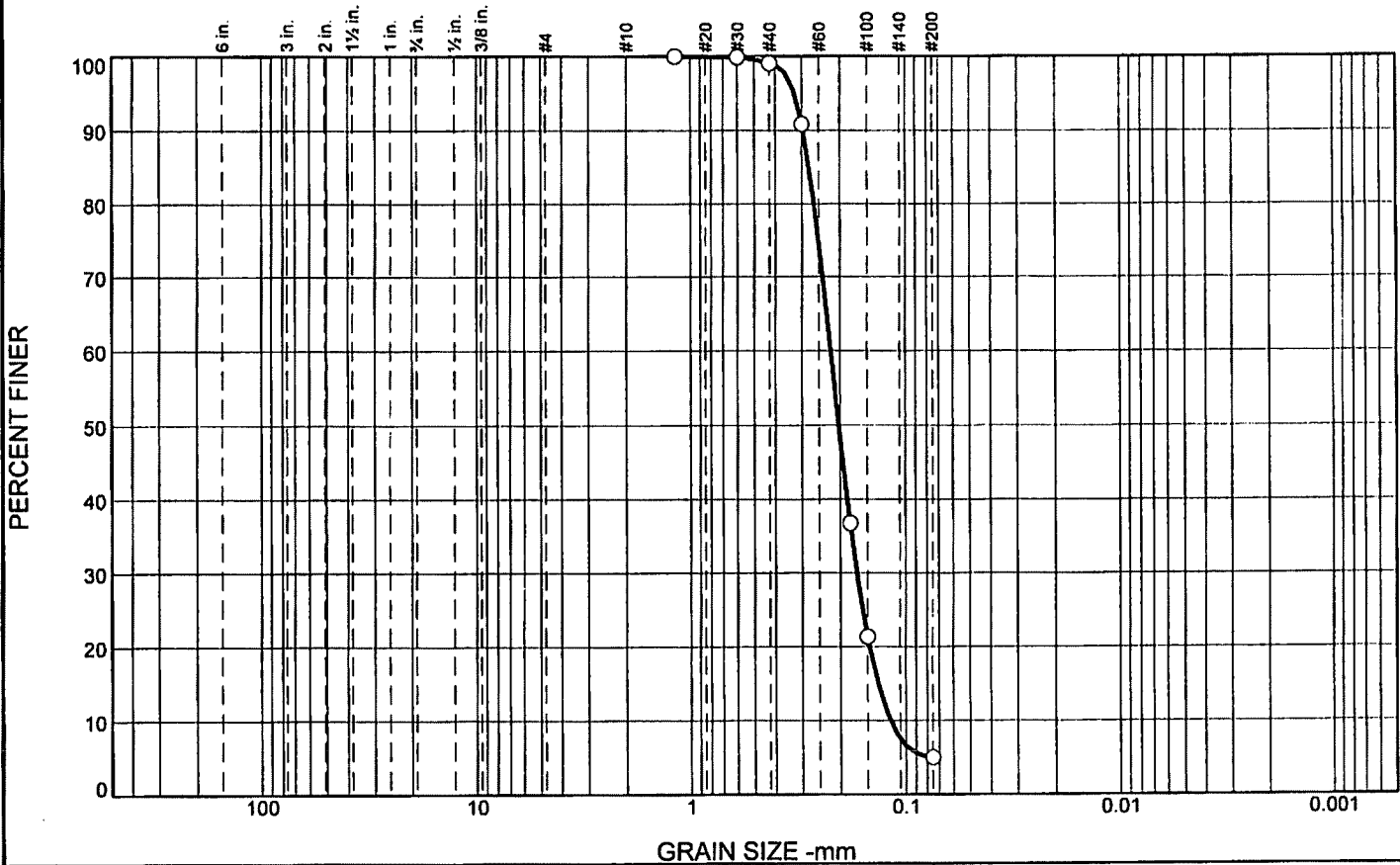
Project No: C21051-4

Figure

Tested By: DRW

Checked By: ESF

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.9	94.1	5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	99.9		
#40	99.1		
#50	90.9		
#80	36.8		
#100	21.4		
#200	5.0		

Material Description

Light Brown Fine Sand, Little Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.2961 D₈₅= 0.2777 D₆₀= 0.2204
D₅₀= 0.2027 D₃₀= 0.1676 D₁₅= 0.1343
D₁₀= 0.1179 C_u= 1.87 C_c= 1.08

Classification

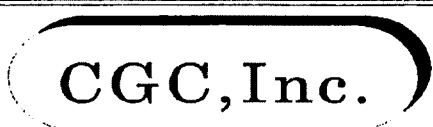
USCS= SP-SM AASHTO=

Remarks

* (no specification provided)

Sample Number: B1: S6

Date: 5/12/21



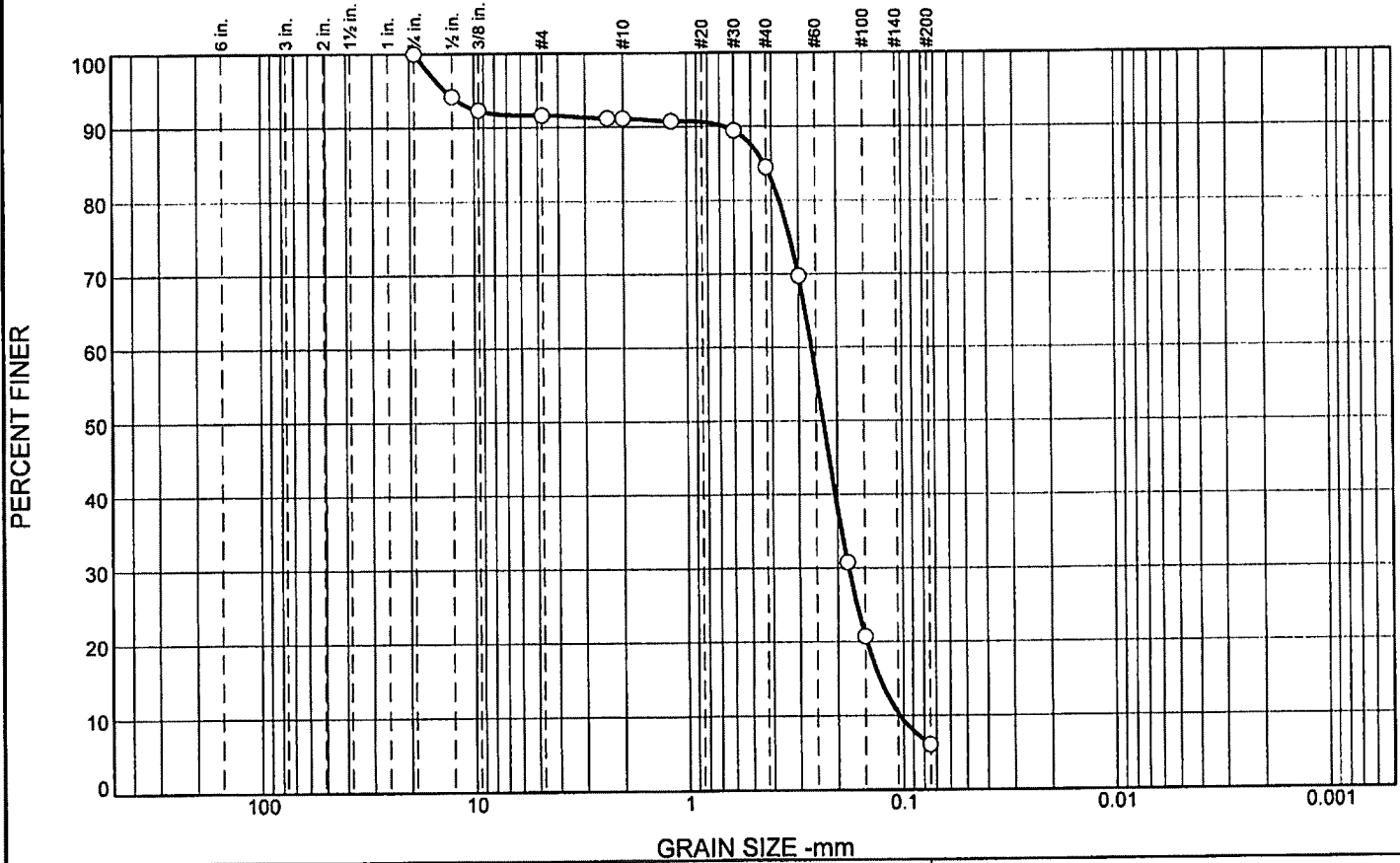
Client: City of Madison
Project: Truax Lift Station
Project No: C21051-4

Figure

Tested By: DRW

Checked By: ESF

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.4	0.4	6.7	78.4	6.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	94.2		
3/8	92.3		
#4	91.6		
#8	91.2		
#10	91.2		
#16	90.8		
#30	89.4		
#40	84.5		
#50	69.8		
#80	30.8		
#100	20.7		
#200	6.1		

Material Description

Brown Fine to Medium Sand, Little Gravel and Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.6630 D₈₅= 0.4333 D₆₀= 0.2616
D₅₀= 0.2310 D₃₀= 0.1778 D₁₅= 0.1289
D₁₀= 0.1043 C_u= 2.51 C_c= 1.16

Classification

USCS= SP-SM AASHTO=

Remarks

* (no specification provided)

Sample Number: B1: S7

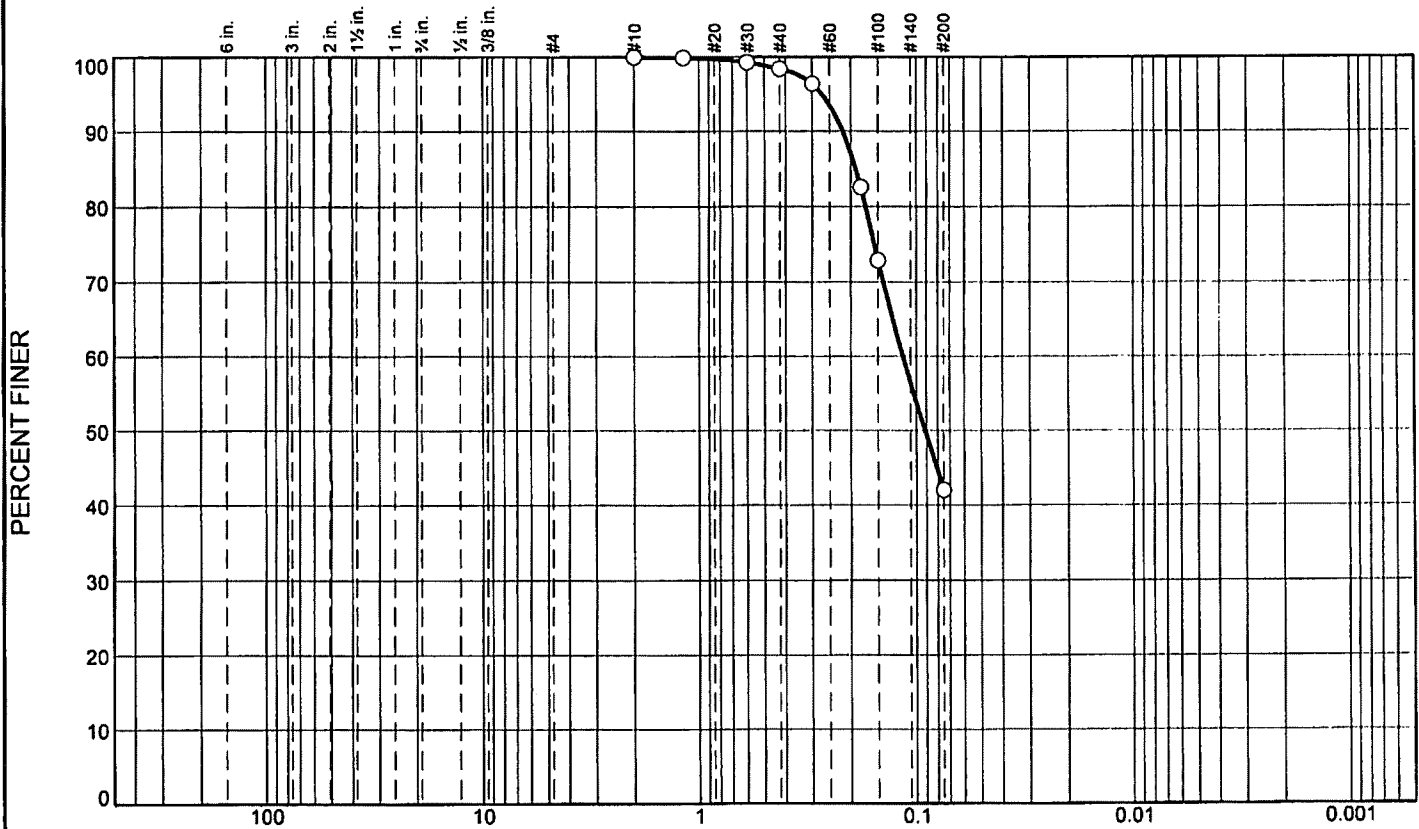
Date: 5/12/21

	<p>Client: City of Madison Project: Truax Lift Station</p> <p>Project No: C21051-4</p>
--	---

Tested By: DRW

Checked By: ESF

Particle Size Distribution Report



GRAIN SIZE -mm

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.6	56.4	42.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	99.9		
#30	99.3		
#40	98.4		
#50	96.4		
#80	82.6		
#100	72.9		
#200	42.0		

Material Description

Brown Silty Fine Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.2177 D₈₅= 0.1899 D₆₀= 0.1153

D₅₀= 0.0913 D₃₀= D₁₅=

D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Sample Number: B1: S8

Date: 5/12/21

	<p>Client: City of Madison</p> <p>Project: Truax Lift Station</p> <p>Project No: C21051-4</p>
<p>Figure</p>	

Tested By: DRW

Checked By: ESF

APPENDIX C
DOCUMENT QUALIFICATIONS

APPENDIX C DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most

effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.*

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic

expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

Modified and reprinted with permission from:

Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

**Table 1
Gradation of Special Fill Materials**

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:

1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction*.
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

**Table 2
Compaction Guidelines**

Area	Percent Compaction (1)	
	Clay/Silt	Sand/Gravel
Within 10 ft of building lines		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
Beyond 10 ft of building lines		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:

1. Based on Modified Proctor Dry Density (ASTM D 1557)

Appendix B
City of Madison General Ordinance Section 10.085

10.085 OUTDOOR LIGHTING.

- (1) Purpose and Intent. This ordinance regulates all outdoor lighting installed on residential site and commercial site property, both publicly and privately owned within the City of Madison with the exception of outdoor lighting on public streets, public bikeways and public walkways which are regulated elsewhere in the ordinances. The purpose of this ordinance is to create standards for outdoor lighting that do not interfere with the reasonable use of commercial site and residential site property, that prevent light trespass and conserve energy yet maintain night time safety. Installation of outdoor lighting is not mandatory but if installed, it shall be in conformance with the provisions of the ordinance, the building code and all other codes and regulations as applicable and under appropriate permit and inspection.

- (2) Definitions.

Commercial Site shall mean a tract consisting of one or more contiguous lots or parts of lots which are to be used for interdependent ingress and egress of vehicles and containing one or more off-street loading or parking facilities or any commercial site having five (5) or more parking stalls.

Covered Parking Facilities shall mean a parking facility with an overhead covering and shall include all floors except the roof level of a multilevel parking structure or ramp.

Driveway shall mean every way or area used for vehicular travel back of the street right-of-way line.

Footcandle shall mean the illumination of a surface one foot distant from a source of light equivalent to one candle.

Building Inspection Division shall mean the Building Inspection Division of the City Department of Planning and Community and Economic Development. (Am. by ORD-08-00109, 10-7-08)

Installation shall mean the attachment or assembly, whether or not connected to a power source, of any outdoor light fixture affixed to the ground, a building, a pole or any other supporting structure or device.

Light Trespass shall mean stray light or spill light flowing across the property boundary. (Am. by Ord. 13,717, 10-26-04)

Lighting Sources shall mean any lamp or manufactured device emitting energy that is capable of exciting the retina and producing a visual sensation. The energy emitted shall fall within the electromagnetic spectrum to a length of between 380 and 770 nanometers. Such devices shall include, but are not limited to, incandescent, fluorescent, carbon arc, quartz-iodine/tungsten halogen, low pressure sodium, high pressure sodium, metal halide and mercury vapor lamps.

Non-Shielded or Non-Cutoff Lighting Fixtures shall mean all types of outdoor lighting fixtures other than shielded or cutoff lighting fixtures and includes any lighting fixture that employs an adjustable bracket, refractorizing glassware or lenses, a non-shielded lamp or light source and distributes light at any angle more than four degrees (4°) above horizontal. (Am. by Ord. 13,717, 10-26-04)

Open Parking Facilities shall mean a parking facility without an overhead covering and shall include the roof level of a multilevel parking structure or ramp.

Outdoor Canopy shall mean a free-standing roof structure without side walls which may or may not be attached to the roof of an adjacent building and which shall include but shall not be limited to canopies over gas station pumps or canopies at convenience stores.

Outdoor Lighting Fixtures shall mean lighting sources which are electrically powered illuminating devices, lighted or reflective surfaces, lamps and similar devices, permanently installed or portable, used for illumination or for advertisement. Such devices shall include, but are not limited to, searchlights, spotlights, floodlights, streetlights, sign lights, security lights, wall lights, porch lights, area lights, parking area lights, sports lights and sign panels.

Outdoor Merchandizing Area shall mean car sales lots, equipment sales lots, retail gasoline stations, garden centers, and other similar areas where products are permanently displayed or dispensed outdoors.

Person shall mean any individual, tenant, lessee, owner, operator, or any public, private, nonprofit, or commercial entity including but not limited to, firm, business, partnership, joint venture, association, corporation, municipality, agency or governmental agency.

Residential Site shall mean a single parcel in a residential zone containing a residential structure of one or more dwelling units with a parking facility for one (1) or more cars. (Am. by Ord. 13,717, 10-26-04)

Shielded or Cutoff Lighting Fixtures shall mean outdoor lighting fixtures that utilize flat, clear lenses with no refractorizing elements and which operate in a horizontal position with nonadjustable mounting hardware or brackets. Such fixtures distribute light by means of an internal reflector only. The light source is totally concealed by the fixture housing when the position of observation is at an angle less than fifteen degrees (15°) above horizontal. No light is permitted at an angle more than four degrees (4°) above horizontal. (Am. by Ord. 13,717, 10-26-04)

Uniformity Ratio shall mean the ratio between the average illumination and the minimum illumination as determined by measurements taken on a four-foot grid throughout the area to be lighted.

(3) General Requirements.

(a) All outdoor lighting fixtures installed and thereafter maintained upon private or public residential, commercial, industrial and other nonresidential property shall comply with the following:

1. The maximum allowable light trespass shall be 0.5 horizontal footcandles four (4) feet above the ground. The point of measurement of this offending light shall be at any point at the outer wall of an adjacent building occupied for residential or public use, or at any point greater than 10 feet from the adjacent lot line. This measurement shall not include any ambient, natural light.
2. All fixtures greater than 1,000 initial lumens (equivalent to 70 watts incandescent) shall be full cutoff, or shall be shielded or installed so that there is not a direct line of sight between the light source or its reflection and a point five (5) feet or higher above the ground at the property boundary. The light source shall not be of such intensity so as to cause discomfort or annoyance.
3. Any outdoor lighting fixture installed on a parking lot, parking structure or outdoor merchandizing area shall use either high pressure sodium, metal halide, or fluorescent lamps. The lighting system shall be extinguished or reduced to fifty percent (50%) no later than thirty (30) minutes after the close of business for the day or after the end of normal office hours for the majority of employees. (Am. by ORD-07-00032, 3-22-07)
4. All lamp types utilized for search lighting and/or spot lighting for advertising purposes shall not be operated past 11:00 P.M.

(b) All outdoor lighting fixtures installed prior to March 30, 1993 shall be exempt from this ordinance except as follows:

1. If any modifications, construction or changes to an existing outdoor lighting fixture system is proposed to fifty percent (50%) or more of the total number of fixtures, then all fixtures shall comply with the provisions of this ordinance.
2. All outdoor lighting fixtures installed on residential parking facilities irrespective of installation date shall conform to subsection (4)(c) herein.

(c) All outdoor lighting fixtures shall be maintained according to approved plans.

(d) Trees and shrubbery shall not be located where they significantly reduce or block the lighting of parking facilities or roadways.

(e) Outdoor lighting fixtures may be used to illuminate buildings and structures; recreational areas, sports fields and courts; parking lots; parking structures, garages, or ramps; landscape areas; outdoor merchandizing areas; building overheads and open canopies. Outdoor lighting fixtures may be installed to provide building and parking lot security.

(Am. by Ord. 13,717, 10-26-04)

(4) Specific Design Requirements.

(a) A lighting system for parking facilities and outdoor merchandizing areas in commercial, industrial, agricultural and recreational areas shall be designed to provide the lighting intensities and uniformities described as follows:

1. Open Parking Facilities. The illumination requirements of an open parking facility depend on the amount of usage the facility receives. Three levels of activity shall be established as High, Medium and Low, reflecting both traffic and pedestrian activity. The following examples are nonexclusive and include:
 - a. High Activity: Facilities for major or league athletic events or major cultural or civic events.
 - b. Medium Activity: Shopping centers, retail parking areas, hospital and clinic parking areas, transportation parking (airports, commuter lots, etc.), cultural, civic or recreational events, and fast food facilities.
 - c. Low Activity: Employee parking, educational facility parking, office parks and church parking.
2. Horizontal Illuminances for Parking Facilities.
 - a. Open Parking Facilities.

General Parking & Pedestrian Area					Vehicle Use Area (Driveway)		
Level of Activity	Min. Footcandles ¹ on Pavement	Max Avg Footcandles on Pavement	Max Uniformity Ratio ¹ (Avg:Min)	Max. Watts ³ /Sq Foot Lighting Load ²	Minimum Footcandles ¹ on Pavement	Max Avg Footcandles on Pavement	Maximum Uniformity Ratio ¹ (Avg:Min)
High	0.6 fc	3.75 fc	5:1	.12	.67 fc	2.5 fc	5:1
Med	0.4 fc	2.5 fc	5:1	.10	.33 fc	1.5 fc	5:1
Low	0.2 fc	1.5 fc	5:1	.08	.125 fc	1.0 fc	5:1

(Sec. 10.085(4)(a)2.a. Am. by Ord. 11,392, Adopted 11-7-95)

b. Covered Parking Facilities.

Areas	Minimum Footcandle Average on Pavement	Minimum Footcandles on Pavement	Maximum Average Footcandles on Pavement	Maximum Uniformity Ratio (Avg:Min)	Maximum Watts ³ /Sq Ft Lighting Load
General Parking and Pedestrian Areas	5 fc	1.25 fc	9 fc	4:1	.2
Private Controlled Entry Parking	3 fc	.75 fc	6 fc	4:1	.2

¹Not mandatory within 4 feet of the pavement edge.

²Not mandatory for driveways.

³Watts shall mean lamp wattage and ballast consumption.

- (b) An outdoor lighting system for illuminating buildings and structures shall have a maximum connected lighting load of five (5) watts per lineal foot. Watts shall mean lamp wattage and ballast consumption. Such lighting shall be shielded or installed so as to illuminate the building, and not the sky.
- (c) A parking facility for more than three (3) cars on a residential site shall be lighted to provide at least .25 footcandles on any surface with an average illumination level of at least .75 footcandles. Outdoor light fixtures shall be designed and installed to minimize light trespass. In addition, the uniformity ratio between the average illumination and minimum illumination shall be no greater than 4:1. (Am. by ORD-05-00055, 4-6-05)
- (d) For an outdoor merchandizing area, the maximum initial illumination level in 75% of the lot shall not exceed 20 footcandles. A contiguous area not to exceed 25% of the lot may be illuminated to a level which shall not exceed 40 footcandles.
- (e) The maximum initial illumination level under an outdoor canopy shall not exceed 50 footcandles at any point.

(Am. by Ord. 13,717, 10-26-04)

(5) Approval Procedures.

- (a) Any person desiring to install outdoor lighting fixtures greater than 1,000 initial lumens shall submit to the Building Inspection Division for review the following materials:
 1. A catalog page, cut sheet or photograph of the lighting fixtures including the mounting method.
 2. A photometric data test report of the proposed lighting fixture graphically showing the lighting distribution in all angles vertically and horizontally around the fixture.
 3. A plot plan showing the location of all outdoor lighting fixtures proposed, the mounting or installation height, the overall initial illumination levels and uniformities and the point where 0.5 horizontal footcandles occurs on the property or adjacent property at a distance four (4) feet above the ground. This may be accomplished by means of an isolux curve or computer printout projecting the illumination levels.
 4. A graphic depiction of the lighting fixture's lamp concealment and light cutoff angles.

(Am. by Ord. 13,717, 10-26-04; ORD-08-00109, 10-7-08)

- (b) Upon review of the material described above, the Building Inspection Division may authorize the installation of outdoor lighting fixtures. (Am. by ORD-08-00109, 10-7-08)

(6) Administrative Exemption.

- (a) Any person may submit a written request to the Building and Fire Code Review and Appeals Board for an administrative exemption from the requirements of this ordinance. The basis for an administrative exemption shall be any one or more of the following reasons: the provisions of the ordinance do not fully apply; the application of the ordinance may cause a manifest injustice to be done; the compliance time required for compliance with the ordinance is unreasonable; an alternate plan for outdoor lighting is equally good or better than standards set by the ordinance. The request shall state fully

the circumstances and conditions relied upon as the basis for an administrative exemption and shall be accompanied by plans and legal description of the property involved. In addition, the request shall contain the following information:

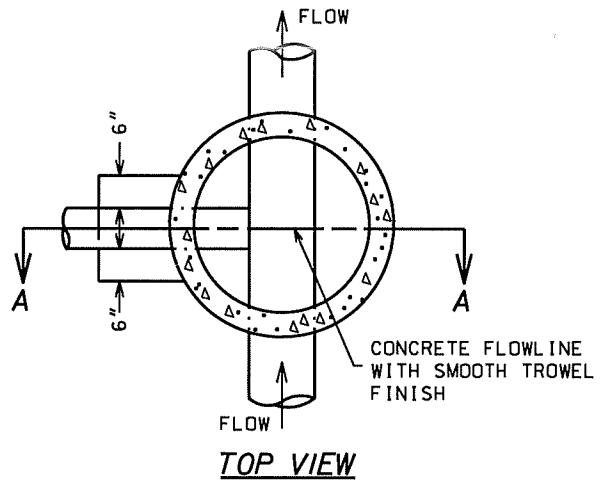
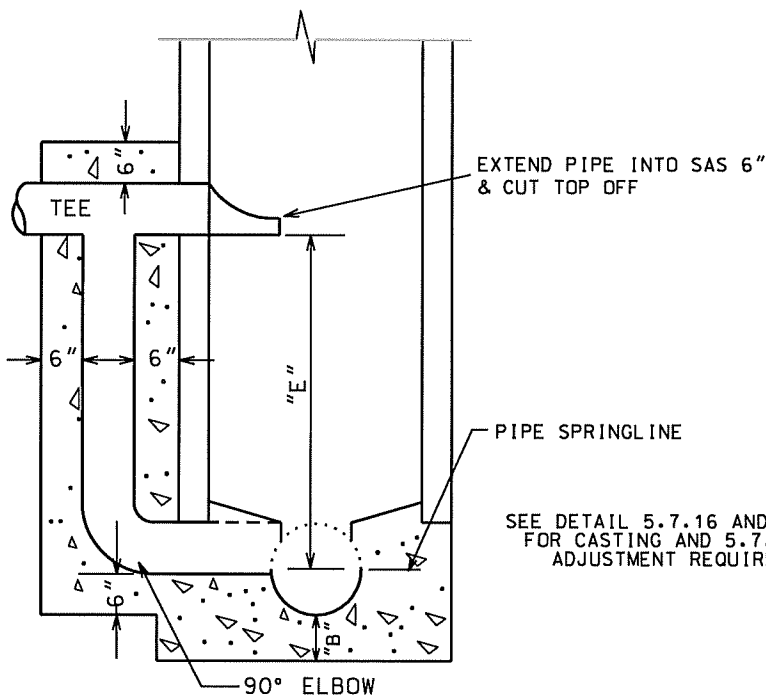
1. Name, address and telephone number of the applicant.
 2. Location of the outdoor lighting fixtures for which the exemption is requested.
 3. The nature of the circumstances which necessitate the exemption.
 4. Use of the outdoor lighting fixture involved.
 5. All description data as called for in subsection (5) herein.
 6. Such other data and information as may be required by the Board.
- (b) In considering whether to grant the request for an administrative exemption from the ordinance, the Building and Fire Code Review and Appeals Board may consider the following factors:
1. Special circumstances or conditions applying to the land, building or outdoor lighting fixture for which the exemption is sought;
 2. Deprivation to the applicant of the reasonable use of the land, buildings or outdoor lighting fixtures that strict application of the ordinance may cause;
 3. The effect of the granting of the exemption on the public welfare.
- (7) Penalties. Any person violating the provisions of this ordinance shall be fined not less than twenty-five dollars (\$25) nor more than two hundred dollars (\$200) and each day of continued violation shall constitute a separate offense.

(Sec. 10.085 Cr. by Ord. 10,631, Adopted 3-30-93)

10.09 CONSTRUCTION AND REPAIR OF SIDEWALKS AND RECONSTRUCTION AND REPAIR OF CONCRETE CURB AND GUTTER.

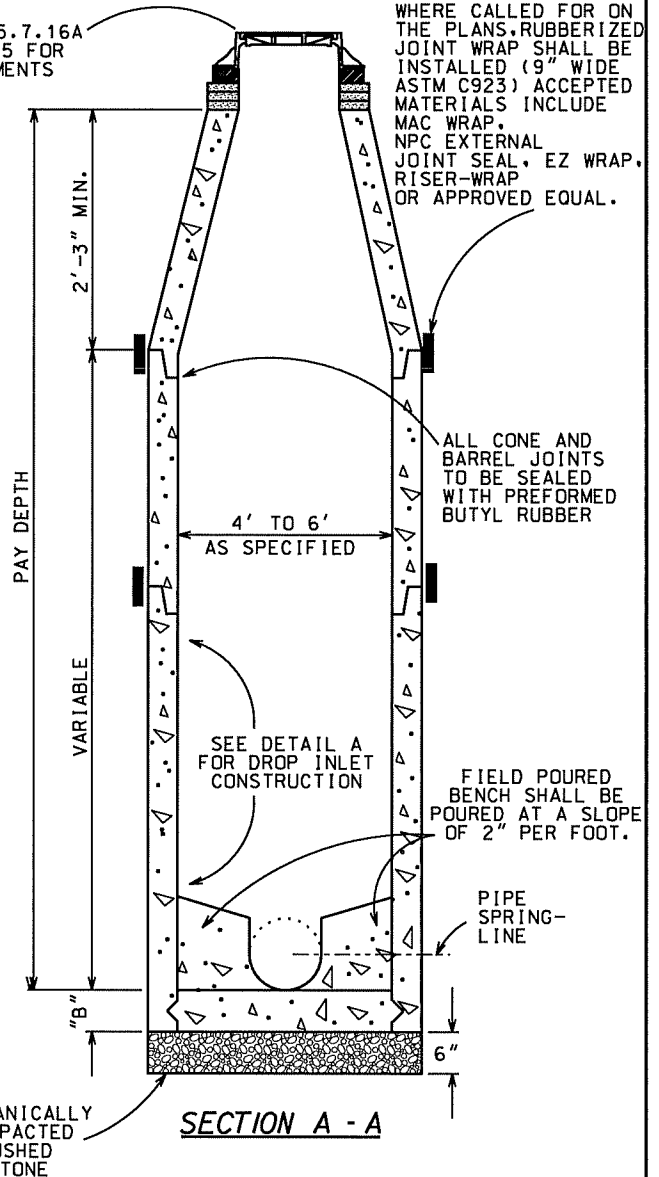
- (1) The provisions of Wis. Stat. § 66.0907 relating to the construction and repair of sidewalks are hereby adopted by reference thereto, except that in every case of sidewalk repair or reconstruction the proportion of such cost shall be paid fifty percent (50%) by the City and fifty percent (50%) by the abutting property owners.
- (2) The provisions of Section 66.0703(1) of the Wisconsin Statutes or Section 66.0701 of the Wisconsin Statutes and these ordinances shall be followed as a police power action in the case of reconstruction and repair of concrete curb and gutter except that property deemed benefited by said reconstruction and repair shall be paid for fifty percent (50%) by the City and fifty percent (50%) by the benefited properties. (Am. by Ord. 10,182, 1-31-91)
(Am. by Ord. 8080, 7-14-83)
- (3) Subject to any other permitting requirements of these ordinances that may apply, property owners may repair or reconstruct, or cause to be repaired or reconstructed, defective public sidewalks, curbs and/or gutters abutting their property. The work must be approved by the City Engineering Division prior to the start of construction, and all work must meet the City's standard specifications for concrete and concrete structures. Private contractors completing the work on behalf of the property owner must hold a current City of Madison Concrete Layers License. Property owners are not precluded from doing the work themselves, provided that they have obtained the necessary approvals and permits and are able to meet the City's standard specifications for concrete and concrete structures. Once the final work is approved and accepted by the City Engineer, property owners proceeding under this subsection shall be reimbursed a portion of the cost to perform this work. The reimbursement amount (rebate) shall be approximately one-third (1/3) the cost of an average sidewalk and curb & gutter citywide installation and repair contract prices for the amount of sidewalk, and/or curb and gutter being repaired or reconstructed by the property owner. The rebate amounts shall be established by the Board of Public Works. The rebate shall not be offered in a year that the property is scheduled for sidewalk repairs as part of the City's sidewalk repair and rehabilitation program. (Cr. by ORD-12-00070, 5-24-12)

Appendix C - City of Madison Standard Details



SEE DETAIL 5.7.16 AND 5.7.16A FOR CASTING AND 5.7.15 FOR ADJUSTMENT REQUIREMENTS

WHERE CALLED FOR ON THE PLANS, RUBBERIZED JOINT WRAP SHALL BE INSTALLED (9" WIDE ASTM C923) ACCEPTED MATERIALS INCLUDE MAC WRAP, NPC EXTERNAL JOINT SEAL, EZ WRAP, RISER-WRAP OR APPROVED EQUAL.



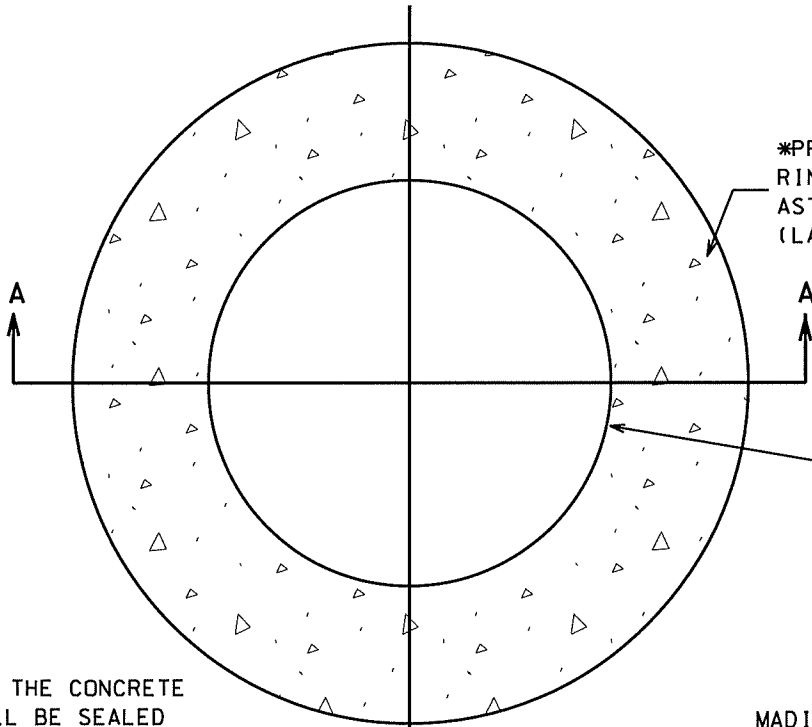
DETAIL A
SHOWING DROP INLET CONSTRUCTION
FOR SANITARY SEWER MAINS & LATERALS

NOTES:

- 1) PRECAST S.A.S. SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478.
- 2) THICKNESS OF BASE, "B":
6" MIN. FOR 4' DIAMETER SAS
8" MIN. FOR 5' AND 6' DIAMETER SAS
- 3) FOR CASTING DESIGNATION REFER TO STANDARD DETAIL DRAWING 5.7.16 AND 5.7.16A
- 4) CENTERED (CONCENTRIC) CONE SHALL BE INSTALLED UNLESS OTHERWISE DIRECTED.
- 5) DROP INLET SHALL BE BUILT FOR ALL SEWER MAINS AND LATERALS WHEN "E" IS GREATER THAN 24". "E" SHOULD BE MEASURED FROM INVERT OF INCOMING PIPE TO THE SPRINGLINE OF THE OUTGOING SEWER. INSIDE DROP PER STANDARD DETAIL DRAWING 5.7.30 MAY BE INSTALLED FOR 4" AND 6" SERVICE CONNECTIONS WHERE OUTSIDE DROP INLET CONSTRUCTION IS INFEASIBLE. ENGINEER SHALL APPROVE INSIDE DROP INLET PRIOR TO INSTALLATION.
- 6) FLEXIBLE PIPE TO SAS CONNECTOR REQUIRED PER STANDARD DETAIL DRAWING 5.7.31
- 7) ALL BENCHES TO BE FIELD POURED CONCRETE WITH SMOOTH TROWEL FINISH. PRECAST BENCHES ONLY PERMITTED WITH PRIOR APPROVAL OF ENGINEER IN WRITING.
- 8) ALL JOINTS BETWEEN RINGS SHALL BE SEALED WITH $\frac{3}{8}$ " OF AIR-ENTRAINED TYPE M OR S MORTAR. THE OUTSIDE SURFACE OF THE ADJUSTING RINGS SHALL BE SEALED WITH A $\frac{1}{2}$ " THICK AIR-ENTRAINED MORTAR TYPE M OR S SEAL. THE METHOD USED FOR SEALING THE OUTSIDE SURFACE SHALL BE COMPATIBLE WITH THAT USED TO SEAL JOINTS BETWEEN THE RINGS.
- 9) PRECAST SANITARY SEWER ACCESS STRUCTURES FOR STREET RECONSTRUCTION PROJECTS AND FOR STREET EXCAVATION PERMITS REQUIRE PRECAST SHOP DRAWING APPROVAL FROM CITY ENGINEERING. PRIOR TO BEING FABRICATED BY THE MANUFACTURER NO PRECAST SHOP DRAWINGS ARE REQUIRED FOR NEW CONSTRUCTION IN SUBDIVISION DEVELOPMENTS.

2015

CITY OF MADISON ENGINEERING DIVISION
SANITARY SEWER PRECAST SAS
STANDARD DETAIL DRAWING 5.7.2

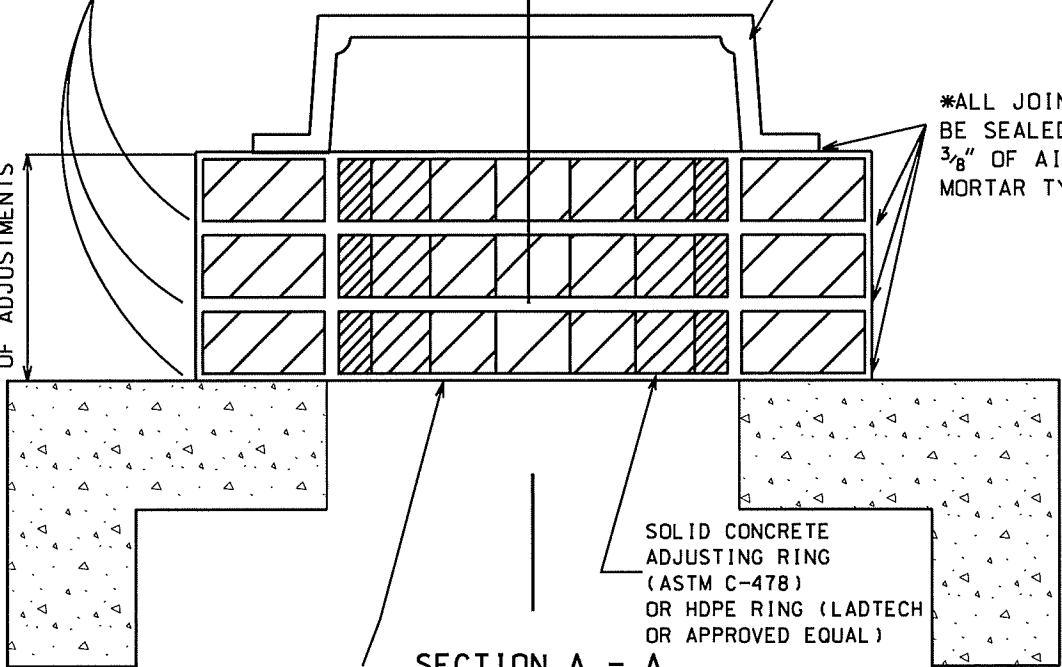


*THE OUTSIDE OF THE CONCRETE ADJUSTING RINGS SHALL BE SEALED WITH A 1/2" THICK, AIR ENTRAINED MORTAR TYPE M OR S SEAL. THE METHOD USED WILL BE COMPATIBLE WITH THE ADJUSTING RING JOINT SEALING METHODS.

MADISON STANDARD MACHINED CAST IRON ACCESS STRUCTURE COVER

MIN. 3" / MAX. 9" OF ADJUSTMENTS

*ALL JOINTS SHALL BE SEALED WITH 3/8" OF AIR ENTRAINED MORTAR TYPE M OR S.



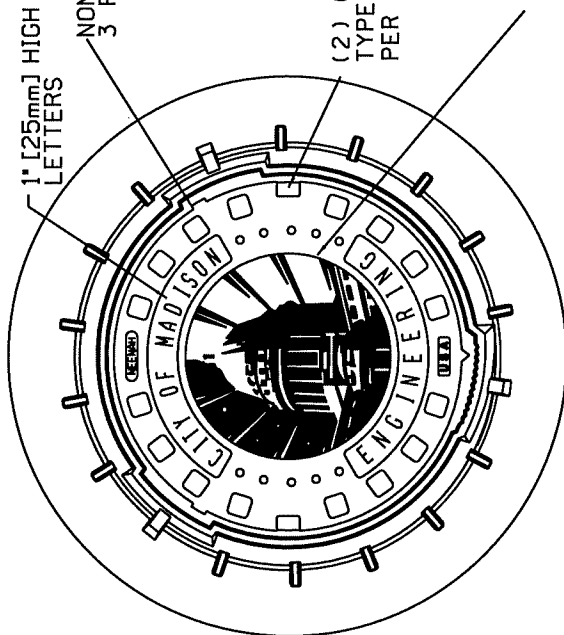
SECTION A - A

** PRE-CAST CONCRETE GRADE RINGS IN CONFORMANCE WITH ASTM C-478

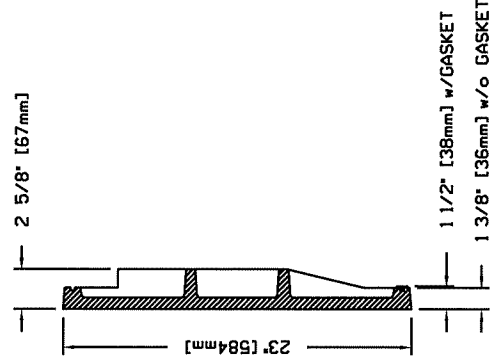
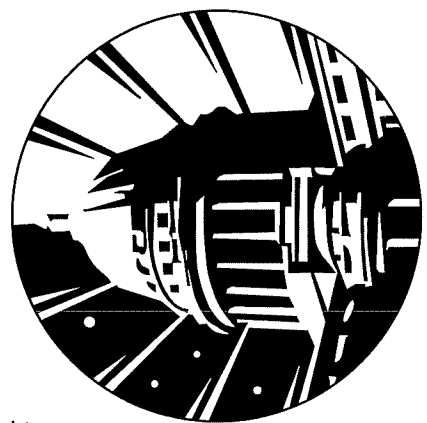
**** NOTE:** HDPE ADJUSTMENT RINGS (LADTECH OR APPROVED EQUAL) MEETING AASHTO HS25 SPECS, ASTM D-1248 INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS WILL BE CONSIDERED AN ACCEPTABLE ALTERNATE TO PRECAST RINGS. IF PRO-RINGS ARE INSTALLED FOR THE WHOLE ADJUSTMENT, CONTRACTOR WILL BE PAID FOR AN INTERNAL CHIMNEY SEAL. PRO-RING ADJUSTMENT IS CONSIDERED TO BE EQUIVALENT OF AN INTERNAL CHIMNEY SEAL. PRO-RING SHALL HAVE M-1 ADHESIVE BETWEEN RINGS. CRETEX PRO RING WILL BE CONSIDERED AN ACCEPTED ALTERNATE FOR PRECAST RINGS. RING JOINT SEALANT SHALL BE ASTM C990 AND AASHTO M-198 (TROWLABLE EZ-STICK #3 OR EQUAL)

2019

CITY OF MADISON ENGINEERING DIVISION
SAS CHIMNEY AND CASTING
STANDARD DETAIL DRAWING 5.7.15



LOGO DETAIL



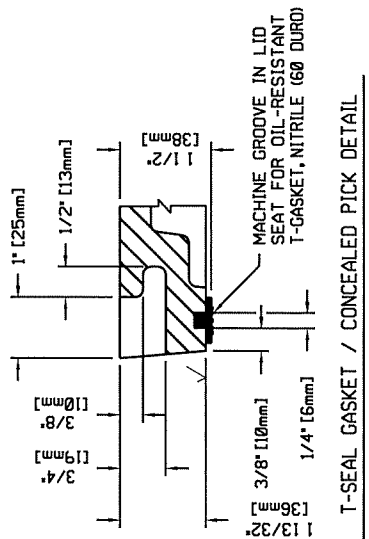
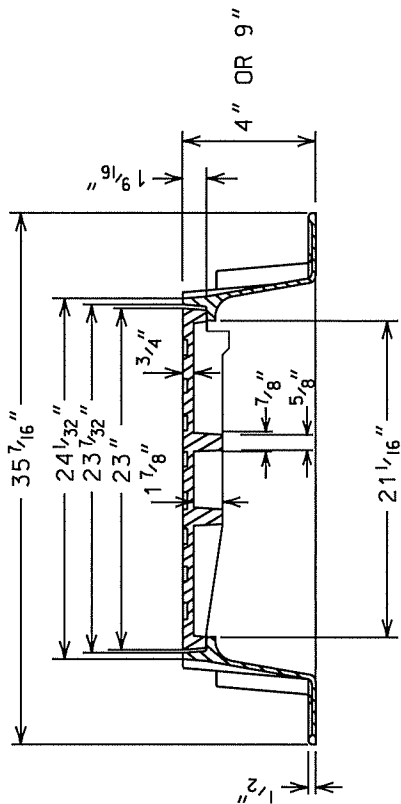
NOTES:

APPROXIMATE TOTAL WEIGHTS:
 R-1550 FRAME w/ LOGO LID 1550-0054, 9" FRAME AND LID = 240 LBS.
 R-1689 FRAME w/ LOGO LID 1550-0054, 4" FRAME AND LID = 279 LBS.

IF LOCKABLE LID IS NECESSARY, R-1916 C, 83/4" FRAME AND LID = 300 LBS
 THERE IS NO CITY OF MADISON LOGO LID AVAILABLE FOR THIS FRAME AND CASTING.

THE FOLLOWING NEENAH FOUNDRY CASTINGS (OR EQUAL CASTINGS) SHALL BE ACCEPTABLE:

1. R-1050, 9" NON-ROCKING ACCESS STRUCTURE FRAME.
2. R-1689, 4" NON-ROCKING ACCESS STRUCTURE FRAME (WHEN REQUESTED BY THE CITY CONSTRUCTION ENGINEER).
3. R-1916 C LOGO WITH A LOCKING CASTING AS WELL AS A LOCKING FRAME. THIS CASTING SHALL BE USED IN GREENWAYS AND EASEMENTS (SEE SDD 5.7.16g)



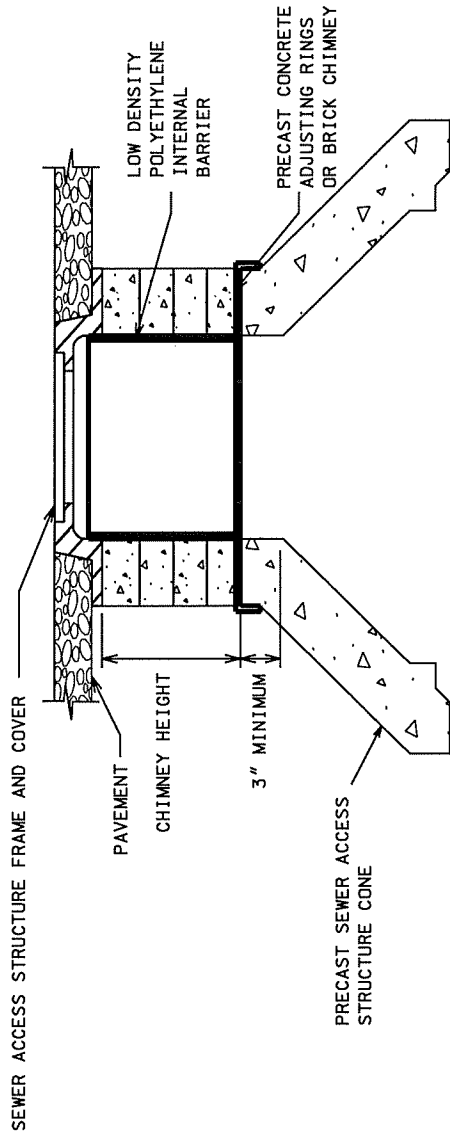
1. FRAME AND COVER SHALL BE MACHINED AND FITTED SO THAT ROCKING AND CHATTERING WILL BE ELIMINATED.
 2. ALL LIDS SHALL BE SELF-SEALING EXCEPT FOR STORM SEWER.
 3. ALL LIDS SHALL HAVE CITY OF MADISON LOGO AS SHOWN IN DETAIL (R-1050-0054 OR EQUIV.)
- LID NOTES: ALL DIMENSIONS SHOWN ARE IN ENGLISH AND [METRIC]
 MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 40A

2015

CITY OF MADISON
 ENGINEERING DIVISION

SAS FRAME & COVER

STANDARD DETAIL DRAWING 5.7.16



LOW DENSITY POLYETHYLENE INTERNAL BARRIER

INTERNAL CHIMNEY SEALS SHALL BE USED ON ALL SANITARY SEWER ACCESS STRUCTURES AT THE FOLLOWING LOCATIONS:

- 1) WITHIN 100' OF A STREET LOW POINT
- 2) ALL GREENWAYS
- 3) WHERE SPECIFIED BY THE ENGINEER

AN INTERNAL CHIMNEY SEAL WHERE NEEDED, SHALL BE INSTALLED TO COVER THE ENTIRE CHIMNEY AREA IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. FRAME SEALS SHALL CONSIST OF THE FOLLOWING INTERNAL SEAL:

LOW DENISTY POLYETHYLENE INTERNAL BARRIER

A LOW DENSITY POLYETHYLENE INTERNAL BARRIER SHALL MAINTAIN THEIR ADHESION ALLOWING REPEATED HORIZONTAL MOVEMENT OF NOT LESS THAN 1 INCH. THE BARRIER SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCH AND CONFORM TO THE REQUIREMENTS OF THE FOLLOWING STANDARDS:
 ASTM D 1248, D 1238, D 790, D 648, D 1693, ASTN D-792, UL-94.

IF CRETEX PRO-RINGS ARE INSTALLED FOR THE ENTIRE ADJUSTMENT, CONTRACTOR WILL BE PAID FOR AN INTERNAL CHIMNEY SEAL. CRETEX PRO-RING SHALL HAVE M-1 ADJESIVE INSTALLED BETWEEN RINGS.

2017

CITY OF MADISON
 ENGINEERING DIVISION

SAS INTERNAL
 CHIMNEY SEAL

STANDARD DETAIL DRAWING 5.7.17

Appendix D - TDS Telecom email dated June 20, 2022

Frank, Kyle

From: O'Brien, David <david.obrien@tdstelecom.com>
Sent: Monday, June 20, 2022 09:53
To: Frank, Kyle
Subject: C.o.M Utility Verification - Truax Lift Station 16 Replacement

Caution: This email was sent from an external source. Avoid unknown links and attachments.

Kyle,

Based on what I see of our records and what is shown on the plans set are a bit different. Here is a snap shot of the cables and duct we have running past the substation.



Thanks,
Dave O'Brien
Email:David.OBrien@tdstelecom.com
Phone:608-577-9654



Department of Public Works
Engineering Division
James M. Wolfe, P.E., City Engineer
City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Assistant City Engineer
Bryan Cooper, AIA
Gregory T. Fries, P.E.
Chris Petykowski, P.E.

Deputy Division Manager
Kathleen M. Cryan

Principal Engineer 2
John S. Fahrney, P.E.
Janet Schmidt, P.E.

Principal Engineer 1
Mark D. Moder, P.E.
Andrew J. Zwieg, P.E.

Financial Manager
Steven B. Danner-Rivers

April 17, 2023

**NOTICE OF ADDENDUM
ADDENDUM 1
CONTRACT NO. 9312
TRUAX LIFT STATION REPLACEMENT**

Revise and amend the contract document(s) for the above project as stated in this addendum, otherwise, the original document shall remain in effect.

PLANS

SHEET 10E2: Remove and replace sheet 10E2 with the attached revised sheet 10E2. Additional note added to include EMT conduit for all wiring between subpanels in the main panel enclosure.

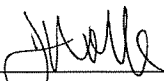
Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on the Bid Express web site at:

<http://www.bidexpress.com>

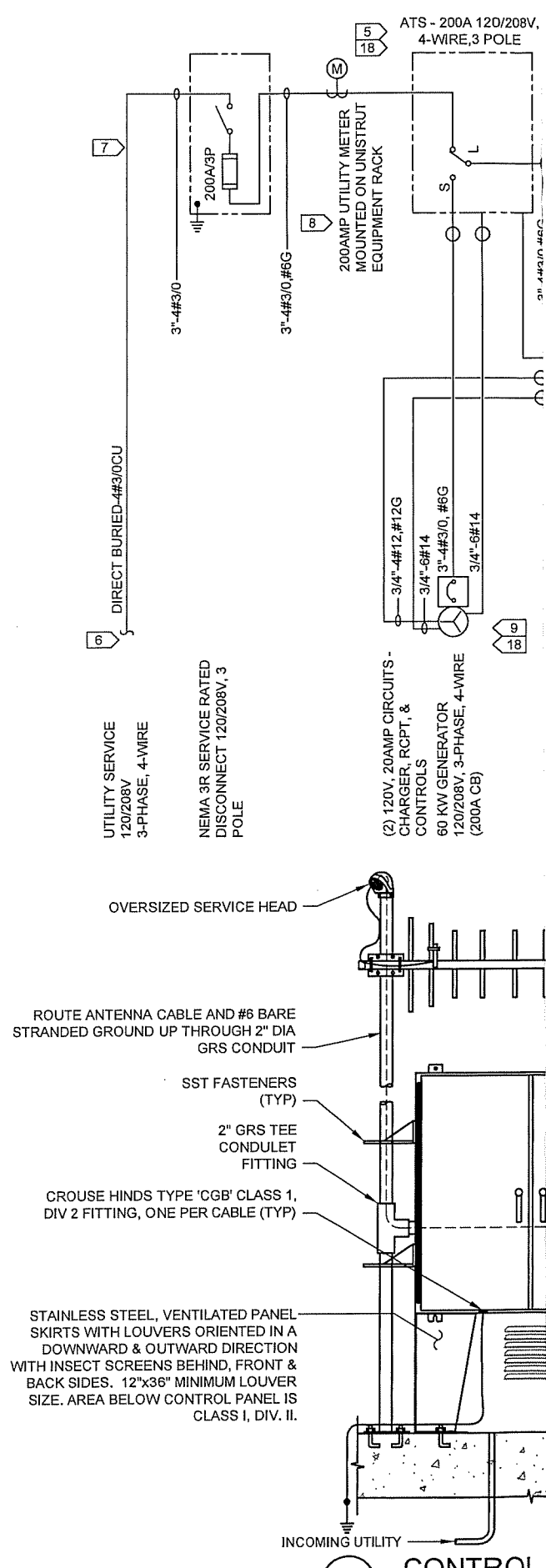
If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

Sincerely,



James M. Wolfe, P.E., City Engineer

JMW:kdf



NOTES:

SIZE MAIN GROUNDING CONDUCTOR PER NEC OR 12.5% OF TOTAL CROSS SECTIONAL AREA OF MAIN SERVICE CONDUCTORS PER PHASE.

EXOTHERMIC WELD ALL CONNECTIONS OF CONDUCTORS TO GROUND RODS.

GROUND RODS SHALL BE SPACED A MINIMUM OF 6 FEET APART. CONDUCTOR CONNECTING THE GROUND RODS SHALL BE A MINIMUM OF #2/0 AWG BARE CU.

BONDING CONDUCTOR PER NEC FOR CONNECTION TO CONTROL PANEL, EXPOSED ABOVE GROUND PIPE/VENT AND ALL OTHER AREAS REQUIRED TO BE BONDED TO GROUNDING.

CONTRACTOR SHALL CONTACT UTILITY AND PROVIDE ARC FLASH AND AVAILABLE FAULT CURRENT LABELING ON EQUIPMENT PER NEC 110.16 AND 110.24.

UTILITY PROVIDED PRIMARY SERVICE AND TRANSFORMERS. ELECTRICAL CONTRACTOR SHALL COORDINATE UTILITY WORK.

PROVIDE SECONDARY CIRCUITRY AND CONNECTIONS.

PROVIDE MG&E APPROVED 200A SINGLE POSITION METER SOCKET AND INSTALL UTILITY FURNISHED METER.

CONNECT GENERATOR HEATER, CHARGER AND DEVICES RECOMMENDED BY GENERATOR MFR.

PROVIDE ANTENNA WITH CORD GRIP, CONDUIT, CABLE AND MOUNTING BRACKETS AND CONNECT TO RADIO. VERIFY HEIGHT REQUIREMENTS WITH OWNER. MMSD TO PROVIDE ANTENNA CABLE AND RADIO. CONTRACTOR TO PROVIDE MAST AND ANY ASSOCIATED HARDWARE OR BRACKETS. COORDINATE ANTENNA/MAST INSTALLATION WITH MMSD.

VERIFY INSTALLED MOTOR FULL LOAD AMPS (FLA) PRIOR TO ORDERING RVSS. PROVIDE CIRCUIT BREAKER AND RVSS SIZED FOR INSTALLED MOTOR. PROVIDE ETHERNET CONNECTION AND HARDWIRE IO CONNECTION BETWEEN EACH RVSS AND SUPERVISORY CONTROL PANEL.

MANUFACTURER (MFR) SUPPLIED CABLE, TYP.

PROVIDE 3-PHASE 208V POWER MONITOR IN SEPARATE ENCLOSURE. PROVIDE CIRCUIT PROTECTION FOR POWER MONITOR PER MANUFACTURER'S RECOMMENDATIONS.

PROVIDE UPS ON SHelf LOCATED WITHIN ENCLOSURE. UPS TO BE POWERED BY SINGLE OUTLET LOCATED ADJACENT TO UPS LOCATION POWERED BY THROUGH CONTROL SECTION. OUTLET SHOULD BE LABELED "UPS ONLY".

PROVIDE PANEL HEATER WITH BUILT IN THERMOSTAT.

PROVIDE LED ENCLOSURE LIGHT, TRIGGERED BY A DOOR SENSOR. PROVIDE (1) 18" LIGHT PER EVERY 3FT OF PANEL WIDTH.

PROVIDE COOLING FAN, THERMOSTATICALLY CONTROLLED. FAN SHALL PULL FILTERED AIR INTO PANEL. PROVIDE FILTERED LOUVERS AND COVERS FOR LOUVERS DURING WINTER MONTHS. PROVIDE SPARE FILTERS.

DEDUCT BID ALTERNATE: DELETE GENERATOR AND ATS, PROVIDE MANUAL TRANSFER SWITCH AND 200A RECEPTACLE FOR PORTABLE GENERATOR, 120/208V, 3-PHASE, 4-WIRE.

PROVIDE EMT CONDUIT FOR ALL WIRING BETWEEN SUBPANELS IN THE MAIN ENCLOSURE.

UTILITY SERVICE
120/208V
3-PHASE, 4-WIRE

NEMA 3R SERVICE RATED
DISCONNECT 120/208V, 3
POLE

OVERSIZED SERVICE HEAD

ROUTE ANTENNA CABLE AND #6 BARE STRANDED GROUND UP THROUGH 2" DIA GRS CONDUIT

SST FASTENERS (TYP)

2" GRS TEE CONDULET FITTING

CROUSE HINDS TYPE 'CGB' CLASS 1, DIV 2 FITTING, ONE PER CABLE (TYP)

STAINLESS STEEL, VENTILATED PANEL SKIRTS WITH LOUVERS ORIENTED IN A DOWNWARD & OUTWARD DIRECTION WITH INSECT SCREENS BEHIND, FRONT & BACK SIDES. 12"x36" MINIMUM LOUVER SIZE. AREA BELOW CONTROL PANEL IS CLASS I, DIV. II.

2
10E2
NO SCALE

10 NORTH HURDLE STREET
CHAPEL HILL, NC 27514
PHONE: 715.720.2200
FAX: 481.490.3180
WEBSITE: 800.326.2005
WWW.SEH.COM



TRUAX LIFT STATION

MADISON, WISCONSIN

ADDED NOTE 19, 4/17/2023

REVISIONS

FILE NO. MADIS 159311
CLIENT PROJECT NO.
PROJECT STATUS
ISSUE DATE
DESIGNED BY CWF
DRAWN BY JRB

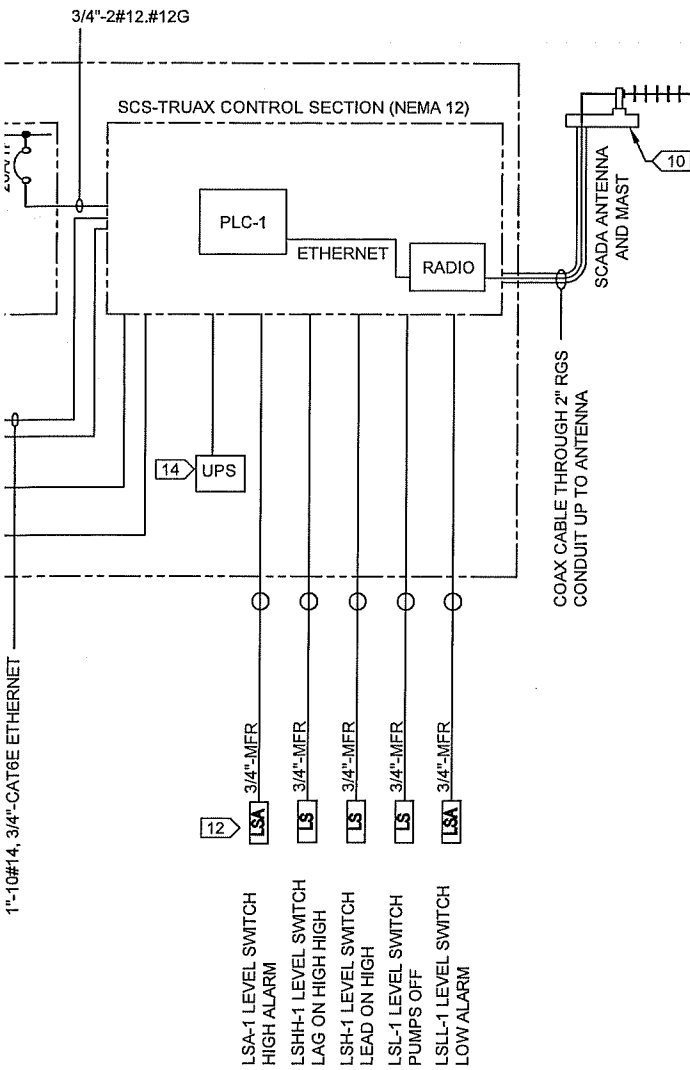
Short Elliott Hendrickson, Inc. © (SEH)

SHEET TITLE
TRUAX LIFT STATION
ELECTRICAL - ONE-LINE
DIAGRAM AND DETAIL

SHEET

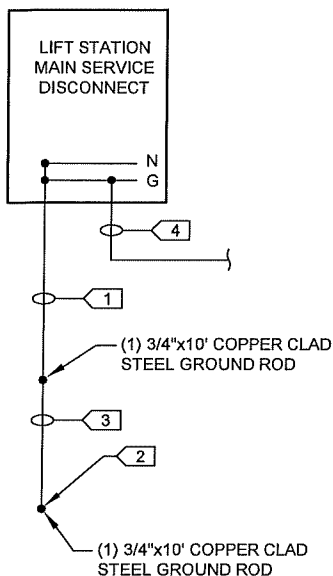
10E2

REVISED



CONTROL PANEL ONE-LINE DIAGRAM

SCALE



GROUNDING & GROUNDING DETAIL

SCALE

KEY NOTES:

1. SIZE MAIN GROUNDING CONDUCTOR PER NEC OR 12.5% OF TOTAL CROSS SECTIONAL AREA OF MAIN SERVICE CONDUCTORS PER PHASE.
2. EXOTHERMIC WELD ALL CONNECTIONS OF CONDUCTORS TO GROUND RODS.
3. GROUND RODS SHALL BE SPACED A MINIMUM OF 6 FEET APART. CONDUCTOR CONNECTING THE GROUND RODS SHALL BE A MINIMUM OF #2/0 AWG BARE CU.
4. BONDING CONDUCTOR PER NEC FOR CONNECTION TO CONTROL PANEL, EXPOSED ABOVE GROUND PIPE/VENT AND ALL OTHER AREAS REQUIRED TO BE BONDED TO GROUNDING.
5. CONTRACTOR SHALL CONTACT UTILITY AND PROVIDE ARC FLASH AND AVAILABLE FAULT CURRENT LABELING ON EQUIPMENT PER NEC 110.16 AND 110.24.
6. UTILITY PROVIDED PRIMARY SERVICE AND TRANSFORMERS. ELECTRICAL CONTRACTOR SHALL COORDINATE UTILITY WORK.
7. PROVIDE SECONDARY CIRCUITRY AND CONNECTIONS.
8. PROVIDE MG&E APPROVED 200A SINGLE POSITION METER SOCKET AND INSTALL UTILITY FURNISHED METER.
9. CONNECT GENERATOR HEATER, CHARGER AND DEVICES RECOMMENDED BY GENERATOR MFR.
10. PROVIDE ANTENNA WITH CORD GRIP, CONDUIT, CABLE AND MOUNTING BRACKETS AND CONNECT TO RADIO. VERIFY HEIGHT REQUIREMENTS WITH OWNER. MMSD TO PROVIDE ANTENNA CABLE AND RADIO. CONTRACTOR TO PROVIDE MAST AND ANY ASSOCIATED HARDWARE OR BRACKETS. COORDINATE ANTENNA/MAST INSTALLATION WITH MMSD.
11. VERIFY INSTALLED MOTOR FULL LOAD AMPS (FLA) PRIOR TO ORDERING RVSS. PROVIDE CIRCUIT BREAKER AND RVSS SIZED FOR INSTALLED MOTOR. PROVIDE ETHERNET CONNECTION AND HARDWARE IO CONNECTION BETWEEN EACH RVSS AND SUPERVISORY CONTROL PANEL.
12. MANUFACTURER (MFR) SUPPLIED CABLE, TYP.
13. PROVIDE 3-PHASE 208V POWER MONITOR IN SEPARATE ENCLOSURE. PROVIDE CIRCUIT PROTECTION FOR POWER MONITOR PER MANUFACTURER'S RECOMMENDATIONS.
14. PROVIDE UPS ON SHELF LOCATED WITHIN ENCLOSURE. UPS TO BE POWERED BY SINGLE OUTLET LOCATED ADJACENT TO UPS LOCATION POWERED BY THROUGH CONTROL SECTION. OUTLET SHOULD BE LABELED "UPS ONLY".
15. PROVIDE PANEL HEATER WITH BUILT IN THERMOSTAT.
16. PROVIDE LED ENCLOSURE LIGHT, TRIGGERED BY A DOOR SENSOR. PROVIDE (1) 18" LIGHT PER EVERY 3FT OF PANEL WIDTH.
17. PROVIDE COOLING FAN, THERMOSTATICALLY CONTROLLED. FAN SHALL PULL FILTERED AIR INTO PANEL. PROVIDE FILTERED LOUVERS AND COVERS FOR LOUVERS DURING WINTER MONTHS. PROVIDE SPARE FILTERS.
18. DEDUCT BID ALTERNATE: DELETE GENERATOR AND ATS, PROVIDE MANUAL TRANSFER SWITCH AND 200A RECEPTACLE FOR PORTABLE GENERATOR, 120/208V, 3-PHASE, 4-WIRE.

10 NORTH BRIDGE STREET
CHIPPewa FALLS, WI 53519
TEL: 608.833.4200
FAX: 608.833.4200
WWW: 608.833.4200
www.sehinc.com



TRUAX LIFT STATION

MADISON, WISCONSIN

REVISIONS

FILE NO. MADIS159311
CLIENT PROJECT NO. 1
PROJECT STATUS
ISSUE DATE CW
DESIGNED BY JRB
DRAWN BY

Sherrill Elliott-Hendrickson, Inc. © (SEH)

SHEET TITLE
TRUAX LIFT STATION
ELECTRICAL - ONE-LINE
DIAGRAM AND DETAIL

SHEET

10E2

AR/RS/BJAL

SECTION E: BIDDERS ACKNOWLEDGEMENT

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2023 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda Nos. _____ through _____ to the Contract, at the prices for said work as contained in this proposal. (Electronic bids submittals shall acknowledge addendum under Section E and shall not acknowledge here)
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. I hereby certify that I have met the Bid Bond Requirements as specified in Section 102.5. (IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).
5. I hereby certify that all statements herein are made on behalf of Speedway Sand & Gravel, Inc. (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of WI a partnership consisting of _____; an individual trading as _____; of the City of _____ State of _____; that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf, and that the said statements are true and correct.



SIGNATURE

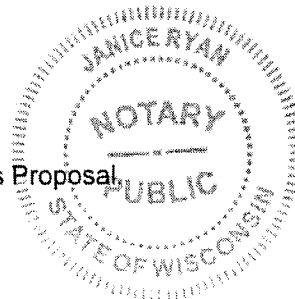
VP

TITLE, IF ANY

Sworn and subscribed to before me this
20th day of April, 2023


(Notary) Public or other officer authorized to administer oaths
My Commission Expires 10/22/25

Bidders shall not add any conditions or qualifying statements to this Proposal.



Contract 9312 – Speedway Sand & Gravel, Inc.

Section F: Best Value Contracting (BVC)

This section is a required document for the bid to be considered complete. There are two methods for completing the Best Value Contracting (BVC) form. Method one: The form can be filled out online and submitted to this site to be included with your electronic bid. Method two: The form can be downloaded from the site and submitted by hand to the City of Madison.

Please check the box in the Upload section if submitting the report by hand.

Method of Submittal for BVC (click in box below to choose) *
I will submit Bid Express fillable online form (BVC).

Best Value Contracting

1. The Contractor shall indicate the non-apprenticeable trades used on this contract.

2. Madison General Ordinance (M.G.O.), 33.07(7), does provide for some exemptions from the active apprentice requirement. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin. Please check applicable box if you are seeking an exemption.

- Contractor has a total skilled workforce of four or less individuals in all apprenticeable trades combined.
- No available trade training program; The Contractor has been rejected by the only available trade training program, or there is no trade training program within 90 miles.
- Contractor is not using an apprentice due to having a journey worker on layoff status, provided the journey worker was employed by the contractor in the past six months.
- First time contractor on City of Madison Public Works contract requests a onetime exemption but intends to comply on all future contracts and is taking steps typical of a "good faith" effort.
- Contractor has been in business less than one year.
- Contractor doesn't have enough journeyman trade workers to qualify for a trade training program in that respective trade.
- An exemption is granted in accordance with a time period of a "Documented Depression" as defined by the State of Wisconsin.

3. The Contractor shall indicate on the following section which apprenticeable trades are to be used on this contract. Compliance with active apprenticeship, to the extent required by M.G.O. 33.07(7), shall be satisfied by documentation from an applicable trade training body; an apprenticeship contract with the Wisconsin Department of Workforce Development or a similar

agency in another state; or the U.S Department of Labor. This documentation is required prior to the Contractor beginning work on the project site.

The Contractor has reviewed the list and shall not use any apprenticeable trades on this project.

LIST APPRENTICABLE TRADES (check all that apply to your work to be performed on this contract)

- BRICKLAYER
- CARPENTER
- CEMENT MASON / CONCRETE FINISHER
- CEMENT MASON (HEAVY HIGHWAY)
- CONSTRUCTION CRAFT LABORER
- DATA COMMUNICATION INSTALLER
- ELECTRICIAN
- ENVIRONMENTAL SYSTEMS TECHNICIAN / HVAC SERVICE TECH/HVAC INSTALL / SERVICE
- GLAZIER
- HEAVY EQUIPMENT OPERATOR / OPERATING ENGINEER
- INSULATION WORKER (HEAT and FROST)
- IRON WORKER
- IRON WORKER (ASSEMBLER, METAL BLDGS)
- PAINTER and DECORATOR
- PLASTERER
- PLUMBER
- RESIDENTIAL ELECTRICIAN
- ROOFER and WATER PROOFER
- SHEET METAL WORKER
- SPRINKLER FITTER
- STEAMFITTER
- STEAMFITTER (REFRIGERATION)
- STEAMFITTER (SERVICE)
- TAPER and FINISHER
- TELECOMMUNICATIONS (VOICE, DATA and VIDEO) INSTALLER-TECHNICIAN
- TILE SETTER

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

Small Business Enterprise Compliance Report

**This information may be submitted electronically through
Bid Express or submitted with bid in sealed envelope.**

Cover Sheet

Prime Bidder Information

Company: Speedway Sand & Gravel, Inc.

Address: 8500 Greenway Blvd, Ste. 202

Telephone Number: 608-836-1071 Fax Number: 608-836-7485


Contact Person/Title: Jeff Borth


Prime Bidder Certification

I, Jeffrey Borth, Office Assistant of
Name Title

Speedway Sand & Gravel certify that the information
Company

contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.


Witness' Signature


Bidder's Signature

4/20/23
Date

TRUAX LIFT STATION REPLACEMENT

CONTRACT NO. 9312

DATE: 4/20/23

**Speedway Sand & Gravel,
Inc.**

Item	Quantity	Price	Extension
Section B: Proposal Page			
10701 - TRAFFIC CONTROL - LUMP SUM	1.00	\$2,900.00	\$2,900.00
10911 - MOBILIZATION - LUMP SUM	1.00	\$29,280.00	\$29,280.00
20140 - GEOTECTILE FABRIC TYPE SAS NON WOVEN (UNDISTRIBUTED) - S.Y.	50.00	\$5.55	\$277.50
20217 - CLEAR STONE - TON	100.00	\$15.00	\$1,500.00
20218 - CRUSHED STONE (UNDISTRIBUTED) - TON	15.00	\$29.00	\$435.00
20221 - TOPSOIL - S.Y.	380.00	\$11.00	\$4,180.00
20323 - REMOVE CONCRETE SIDEWALK & DRIVE - S.F.	115.00	\$4.56	\$524.40
20335 - ABANDON SEWER PIPE WITH SLURRY - C.Y.	11.50	\$234.00	\$2,691.00
20336 - PIPE PLUG - EACH	4.00	\$432.00	\$1,728.00
20701 - TERRACE SEEDING - S.Y.	380.00	\$4.00	\$1,520.00
21011 - CONSTRUCTION ENTRANCE - EACH	1.00	\$545.00	\$545.00
21013 - STREET SWEEPING - LUMP SUM	1.00	\$4,500.00	\$4,500.00
21018 - SILT SOCK (8 INCH) - PROVIDE, INSTALL & MAINTAIN - L.F.	5.00	\$10.00	\$50.00
21019 - SILT SOCK (8 INCH) - REMOVE & RESTORE - L.F.	5.00	\$10.00	\$50.00
21022 - SILT FENCE - PROVIDE, INSTALL & MAINTAIN - L.F.	92.00	\$4.00	\$368.00
21023 - SILT FENCE - REMOVE & RESTORE - L.F.	92.00	\$2.00	\$184.00
21063 - EROSION MATTING, CLASS I, TYPE A - ORGANIC - S.Y.	380.00	\$4.20	\$1,596.00
40102 - CRUSHED AGGREGATE BASE COURSE GRADATION NO. 2 - TON	266.00	\$21.50	\$5,719.00
40202 - HMA PAVEMENT 4 LT 58-28 S - TON	92.00	\$125.00	\$11,500.00
50202 - TYPE II DEWATERING - LUMP SUM	1.00	\$55,710.00	\$55,710.00
50203 - UNDERCUT FOR SANITARY SEWER (UNDISTRIBUTED) - C.Y.	15.00	\$246.00	\$3,690.00
50212 - SELECT BACKFILL FOR SANITARY SEWER - T.F.	125.00	\$1.00	\$125.00
50307 - 24 INCH PVC SANITARY SEWER PIPE (SDR-26) - L.F.	125.00	\$823.15	\$102,893.75
50390 - SEWER ELECTRONIC MARKER - EACH	1.00	\$123.00	\$123.00
50702 - 5' DIA. SANITARY SAS - EACH	3.00	\$11,380.00	\$34,140.00
50771 - INTERNAL CHIMNEY SEAL - EACH	3.00	\$415.00	\$1,245.00
50791 - SANITARY SEWER TAP - EACH	1.00	\$2,690.00	\$2,690.00
50797 - EXTERNAL SEWER ACCESS STRUCTURE JOINT SEAL - EACH	3.00	\$1,268.00	\$3,804.00
90070 - SANITARY SEWER LIFT STATION - LUMP SUM	1.00	\$905,689.00	\$905,689.00
90071 - SANITARY SEWER FORCE MAIN - 14 INCH - L.F.	42.00	\$498.00	\$20,916.00
90072 - EXISTING LIFT STATION DEMOLITION - LUMP SUM	1.00	\$25,740.00	\$25,740.00
90073 - HEAVY WASTEWATER CONTROL - LUMP SUM	1.00	\$23,000.00	\$23,000.00
SUBTOTALS			\$1,249,313.65
Section B: Proposal Page - Bid Alternate #1 - Generator			
90074 - GENERATOR - LUMP SUM	1.00	\$31,000.00	\$31,000.00
TOTAL 33 Items	Totals		\$1,280,313.65



Department of Public Works
Engineering Division
Robert F. Phillips, P.E., City Engineer

City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Deputy City Engineer

Gregory T. Fries, P.E.

Deputy Division Manager

Kathleen M. Cryan

Principal Engineer 2

Christopher J. Petykowski, P.E.
John S. Fahrney, P.E.

Principal Engineer 1

Christina M. Bachmann, P.E.
Mark D. Moder, P.E.
Janet Schmidt, P.E.
James M. Wolfe, P.E.

Facilities & Sustainability

Bryan Cooper, Principal Architect

Mapping Section Manager

Eric T. Pederson, P.S.

Financial Manager

Steven B. Danner-Rivers

BIENNIAL BID BOND

Speedway Sand & Gravel, Inc.

(a corporation of the State of Wisconsin)
(individual), (partnership), (hereinafter referred to as the "Principal") and
Fidelity and Deposit Company of Maryland

a corporation of the State of Maryland (hereinafter referred to as the "Surety") and licensed to do business in the State of Wisconsin, are held and firmly bound unto the City of Madison, Wisconsin (hereinafter referred to as the "City"), in the sum equal to the individual proposal guaranty amounts of the total bid or bids of the Principal herein accepted by the City, for the payment of which the Principal and the Surety hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of this obligation is that the Principal has submitted to the City certain bids for projects from the time period of February 1, 2022 through January 31, 2024.

If the Principal is awarded the contract(s) by the City and, within the time and manner required by law after the prescribed forms are presented for its signature, the Principal enters into (a) written contract(s) in accordance with the bid(s), and files with the City its bond(s) guaranteeing faithful performance and payment for all labor and materials, as required by law, or if the City rejects all bids for the work described, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

In the event the Principal shall fail to execute and deliver the contract(s) or the performance and payment bond(s), all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to pay to the City within ten (10) calendar days of written demand a total equal to the sum of the individual proposal guaranty amounts of the total bid(s) as liquidated damages.

The Surety, for value received, hereby agrees that the obligations of it and its bond shall be in no way impaired or affected by any extension of time within which the City may accept a bid, and the Surety does hereby waive notice of any such extension.

This bond may be terminated by the Surety upon giving thirty (30) days written notice to the City of its intent to terminate this bond and to be released and discharged therefrom, but such termination shall not operate to relieve or discharge the Surety from any liability already accrued or which shall accrue before the expiration of such thirty (30) day period.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

PRINCIPAL

Speedway Sand & Gravel, Inc.
COMPANY NAME AFFIX SEAL

Dec 15, 2021
DATE

By: Jarvice Ryan
SIGNATURE AND TITLE Corp sec.

SURETY

Fidelity and Deposit Company of Maryland
COMPANY NAME AFFIX SEAL

December 15, 2021
DATE

By: Nicole Stillings
SIGNATURE AND TITLE
Nicole Stillings, Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the Surety in Wisconsin under National Provider No. 6966174 for the year 2020 and appointed as attorney in fact with authority to execute this bid bond, which power of attorney has not been revoked.

December 15, 2021
DATE

Nicole Stillings
AGENT SIGNATURE

1600 Aspen Commons, Suite 990
ADDRESS

Middleton, WI 53562
CITY, STATE AND ZIP CODE

608-242-2551
TELEPHONE NUMBER

Note to Surety and Principal: Any bid submitted which this bond guarantees may be rejected if the Power of Attorney form showing that the Agent of Surety is currently authorized to execute bonds on behalf of Surety is not attached to this bond.

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Illinois, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Illinois (herein collectively called the "Companies"), by **Robert D. Murray, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **R. W. FRANK, Brian J. OESTREICH, Melinda C. BLODGETT, Nathan WEAVER, Joshua R. LOFTIS, R.C. BOWMAN, Ted JORGENSEN, Nicole STILLINGS and C. WHITE, of Minneapolis, Minnesota**, its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND, this 18th day of November, A.D. 2021.



ATTEST:
ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND

By: *Robert D. Murray*
Vice President

By: *Dawn E. Brown*
Secretary

**State of Maryland
County of Baltimore**

On this 18th day of November, A.D. 2021, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **Robert D. Murray, Vice President and Dawn E. Brown, Secretary** of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposes and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



Constance A. Dunn, Notary Public
My Commission Expires: July 9, 2023

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 15th _ day of December, 2021.



MJ Pethick

By: Mary Jean Pethick
Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfcliams@zurichna.com
800-626-4577

Authenticity of this bond can be confirmed at bondvalidator.zurichna.com or 410-559-8790

CERTIFICATE OF BIENNIAL BID BOND

TIME PERIOD- VALID (FROM/TO) February 1, 2022 - January 31, 2024
NAME OF SURETY Fidelity and Deposit Company of Maryland
NAME OF CONTRACTOR Speedway Sand & Gravel, Inc.
CERTIFICATE HOLDER City of Madison, Wisconsin

This is to certify that a biennial bid bond issued by the above-named Surety is currently on file with the City of Madison.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the biennial bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing Surety will give thirty (30) days written notice to the certificate holder indicated above.



SIGNATURE OF AUTHORIZED CONTRACTOR REPRESENTATIVE

February 1, 2022

DATE

SECTION H: AGREEMENT

On this 17th day of May in the year Two Thousand and SPEEDWAY SAND & GRAVEL, INC. hereinafter called the Contractor, and the City, hereinafter called the City.

The Council of the said City of Madison under the provisions of a resolution adopted in the year Two Thousand and SPEEDWAY SAND & GRAVEL, INC. hereinafter called the Contractor, and the City, hereinafter called the City, has awarded to the Contractor the right to perform certain main construction.

The Contractor and the City, for the consideration hereinafter named, agree as follows:

Work. The Contractor shall, perform the construction, execution and completion of the work covered or stipulated in the proposal; perform all altered or extra work; and shall be responsible for the procurement of all materials, implements, machinery, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work.

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

Start Date/Contract Time. Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor. The work shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the progress and the time of completion being essential conditions of this Agreement.

Contract Price. The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of ONE MILLION TWO HUNDRED EIGHTY SAND THREE HUNDRED THIRTEEN AND 65/100 (\$1,280,313.65) Dollars being the contract price for the work awarded to him/her as provided by law.

Non-Discriminatory Action. In the performance of the services under this Agreement the Contractor shall not discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, criminal record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered. The notice will include a job description, classification, qualifications and application procedures.

\$1,280,313.65
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and deadlines. The Contractor agrees to interview and consider candidates referred by the Affirmative Action Division if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date started in the notice.

Articles of Agreement
Article I

The Contractor shall take affirmative action in accordance with the provisions of this contract to insure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin and that the employer shall provide harassment free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the City setting out the provisions of the nondiscrimination clauses in this contract.

Article II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractors state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin.

Article III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided by the City advising the labor union or worker's representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

Article V

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works contractors in a form approved by the Affirmative Action Division Manager.

Article VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City Affirmative Action Division with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

Article VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action Provisions of this contract or Section 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the City at its option may do any or all of the following:

1. Cancel, terminate or suspend this Contract in whole or in part.

2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.
3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or ten thousand dollars (\$10,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract. (In federally funded contracts the terms "DBE, MBE and WBE" shall be substituted for the term "small business" in this Article.)

5. Substance Abuse Prevention Program Required. Prior to commencing work on the Contract, the Contractor, and any Subcontractor, shall have in place a written program for the prevention of substance abuse among its employees as required under Wis. Stat. Sec. 103.503.
6. **Contractor Hiring Practices.**

Ban the Box - Arrest and Criminal Background Checks. (Sec. 39.08, MGO)

This provision applies to all prime contractors on contracts entered into on or after January 1, 2016, and all subcontractors who are required to meet prequalification requirements under MGO 33.07(7)(l), MGO as of the first time they seek or renew pre-qualification status on or after January 1, 2016. The City will monitor compliance of subcontractors through the pre-qualification process.

- a. **Definitions.** For purposes of this section, "Arrest and Conviction Record" includes, but is not limited to, information indicating that a person has been questioned, apprehended, taken into custody or detention, held for investigation, arrested, charged with, indicted or tried for any felony, misdemeanor or other offense pursuant to any law enforcement or military authority.

"Conviction record" includes, but is not limited to, information indicating that a person has been convicted of a felony, misdemeanor or other offense, placed on probation, fined, imprisoned or paroled pursuant to any law enforcement or military authority.

"Background Check" means the process of checking an applicant's arrest and conviction record, through any means.

- b. **Requirements.** For the duration of this Contract, the Contractor shall:
 1. Remove from all job application forms any questions, check boxes, or other inquiries regarding an applicant's arrest and conviction record, as defined herein.

2. Refrain from asking an applicant in any manner about their arrest or conviction record until after conditional offer of employment is made to the applicant in question.
3. Refrain from conducting a formal or informal background check or making any other inquiry using any privately or publicly available means of obtaining the arrest or conviction record of an applicant until after a conditional offer of employment is made to the applicant in question.
4. Make information about this ordinance available to applicants and existing employees, and post notices in prominent locations at the workplace with information about the ordinance and complaint procedure using language provided by the City.
5. Comply with all other provisions of Sec. 39.08, MGO.

c. Exemptions: This section shall not apply when:

1. Hiring for a position where certain convictions or violations are a bar to employment in that position under applicable law, or
2. Hiring a position for which information about criminal or arrest record, or a background check is required by law to be performed at a time or in a manner that would otherwise be prohibited by this ordinance, including a licensed trade or profession where the licensing authority explicitly authorizes or requires the inquiry in question.

To be exempt, Contractor has the burden of demonstrating that there is an applicable law or regulation that requires the hiring practice in question, if so, the contractor is exempt from all of the requirements of this ordinance for the position(s) in question.

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

the Contractor has hereunto set his/her hand and seal and the City has caused with its corporate seal and to be executed by its Mayor and City Clerk on the

SPEEDWAY SAND & GRAVEL, INC.

Company Name

May 17, 23

Date

May 17, 23

Date

v. President

May 17, 23

Date

May 17, 23

Date

Secretary

\$1,280,313.65
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WISCONSIN

made to pay the liability
of this contract.

Approved as to form:

Michael Hayes 5/26/23
City Attorney Date

[Signature] 5/26/23
Mayor Date

Maibeth Witzel-Bell 5-22-23
City Clerk Date

[Signature] 5-26-23
Date

[Signature] 5/24
Date

[Signature] 5/22/23
Date

SECTION I: PAYMENT AND PERFORMANCE BOND

BY THESE DOCUMENTS PRESENTED, that we **SPEEDWAY SAND & GRAVEL, INC.**
Fidelity and Deposit Company of Maryland
Schaumburg, IL as surety, are held and firmly bound unto the City of
Wisconsin, in the sum of **ONE MILLION TWO HUNDRED EIGHTY THOUSAND THREE**
THIRTEEN AND 65/100 (\$1,280,313.65) Dollars, lawful money of the United States, for the
of which sum to the City of Madison, we hereby bind ourselves and our respective executors
administrators firmly by these presents.
condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully
perform all of the terms of the Contract entered into between him/herself and the City of Madison for the
construction of:

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the
prosecution of said work, and save the City harmless from all claims for damages because of negligence
in the prosecution of said work, and shall save harmless the said City from all claims for compensation
(under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is
to be void, otherwise of full force, virtue and effect.

Signed and sealed this 17th day of May, 2023

Countersigned:

SPEEDWAY SAND & GRAVEL, INC.

Company Name (Principal)

[Signature]
Witness

[Signature]
V. President NA Seal

[Signature]
Secretary

Approved as to form:

Fidelity and Deposit Company of Maryland

Surety Seal

Salary Employee Commission

[Signature]
City Attorney

By [Signature]
Attorney-in-Fact **Tina Domask**

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under
National Producer Number 17584644 for the year 2023, and appointed as attorney-in-fact
with authority to execute this payment and performance bond which power of attorney has not been
revoked.

May 17, 2023

Date

[Signature]
Agent Signature **Tina Domask**

Bond No. 9402477

SECTION I: PAYMENT AND PERFORMANCE BOND

LET ALL KNOW BY THESE DOCUMENTS PRESENTED, that we SPEEDWAY SAND & GRAVEL, INC. as principal, and Fidelity and Deposit Company of Maryland Company of Schaumburg, IL as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of ONE MILLION TWO HUNDRED EIGHTY THOUSAND THREE HUNDRED THIRTEEN AND 65/100 (\$1,280,313.65) Dollars, lawful money of the United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our respective executors and administrators firmly by these presents.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform all of the terms of the Contract entered into between him/herself and the City of Madison for the construction of:

**TRUAX LIFT STATION REPLACEMENT
CONTRACT NO. 9312**

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the prosecution of said work, and save the City harmless from all claims for damages because of negligence in the prosecution of said work, and shall save harmless the said City from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this 17th day of May, 2023

Countersigned:

SPEEDWAY SAND & GRAVEL, INC.
Company Name (Principal)

[Signature]
Witness

[Signature]
v. President Seal NA

[Signature]
Secretary

Approved as to form:

Fidelity and Deposit Company of Maryland
Surety Seal
 Salary Employee Commission

City Attorney

By [Signature]
Attorney-in-Fact **Tina Domask**

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Producer Number 17584644 for the year 2023, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

May 17, 2023
Date

[Signature]
Agent Signature **Tina Domask**

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 17th day of May, 2023 .



Brian M. Hodges

By: Brian M. Hodges
Vice President

TO REPORT A CLAIM WITH REGARD TO A SURETY BOND, PLEASE SUBMIT A COMPLETE DESCRIPTION OF THE CLAIM INCLUDING THE PRINCIPAL ON THE BOND, THE BOND NUMBER, AND YOUR CONTACT INFORMATION TO:

Zurich Surety Claims
1299 Zurich Way
Schaumburg, IL 60196-1056
www.reportsfclaims@zurichna.com
800-626-4577