$7,540,425.00

BID OF JOE DANIELS CONSTRUCTION CO., INC.

2023

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

UNIT WELL 19 TREATMENT SYSTEM ADDITION

CONTRACT NO. 9289

MUNIS NO. 10448-86-140

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON **JANUARY 23, 2024**

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

https://bidexpress.com/login

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

INDEX

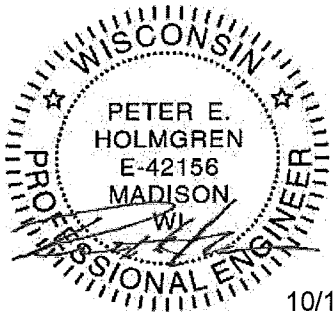
This Proposal, and Agreement have
been prepared by:

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

10/12/2023

Pete Holmgren, P.E.
Madison Water Utility Chief Engineer

PEH:



10/12/2023

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:	UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO.:	9289
SBE GOAL	8%
BID BOND	5%
CONSTRUCTION PRE BID MEETING (2:00 P.M.)	11/13/2023; See Info Below (OPTIONAL)
SBE PRE BID MEETING	See SBE Pre Bid Meeting Info Below
PREQUALIFICATION APPLICATION DUE (2:00 P.M.)	11/21/2023
BID SUBMISSION (2:00 P.M.)	11/30/2023
BID OPEN (2:30 P.M.)	11/30/2023
PUBLISHED IN WSJ	10/19, 10/26, 11/2, 11/9, 11/16 & 11/23/2023

CONSTRUCTION PRE BID MEETING: Madison Water Utility will be hosting an **OPTIONAL** pre-bid construction meeting to review the site and project details with prospective contractors, as well as answer questions. **This meeting will be held virtually through Zoom on November 13, 2023 at 2:00 P.M. (CST):**

Zoom Meeting ID: 899 6430 5207 **Zoom Passcode:** 859818

For additional questions or coordination related to this meeting, contact:

- Jeffrey Nussbaum
  (715) 720-6255
  jnussbaum@sehinc.com

SBE PRE BID MEETING: Small Business Enterprise Pre-Bid Meetings are being held virtually. Advance registration is required. Visit the SBE Meeting web page on Engineering's web site: https://www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-bid-public-works-contracts/small-business-enterprise-sbe-meetings . Questions regarding SBE Program requirements may be directed to Tracy Lomax, Affirmative Action Division. Tracy may 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 DISCREPENCIES

Bidder is responsible for submitting all forms necessary for the City to determine compliance with State and City bidding requirements. Nothwithstanding 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) 266-6510.

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. Nothwithstanding 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

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

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).

REFER TO THE FOLLOWING SPECIFICATION DOCUMENT FOR THE COMPLETE PROJECT TECHNICAL SPECIFICATIONS:

Unit Well 19 Treatment System Addition

Madison Water Utility
Madison, Wisconsin

SEH No. MADWU 167818
Contract No. 9289
Project No. 10448
MUNIS No. 10448-86-140

October 12, 2023

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

October 31, 2023

NOTICE OF ADDENDUM
ADDENDUM 1

CONTRACT NO. 9289
PROJECT NO. 10448
UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

REPLACE the entirety of the "9289 Contract" document with the "9289 Contract Addendum 1" document. Notable changes to the document are as follows:

1. **Due dates for bids have been changed as follows (all times CST):**

   a. Bid Submission Deadline – November 30, 2023 at 2:00 P.M.

   b. Bid Opening – November 30, 2023 at 2:30 P.M.

   c. Contractor Prequalification Application Deadline – November 23, 2023 at 2:00 P.M.

   d. Construction Pre-Bid Meeting – November 13, 2023 at 2:00 P.M.

      i. Attendance of the Construction Pre-Bid Meeting is NOT REQUIRED for bidders; it is an optional opportunity to review the project with the design team and ask questions
      ii. This meeting will be held virtually
      iii. Refer to SECTION A of the contract document for additional information and details on how to attend

2. **The overall contract document has been altered to remove the general requirements of a federally-funded project, including but not limited to:**

   a. "Disadvantaged Business Enterprise" (DBE) requirements have replaced with "Small Business Enterprise" (SBE) requirements; refer to SECTION A and SECTION C in the contract documents for additional information

   b. Removal of American Iron and Steel (AIS) and/or Build America Buy America (BABA) requirements; please refer to the project technical specification document for material requirements

   c. Removal of SECTION J for Davis-Bacon wage/labor compliance provisions

   d. Removal of SECTION K for Davis-Bacon wage rates

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

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.

10/31/2023

Pete Holmgren, PE
Chief Engineer – Madison Water Utility

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

November 17, 2023

NOTICE OF ADDENDUM
ADDENDUM 1
CONTRACT NO. 8711, 8762
8711- HARVEY STREET AND SCHMITT PLACE ASSESSMENT DISTRICT – 2023
8762 – HAMMERSLEY ROAD RESURFACING ASSESSMENT DISTRICT – 2024
NOTICE OF ADDENDUM
ADDENDUM 2
9289 - UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

On all 3 contracts, the link to register for the SBE Pre Bid Meeting is incorrect, both on page A-1 of the contract documents as well as the direct link on Bid Express. The correct link is noted below and has been updated on Bid Express, too.

Please note that the SBE Pre Bid Meeting for all 3 contracts will be held on **November 21, 2023 at 2:00pm.**

SBE Pre Bid Meeting Registration Link:
https://www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-bid-public-works-contracts/small-business

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

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

November 21, 2023

NOTICE OF ADDENDUM
ADDENDUM 3

CONTRACT NO. 9289
PROJECT NO. 10448
UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

1. **Changes to SPECIFICATIONS:**

   a. Document 00 01 10 Table of Contents, REPLACE in its entirety.
   b. Section 01 12 16 Work Sequence, REPLACE in its entirety.
   c. Section 01 51 00 Temporary Utilities, ADD this section in its entirety.
   d. Section 01 77 00 Closeout Procedures, REPLACE in its entirety.
   e. Section 26 24 19 Motor-Control Centers, REPLACE in its entirety.
   f. Section 33 16 50 Submersible Tank Mixing System, REPLACE in its entirety.
   g. Section 40 23 30 Process Piping Specialties, REPLACE in its entirety.
   h. Section 40 92 13 Control Panels and SCADA System Components, REPLACE in its entirety.
   i. Section 40 92 43 Electric Actuators, ADD this section in its entirety.

2. **REPLACE the following DRAWINGS in their entirety:**

   a. GS002-General Structural Notes
   b. GS003-General Structural Notes
   c. 01 S101-Foundation & Floor Plan
   d. 01 S102-Roof Plan
   e. 01 S301-Building Sections
   f. DS502-Foundation Details
   g. DS511-Foundation Details
   h. DS512-Framing Details
   i. DS531-Steel Details
   j. 01 P101-Process Plan
   k. 01 E502-One-Line Diagram
   l. 01 E504-One-Line Diagram

Madison Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

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11/21/2023

Pete Holmgren, PE
Chief Engineer – Madison Water Utility

DOCUMENT 00 01 10

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SECTION 01 12 16

WORK SEQUENCE

PART 1 GENERAL

1.01 SUMMARY

A. General identification of Work sequence.

B. Related Sections:
1. Section 01 11 00 - Summary of Work
2. Section 01 31 13 - Coordination
3. Section 01 33 00 - Submittal Procedures
4. Section 02 41 13 - Building Removal
5. Section 33 11 00 - Water Distribution Systems
6. Section 40 23 10 - Process Water and Waste Piping

1.02 QUALITY ASSURANCE

A. Coordinate all equipment shutdowns, startups, and general scheduling with Owner.

1.03 SUBMITTALS

A. Conform to Section 01 33 00.

B. Work Plans:
1. Work plans and schedules shall be submitted for all work activities involving temporary shutdown of the Owner's water treatment plants, potable water storage facilities, or existing pump stations.
2. Work plans and schedules shall be submitted for all temporary and permanent process systems, electrical and control systems requiring testing and/or commissioning prior to system start-up and integration into the Owner's existing systems and/or operations.
3. Excavation and shoring work plans.
4. Piping Systems:
   a. Plan and schedule for all pipeline work requiring connections to the Owner's existing pipeline systems.
   b. Detailed piping connection layouts for connection to existing and proposed pipe and equipment.
   c. Plan for Disinfection Procedures
   d. Plan for Flushing Operations
   e. Plan for Hydrostatic Testing Procedures
5. Others as required by the Owner and/or specified elsewhere.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 GENERAL

A. Construct Work in phases to allow for Owner's continuous occupancy as required for operation of the existing Unit Well 19, Reservoir, and Booster Pumps 1, 2, and 3. Coordinate construction schedule and operations with Owner and Engineer.

B. All utility interruptions to the Owner's system shall occur at off-peak hours of operation and at other such times as suitable to the Owner. Contractor shall assume that these interruption periods will occur on evenings and overnight.

C. Contractor shall request a shut down for connection of new equipment and piping to the existing system no less than 14 days prior to requested date of shutdown.
   1. A request shall be specific for the scope of work to be performed and at a minimum shall include the following information:
      a. Date and time of requested shutdown.
      b. Work to be performed.
      c. Existing equipment or piping to be removed from service to accommodate the shutdown.
      d. Duration of shutdown requested/anticipated duration of work.
   2. Shutdowns to connect new equipment or piping to existing will not be permitted on Friday, Saturdays, or Sundays.

D. Determine type and extent of temporary facilities the Project requires to maintain continuous operation.

E. Provide all temporary connections, parallel temporary lines, temporary power, temporary bulkheads, temporary equipment, and temporary operations necessary to perform Work.

F. The Owner may disallow any impacts to system or facility operations due to expected, and/or unexpected system demands. In the event that the Owner has to cancel a planned shutdown, the Contractor shall work with the Owner to reschedule the shutdown at a mutually convenient time. No additional compensation shall be allowed due to the cancellation of a previously scheduled utility or system shutdown.

G. Submit a detailed Phasing Schedule in accordance with Section 01 33 00. Schedule to include:
   1. Proposed phasing for the Project.
   2. Construction dates for each component of Work identified in each phase.
   3. Description of Work sequence.
   4. Description of interaction with existing plant facilities.
   5. Temporary pumping, piping, and utility services to maintain operability for facilities.
   6. A plan of action for each impact to normal operations of the system. A plan of action shall include:
      a. Description of the work impacting normal operations.
      b. Outline of procedure to minimize the amount of time normal operations will be impacted.
      c. Description of potential issues that could arise and how to avoid/correct these issues.
      d. Must be approved by Owner.
   7. Resubmit until approved by Engineer.

H. Review existing facilities with Owner to become familiar with potentially difficult items that must remain in service. No Work procedures will be permitted that require shutting down of any portion of existing facilities, except as authorized by Owner.

3.02 SEQUENCING REQUIREMENTS

A. Construction sequencing of the water main and pump station are subject to Contractor's means and methods. Contractor shall clearly identify work sequence on Construction Schedules

B. New piping and equipment will not be permitted to be connected to the existing system until flushing and disinfection requirements have been met.

C. The following is a list of sequencing requirements. This is not intended to be exhaustive, nor does it relieve the contractor of any responsibility in developing or implementing a Phasing Schedule.
   1. Work will be permitted on the site beginning March 1, 2024
   2. Contractor shall mow and prepare the staging area prior to April 15, 2024. If the staging area is not mowed and prepared prior to April 15, 2024, the area will not be permitted for use until October 15, 2024.

3. The well house, chemical feed systems, reservoir, and booster pumps shall be in service during high demand months, defined as ~~May 1~~ June 1, 2024 to ~~October 15~~ September 30, 2024. This period may change at the sole discretion of the Owner/Engineer based on system demands.
4. ~~The reservoir and booster pumps shall be in service during low demand months, defined as October 16 to April 30.~~
5. Unit Well 19 (well, chemical feed systems, reservoir, and booster pumps) could be taken out of service entirely during the period of October 1, 2024 until June 1, 2025, to allow flexibility to complete phases of the work that require shutdowns of equipment.

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. Electric Power Service.
   2. Lighting.
   3. Telephone Services and Internet Access.
   4. Heat.
   5. Weather Instrumentation and Siren
   6. Sanitary Facilities.

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.

B. The Drawings do not show all of the temporary facilities that the Contractor ultimately uses to complete the Work.

C. All costs in connection with temporary services, including, but not limited to, installation, utility company service charges, maintenance, relocation and removal shall be borne by the Contractor at no additional cost to the Owner.

1.03 REFERENCES

A. ANSI - A10 Series Safety Requirements Standards

B. NECA - NJG-6 - Temporary Job Utilities and Services

C. NEMA

D. NFPA:
   1. 70 - National Electrical Code
   2. 241 - Safeguarding Construction, Alteration, and Demolition Operations

E. Underwriter's Laboratory (UL)

1.04 COORDINATION

A. Coordinate with Madison Gas and Electric to provide a separate and temporary metered electric service for use during the construction of this project for site power. This temporary service shall also feed the existing weather instrumentation equipment located on the reservoir, the existing warning siren on the site, and the grinder pump station connected to the facility, as these cannot be out of service at any point during the project.

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 SUBMITTALS

A. Refer to Section 01 12 16.

1.06 QUALITY ASSURANCE

A. Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary utilities and related services.

B. Comply with requirements of NECA NJG-6, NFPA 241, and ANSI A10

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, 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 ELECTRIC POWER SERVICE

A. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of Work.

B. Contractor shall pay for electricity used for construction purposes.
   1. Electrical service shall be provided and installed by Contractor.
   2. Any Trade requiring power with different characteristics than provided shall arrange and pay for access to such power.

C. Install service and grounding in compliance with NFPA 70. Include necessary meters, transformers, overload protected disconnect, and main distribution switch gear.

D. Connect temporary service to local electric power company main as directed by electric company officials.

E. Install temporary service with an automatic ground-fault interrupter feature, activated from circuits of the system.

F. 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.

G. Provide identification/warning signs at power outlets that are other than 110 to 120 volt power.

H. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110 to 120 volt plugs into higher voltage outlets.

I. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.

J. 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.

3.03 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.

3.04 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. Long distance calls are to be by credit card.

E. Contractor shall maintain internet service to site.

3.05 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. Use only smokeless portable heaters acceptable to Engineer

D. 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.

E. Maintain a minimum temperature of 50 degrees in once any structure is enclosed.

F. Maintain a temperature of 65 F before and during the application of interior finishing, painting, etc.

G. Any work damaged by dampness or insufficient or abnormal heating shall be replaced by the Contractor at no additional cost to the Owner.

3.06 WEATHER INSTRUMENTATION AND SIREN

A. Provide temporary 240V power to weather instrumentation located on site. Use existing disconnect for point of connection.
   1. Provide necessary equipment to ensure safe and continuous operation of weather instrumentation while on temporary power and during switchovers. Coordinate with Madison Water Utility or designated contact/owner of the weather station equipment for switchovers and to verify continuous operations.

B. Provide temporary power to Emergency Warning Siren located on site.
   1. Test equipment to ensure proper operation while on temporary power. Coordinate with Dane County Emergency Management.

3.07 SANITARY FACILITIES

A. Provided by Contractor for workers engaged in this Work. (Construction personnel may not use sanitary facilities within owner's existing facilities.)

B. Refer to section 01 52 19.

C. Provide temporary power for the grinder pump station, existing or new, which services the facilities existing bathroom and floor drains sewer waste.

3.08 OPERATION, TERMINATION, AND REMOVAL

A. Enforce strict discipline in use of temporary services and facilities at the Site.
   1. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse.
   2. Do not permit temporary installations to be abused or endangered.
   3. Do not allow hazardous, dangerous, or unsanitary conditions to develop or persist on Site.

B. Operate temporary services and facilities in a safe and efficient manner.
   1. Do not overload temporary services or facilities.
   2. Protect from damage by freezing temperatures and similar elements.
   3. Prevent water-filled piping from freezing by use of ground covers, insulation, draining, or by temporary heating.
   4. Maintain distinct markers for underground lines.
   5. Protect from damage during excavation operations.

C. Unless Engineer requests that it be maintained for a longer period of time, remove each temporary service and facility promptly when no longer needed, when it has been replaced by the authorized use of a permanent facility, or no later than Substantial Completion.

D. Complete or restore permanent Work which may have been delayed because of interference with temporary service or facility.

E. Repair damaged Work, clean exposed surfaces, and replace Work which cannot be satisfactorily repaired.

F. Materials and facilities that constitute temporary services and facilities are, and will remain, the property of Contractor.

G. At Substantial Completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during construction, including but not limited to:
   1. Replace air filters and clean inside of ductwork and housings.
   2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
   3. Replace lighting system lamps that are burned out or noticeably dimmed.

END OF SECTION

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SECTION 01 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.
   3. City of Madison's Standard Specifications for Public Works Construction - 2023 Edition.

1.02 BENEFICIAL OCCUPANCY

A. Completion Dates
   1. Deadline for beneficial occupancy will be September ~~August~~ 30, 2025.
   2. Failure to meet beneficial occupancy requirements will result in liquidated damages.
      a. Liquidated damages are specified in the City of Madison's Standard Specifications for Public Works Construction - 2023 Edition, Section 109.9.

B. Complete the following before requesting Engineer's inspection for certification of beneficial occupancy:
   1. Assure the following:
      a. All equipment signed off from the vendor
      b. All equipment has been tested, adjusted and properly started and commissioned.
      c. Facility commissioning is successful (see section 01 75 00)
      d. All inspections complete (see below)
      e. MWU has unrestricted use of entire facility.
      f. MWU is able to operate the complete facility as designed and is able to provide safe and reliable water supply to the water distribution system.
   2. 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.
   3. Obtain, submit releases enabling Owner unrestricted use of the Work and access to services and utilities.
   4. Regulatory requirements:
      a. Where required, obtain occupancy permits, operating certificates, similar releases.
      b. Obtain necessary State, City, Fire, Building Department, Generator inspections as required
      c. Generator and EC inspections will be allowed after beneficial occupancy and before final completion.
   5. Bonding and insurance:
      a. Consent of Surety to Reduction In or Partial Release of Retainage.
      b. Advise Owner of pending insurance change-over-requirements.

C. 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 & SUBSTANTIAL COMPLETION

A. Completion Dates
   1. Deadline for substantial completion will be October 31, 2025.
   2. Failure to meet substantial completion requirements will result in liquidated damages.
      a. Liquidated damages are specified in the City of Madison's Standard Specifications for Public Works Construction - 2023 Edition, Section 109.9.
   3. Deadline for final acceptance will be November 28, 2025

B. Before requesting final inspection for determining date of Substantial Completion, complete the following:
   1. Submittals:
      a. Lien Waivers (from all subcontractors and suppliers).
      b. Certificate of Substantial Completion (AIA G704) - 3 copies.
      c. Contractor's Affidavit of Payment of Debts and Claims (AIA G706).
      d. Contractor's Affidavit of Release of Liens (AIA G706A).
      e. Consent of Surety (if Performance Bond provided).
         1) To Partial Release of Retainage (AIA G707A).
         2) To Final Payment (AIA G707).
      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. 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. Pumps
      b. Filters
      c. Chemical Feed Equipment
      d. Automated valves
      e. Valves
      f. Water quality monitoring equipment
      g. HVAC Equipment
      h. Electrical Equipment
      i. Control Systems
   3. Maintenance:
      a. Materials (each type and color):
         1) Masonry.
         2) Tile.
         3) Ceiling panels.
         4) Paint.
         5) Fuses.
      b. Equipment
         1) Pumps
         2) Filters
         3) Chemical Feed Equipment
         4) Automated valves
         5) Valves
         6) Water quality monitoring equipment
         7) HVAC Equipment
         8) Electrical Equipment
         9) Control Systems
      c. Maintenance instructions.

d. Maintenance services:
   1) Roof hatches.
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) All performed tests.

C. Record Drawings: Submit to Engineer a set of record prints marked to show "as-built" conditions for work of contract.

D. Adjusting:
   1. Repair and restore marred exposed finishes.
   2. Touch up of painting of marred surfaces.
   3. Complete final cleaning requirements.

E. 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.

F. 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 26 24 19

MOTOR-CONTROL CENTERS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes MCCs for use with ac circuits rated 600 V and less, with combination controllers and having the following factory-installed components:
   1. Incoming main lugs and OCPDs.
   2. Feeder-tap units.
   3. Full-voltage magnetic controllers.
   4. VFDs.
   5. Surge Protection.
   6. Instrumentation and customer metering.
   7. Auxiliary devices.

1.03 DEFINITIONS

A. CPT: Control power transformer.

B. GFCI: Ground fault circuit interrupting.

C. LAN: Local area network.

D. MCC: Motor-control center.

E. MCCB: Molded-case circuit breaker.

F. MCP: Motor-circuit protector.

G. SPD: Surge protective device.

H. SSRV: Solid State Reduced Voltage Starter.

I. VFD: Variable-frequency drive.

J. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.04 SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for MCCs.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories for each cell of the MCC.

B. Shop Drawings: For each MCC, manufacturer's approval drawings as defined in UL 845. In addition to requirements specified in UL 845, include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details.
   1. Show tabulations of installed devices, equipment features, and ratings. Include the following:
      a. Each installed unit's type and details.
      b. Factory-installed devices.
      c. Enclosure types and details.
      d. Nameplate legends.
      e. Short-circuit current (withstand) rating of complete MCC, and for bus structure and each unit.
      f. Features, characteristics, ratings, and factory settings of each installed controller and feeder device, and installed devices.
      g. Specified optional features and accessories.
   2. Schematic Wiring Diagrams: For power, signal, and control wiring for each installed controller.
   3. Nameplate legends.
   4. Vertical and horizontal bus capacities.
   5. Features, characteristics, ratings, and factory settings of each installed unit.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For MCCs, all installed devices, and components to include in emergency, operation, and maintenance manuals.
   1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
      a. Manufacturer's Record Drawings: As defined in UL 845. In addition to requirements specified in UL 845, include field modifications incorporated during construction by manufacturer, Contractor, or both.
      b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
      c. Manufacturer's written instructions for setting field-adjustable overload relays.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
   2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
   3. Indicating Lights: Two of each type and color installed.
   4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
   5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.07 QUALITY ASSURANCE

A. Source Limitations: Obtain MCCs and controllers of a single type from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, and marked for intended use.

C. UL Compliance: MCCs shall comply with UL 845 and shall be listed and labeled by a qualified testing agency.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver MCCs in shipping splits of lengths that can be moved past obstructions in delivery paths.

B. Handle MCCs according to the following:
   1. NECA 402, "Recommended Practice for Installing and Maintaining Motor Control Centers."

2. NEMA ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More Than 600 Volts."

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   1. Ambient Temperature Rating: Not less than 0 deg F (minus 18 deg C) and not exceeding 104 deg F (40 deg C), with an average value not exceeding 95 deg F (35 deg C) over a 24-hour period.
   2. Ambient Storage Temperature Rating: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C)
   3. Humidity Rating: Less than 95 percent (noncondensing).
   4. Altitude Rating: Not exceeding 6600 feet (2000 m), or 3300 feet (1000 m) if MCC includes solid-state devices.

B. Interruption of Existing Electrical Service or Distribution Systems: Do not interrupt electrical service to, or distribution systems within, a facility occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:
   1. Notify Construction Manager and Engineer no fewer than 7 days in advance of proposed interruption of electrical service.
   2. Indicate method of providing temporary electrical service.
   3. Do not proceed with interruption of electrical service without Construction Manager's or Engineer's written permission.
   4. Comply with NFPA 70E.
   5. Coordinate service demo with construction sequence.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for MCCs, including clearances between MCCs and adjacent surfaces and other items.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

B. Coordinate features of MCCs, installed units, and accessory devices with remote pilot devices and control circuits to which they connect.

C. Coordinate features, accessories, and functions of each MCC, each controller, and each installed unit with ratings and characteristics of supply circuits, motors, required control sequences, and duty cycle of motors and loads.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. MCC manufacturer basis of design is Rockwell Automation:
   1. Rockwell Automation, Inc. Bulletin 2100.
   2. No substitutions allowed.

B. General Requirements for MCCs: Comply with NEMA ICS 18 and UL 845.

2.02 RATINGS

A. Nominal System Voltage: 480Y/277 V, three phase, four wire.

B. Short-Circuit Current Rating: Fully rated, as shown on the one-line diagrams.

2.03 MOTOR CONTROL CENTER ENCLOSURES

A. Indoor Enclosures: Freestanding steel cabinets unless otherwise indicated. NEMA 250, **Type 1** unless otherwise indicated to comply with environmental conditions at installed location.

B. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's **standard gray** finish over a rust-inhibiting primer on treated metal surface.

2.04 ASSEMBLY

A. Structure:
   1. Comply with UL requirements for service entrance equipment.
   2. Units up to and including Size 3 shall have drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
   3. Pull-apart terminal strips for external control connections.

B. Compartments: Modular; individual doors with concealed hinges and quick-captive screw fasteners.
   1. Interlock compartment door to require that the disconnecting means is "off" before door can be opened or closed, except by operating a concealed release device.
   2. Compartment construction shall allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in MCC.
   3. The same-size compartments shall be interchangeable to allow rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.

C. Owner's Metering Compartment: A separate customer metering compartment and section with front hinged door, metering, and current transformers for each meter. Current transformer secondary wiring shall be terminated on shorting-type terminal blocks. Include PTs having primary and secondary fuses with disconnecting means and secondary wiring terminated on terminal blocks.

D. Wiring Spaces:
   1. Vertical wireways in each vertical section for vertical wiring to each unit compartment; supports to hold wiring in place.
   2. Horizontal wireways in bottom and top of each vertical section for horizontal wiring between vertical sections; supports to hold wiring in place.

E. Provisions for Future:
   1. Compartments marked "future" shall be bused, wired and equipped with guide rails or equivalent, and ready for insertion of drawout units.
   2. Compartments marked "spare" shall include provisions for connection to the vertical bus.

F. Control Power:
   1. 120-V ac; obtained from CPT integral with controller; with primary and secondary fuses. The CPT shall be of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
      a. CPT Spare Capacity: 100 VA.

G. Factory-Installed Wiring: Factory installed, with bundling, lacing, and protection included. Use flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
   1. Wiring Class: NEMA ICS 18, Class II Type B.

H. Bus:
   1. Main Horizontal and Equipment Ground Buses: Uniform capacity for entire length of MCC's main and vertical sections. Provide for future extensions.
   2. Vertical Phase and Equipment Ground Buses: Uniform capacity for entire usable height of vertical sections, except for sections incorporating single units.

3. Ground Bus: Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for ground conductors, minimum size 1/4-by-2 inches. Equip with mechanical or compression connectors for outgoing conductors.
4. Neutral Disconnect Link: Bolted, uninsulated, 1/4-by-2-inch copper bus, arranged to connect neutral bus to ground bus.

2.05 MAIN DISCONNECT AND OVERCURRENT PROTECTIVE DEVICE(S)

A. Incoming Mains Location: Bottom.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
   1. Adjustable magnetic trip setting for main circuit-breaker frame sizes 250 A up to 600A.
   2. Main breakers 600A and greater shall be electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
      a. Instantaneous trip.
      b. Long- and short-time pickup levels.
      c. Long- and short-time time adjustments.
      d. Individually adjustable ground-fault setting and time delay for 1000 amp and larger.
      e. Provide arc flash reduction mode (ARM):
         1) For each breaker 800 A or greater, provide a manual switch on the compartment door to switch the circuit breaker tripping characteristic to instantaneous with minimum pickup setting, in order to reduce the available energy at downstream equipment.
         2) Provide a lock feature for the ARM switch so that it may be locked in either the normal or instantaneous position.
         3) Provide a yellow LED indicating light when ARM switch is in instantaneous mode.
         4) Wire contacts on all ARM switches to a common alarm input to the power monitoring system digital meter.
   3. MCCB Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
      c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

C. Surge Suppression: Factory installed as an integral part of the incoming feeder, complying with UL 1449, SPD shall be service entrance type surge protective device suitable for use as Type 1 or Type 2 device per UL1449 4th Edition, applied to the line or load side of the utility feed inside the facility.

2.06 FEEDER TAP UNITS

A. MCCBs: Fixed mounted, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A to 600A, Electronic trip circuit breakers 800-1200A. Comply with UL 489, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
   1. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   2. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
      a. Instantaneous trip.
      b. Long- and short-time pickup levels.
      c. Long- and short-time time adjustments.
      d. Ground-fault pickup level, time delay, and I^2t response for 1000A and greater.
   3. Alarm Switch: One NC contact that operates only when circuit breaker has tripped.

2.07 MAGNETIC CONTROLLERS

A. Full-Voltage Controllers:
   1. General Requirements for Full-Voltage Enclosed Controllers: Comply with NEMA ICS 2, general purpose, Class A.
   2. Magnetic Controllers: Full voltage, across the line, electrically held.
      a. Controller Units: Combination controllers.
      b. Configuration: Non-reversing.

B. Disconnects:
   1. MCP:
      a. UL 489, with interrupting capacity complying with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
      b. Lockable Handle: For three padlocks and interlocks with cover in closed position.
   2. MCCB:
      a. UL 489, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
      b. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
      c. Lockable Handle: For three padlocks and interlocks with cover in closed position.
      d. NC alarm contact that operates only when MCCB has tripped.

C. Overload Relays:
   1. Solid-State Overload Relays:
      a. Switch or dial selectable for motor-running overload protection.
      b. Sensors in each phase.
      c. **Class 10/20 selectable** tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
   2. Two (2) NC isolated overload alarm contacts.
   3. External overload reset push button.

2.08 VARIABLE FREQUENCY DRIVES

A. Application: Constant torque and variable torque as required for equipment installed.

B. Controller Units: Combination controllers, consisting of variable-frequency power converter that is factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged for self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency. Comply with NEMA ICS 7, NEMA ICS 61800-2 and UL 508C.
   1. Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
   2. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
   3. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.

C. Disconnects:
   1. MCP:
      a. UL 489, with interrupting capacity complying with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
      b. Lockable Handle: For three padlocks and interlocks with cover in closed position.
      c. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
      d. NC alarm contact that operates only when MCP has tripped.

e. Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.

2. MCCB:
   a. UL 489, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
   b. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
   c. Lockable Handle: For three padlocks and interlocks with cover in closed position.
   d. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
   e. NC alarm contact that operates only when MCCB has tripped.
3. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFD input current rating, whichever is larger.

D. Design and Rating: Match load type such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.

E. VFDs shall be heavy duty rated.

F. Verify motor current requirements prior to ordering.

G. Output Rating: Three-phase; 10 to 60 Hz for variable torque load or 10 to 66 Hz, with torque contact as speed change for constant torque loads, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.

H. Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
2. Input AC Voltage Unbalance: Not exceeding 3 percent.
3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
4. Minimum Efficiency: 96 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 96percent under any load or speed condition.
6. Overload Capability:
   a. For variable-torque controllers, 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
   b. For constant-torque controllers, 1.5 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
7. Starting Torque: Minimum of 100 percent of rated torque from 3 to 60 Hz.
8. Speed Regulation: Plus or minus 5 percent.
9. Output Carrier Frequency: Field selectable.
10. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.

I. Internal Adjustability Capabilities:
1. Minimum Speed: 5 to 25 percent of maximum rpm.
2. Maximum Speed: 80 to 100 percent of maximum rpm.
3. Acceleration: 0.1 to 999.9 seconds.
4. Deceleration: 0.1 to 999.9 seconds.
5. Current Limit: 30 to a minimum of 150 percent of maximum rating.

J. Self-Protection and Reliability Features:
1. Input transient protection by means of SPDs for three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
2. Loss of Input Signal Protection: Selectable response strategy including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
3. Under- and overvoltage trips.
4. Inverter overcurrent trips.
5. VFD and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFD

overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved and listed and labeled by an NRTL.
6. Critical frequency rejection, with three selectable, adjustable deadbands.
7. Instantaneous line-to-line and line-to-ground overcurrent trips.
8. Loss-of-phase protection.
9. Reverse-phase protection.
10. Short-circuit protection.
11. Motor overtemperature fault.

K. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
1. Motor Temperature Compensation at Slow Speeds: Adjustable current fallback based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.

L. Operator Station:
1. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.
2. Isolated Control Interface: Allows VFDs to follow remote-control signal over a minimum 40:1 speed range.
3. Panel-mounted, manufacturer's standard front-accessible, sealed keypad and plain-English-language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
   a. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
   b. Security Access: Electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.

M. Displays:
1. Historical Logging Information and Displays:
   a. Real-time clock with current time and date.
   b. Running log of total power versus time.
   c. Total run time.
   d. Fault log, maintaining last four faults with time and date stamp for each.
2. Indicating Devices: Digital display mounted flush in VFD door and connected to display VFD parameters including the following:
   a. Output frequency (Hz).
   b. Motor speed (rpm).
   c. Motor status (running, stop, fault).
   d. Motor current (amperes).
   e. Motor torque (percentage).
   f. Fault or alarming status (code).
   g. PID feedback signal (percentage).
   h. DC-link voltage (V dc).
   i. Set-point frequency (Hz).
   j. Motor output voltage (V ac).

N. Provide with Ethernet output connection to Allen-Bradley PLC.
1. Ethernet outputs shall allow all data to be transmitted to PLC, including but not limited to:
   a. Motor running.
   b. Fault.
   c. Speed input.
   d. Speed output.
   e. Motor current (amperes).
   f. Motor Speed (rpm).
   g. Voltage.
   h. Frequency.
   i. VFD shall be capable of receiving motor control, (start/stop) and motor speed setting input commands from the PLC via Ethernet.

O. VFD conditioning and filtering:
   1. Each VFD shall be provided with input line conditioning, 5-percent line reactors minimum.
   2. Harmonic Distortion:
      a. Drives shall be designed to limit the harmonic currents which are generated on the AC service and which would produce electromagnetic interference (EMI) or radio frequency interference (RFI). Individual current harmonic distortion and the total demand distortion expressed as percent of maximum demand load current shall not exceed the values specified in IEEE 519 – Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, Table 10.3.
      b. Total Harmonic Distortion (THD) shall not exceed 5 percent, and individual voltage harmonic distortion shall not exceed 3 percent per IEEE 519.
      c. If the drives generate objectionable interference, EMI or RFI drive manufacturer shall provide the specifications for the equipment required to reduce it to acceptable levels. The VFD supplier shall have in possession filters to alleviate interference if encountered.
      d. The Owner will provide the equipment specified by the drive manufacturer to correct the problem through a direct purchase or a Change Order to the Contract.

P. Manufacturer:
   1. Allen-Bradley Powerflex 755 or approved equal.

2.09 CONTROLLER-MOUNTED AUXILIARY DEVICES

A. Control-Circuit and Pilot Devices: Factory installed in controller enclosure cover unless otherwise indicated. Comply with NEMA ICS 5.
   1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oil-tight type.
      a. Push Buttons: Recessed type; momentary contact unless otherwise indicated.
      b. Pilot Lights: LED type; color as indicted on drawings, push to test.
      c. Selector Switches: Rotary type.

B. Elapsed-Time Meters: Heavy duty with digital readout in hours; non-resettable.

C. Auxiliary Dry Contacts: Reversible NC/NO.

D. Control Relays:
   1. Time Delay: Auxiliary and adjustable solid-state time-delay relays.
   2. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections and adjustable undervoltage, overvoltage, and time-delay settings.

2.10 MEASUREMENT AND CONTROL DEVICES

A. Instrument Transformers: IEEE C57.13, NEMA EI 21.1, and the following:
   1. PTs: IEEE C57.13; 120 V, 60 Hz, single secondary; disconnecting type with integral fuse mountings. Burden and accuracy shall be consistent with connected metering and relay devices.
   2. Current Transformers: IEEE C57.13; 5 A, 60 Hz, secondary; wound type; single secondary winding and secondary shorting device. Burden and accuracy shall be consistent with connected metering and relay devices.
   3. CPTs: Dry type, mounted in separate compartments for units larger than 3 kVA.
   4. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, for selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker and ground-fault protection.

B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
   1. Listed or recognized by a nationally recognized testing laboratory.
   2. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
   3. Panel mounted with built-in LCD display

4. Measurement of the following values with the indicated maximum accuracy tolerances:
   a. Phase Currents, Each Phase: Plus or minus 1 percent.
   b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
   c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
   d. Three-Phase Real Power (Megawatts): Plus or minus 2 percent.
   e. Power Factor: Plus or minus 2 percent.
   f. Frequency: Plus or minus 0.5 percent.
   g. Accumulated Energy, Megawatt Hours: Plus or minus 2 percent; accumulated values unaffected by power outages up to 72 hours.
5. Ethernet IP communication to connect to Allen-Bradley PLC.
6. Mounting: Display and control unit flush or semiflush mounted in MCC compartment door.
7. Manufacturer: Allen-Bradley PowerMonitor 5000, with communication over Ethernet I/P.

C. Control Circuits: 120-V ac, supplied through secondary disconnecting devices from CPT.

D. Control Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.

E. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.

2.11 SURGE PROTECTION DEVICE

A. Comply with UL 1449, 4th edition and UL 1283 5th edition. Type 1 or Type 2.

B. Manufacturer: SPD's integral to the MCC shall be by MCC manufacturer, externally mounted SPD's shall be:
   1. ABB/Current Technology, Inc.
   2. Approved Substitution.

C. Surge Protection Device Description: IEEE C62.41-compliant, solid-state, parallel-connected, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the MCC short-circuit rating, and with the following features and accessories:
   1. Fuses, if required, rated at 200-kA interrupting capacity.
   2. Fabrication using bolted compression lugs for internal wiring.
   3. Integral disconnect switch.
   4. Redundant suppression circuits.
   5. Redundant replaceable modules.
   6. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
   7. LED indicator lights for power and protection status.
   8. Audible alarm, with silencing switch, to indicate when protection has failed.
   9. Form-C contacts rated at 5 A and 250-V ac, one NO and one NC, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
   10. Four-digit, transient-event counter set to totalize transient surges.

D. Peak Single-Impulse Surge Current Rating: 150 kA per mode/~~320~~ 200 kA per phase.

E. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.

F. Features and Accessories:
   1. Provide protection against both transient surges under 100 microseconds and temporary overvoltages, (TOV) and swells up to 3600 cycles.
   2. Operating temperature range shall be -40 degrees Celsius +60 degrees Celsius (-40 degrees Fahrenheit to +140 degrees Fahrenheit).

3. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
4. Indicator light display for protection status.
5. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
6. Surge counter.

G. Ratings:
   1. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V and 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:
      a. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
      b. Line to Ground: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
      c. Neutral to Ground: 1000 V for 480Y/277 V, 700 V for 208Y/120 V.
      d. Line to Line: 2000 V for 480Y/277 V, 1200 V for 208Y/120 V.
   2. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
      a. Line to Neutral: 700 V.
      b. Line to Ground: 700 V.
      c. Neutral to Ground: 700 V.
      d. Line to Line: 1200 V.
   3. The SPD shall provide Temporary Overvoltage (TOV) and voltage swell protection to the following:
      a. TOV - should be capable of surviving and continue to protect critical loads against multiple TOV events (described as 200% nominal voltage by 8 milliseconds (ms).
      b. Swell - should be capable of protection against swells up to 180% nominal for 0.7 ohms load for greater than 3600 cycles.
   4. Minimum Single Pulse Surge Current Capacity based on ANSI/IEEE 8x20 microsecond wave shape. Surge currents shall be verified by an independent 3rd party test lab.

H. Test system for repetitive sequential ANSI/IEEE C62.41 Category C3 waveforms. Minimum repetitive strikes of 1.2 X 50 s, 20 kilovolt (KV) open circuit voltage and 8 X 20 s, 10 kiloampere (KA) short circuit current with no more than 10% degradation of clamping voltage at the specified surge current. Service entrance units shall survive minimum exposure of 12,000 events, Panelboard units shall survive 5,000 events with no more than 10% degradation.

I. Electrical Noise Filter: each unit shall include a high-performance EMI/RFI noise rejection filter with a maximum attenuation of 54dB at 142kHz, per MIL-STD-220B.
   1. SPD shall include an EMI/RFI noise rejection filter for all L-N modes as well as a removable filter in the N-G mode.

~~**2.12 SOURCE QUALITY CONTROL**~~

~~A. MCC Testing: Test and inspect MCCs according to requirements in NEMA ICS 18.~~

~~B. VFD Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.~~
   ~~1. Test each VFD while connected to a motor that is comparable to that for which the VFC is rated.~~
   ~~2. Verification of Performance: Rate VFDs according to operation of functions and features specified.~~

~~C. MCCs will be considered defective if they do not pass tests and inspections.~~

~~D. Prepare test and inspection reports.~~

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and surfaces to receive MCCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. NEMA Industrial Control and Systems Standards: Comply with parts of NEMA ICS 2.3 for installation and startup of MCCs.

B. Coordinate layout and installation of MCCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

C. Floor Mounting: Install MCCs on 4-inch (100-mm) nominal-thickness concrete base.
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in control circuits if not factory installed.

F. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

G. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.

H. Comply with NECA 1.

3.03 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for identification of MCC, MCC components, and control wiring.
   1. Identify field-installed conductors, interconnecting wiring, and components.
   2. Install required warning signs.
   3. Label MCC and each cubicle with engraved nameplate.
   4. Label each enclosure-mounted control and pilot device.
   5. Mark up a set of manufacturer's connection wiring diagrams with field-assigned wiring identifications and return to manufacturer for inclusion in Record Drawings.

B. Provide arc flash and available arc fault current labeling on the equipment per NEC 110.16 and 110.24.

3.04 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices and facility's central-control system.

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control selection devices where applicable.
   1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
   2. Connect selector switches within enclosed controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.05 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

~~B. Acceptance Testing Preparation:~~
   ~~1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.~~
   ~~2. Test continuity of each circuit.~~

C. Tests and Inspections:
   1. Inspect controllers, wiring, components, connections, and equipment installation.
   ~~2. Test insulation resistance for each enclosed controller element, component, connecting motor supply, feeder, and control circuits.~~
   3. Test continuity of each circuit.
   4. Verify that voltages at controller locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Construction Manager before starting the motor(s).
   5. Test each motor for proper phase rotation.
   ~~6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.~~
   7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   ~~8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:~~
      ~~a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multipole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.~~
      ~~b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multipole enclosed controller 11 months after date of Substantial Completion.~~
      ~~c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.~~
   9. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
   10. Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.

D. MCCs will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.06 STARTUP SERVICE

~~A. Engage a factory-authorized service representative to perform startup service.~~
   ~~1. Complete installation and startup checks according to NETA Acceptance Testing Specification and manufacturer's written instructions.~~

B. After startup, VFDs shall be thoroughly cleaned.
   1. Cleaning shall include wiping down of the enclosure and removal of all debris and dirt from the interior of the enclosure.
   2. Cleaning procedure shall include vacuuming the drive interior and wipe down of all exterior surfaces, utilization of compressed air for cleaning is not acceptable.

3.07 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload relay pickup and trip ranges.

B. Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Construction Manager before increasing settings.

D. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage, solid-state controllers.

E. Program microprocessors in VFDs for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.

F. Set field-adjustable circuit-breaker trip ranges.

3.08 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers.

END OF SECTION

SECTION 33 16 50

SUBMERSIBLE TANK MIXING SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Submersible mixing system.
   2. Accessories.
   3. Electrical Power Connection.

1.02 PERFORMANCE REQUIREMENTS

A. Sized to completely mix a minimum 3,060,037-million-gallon water storage tank with a tank height of 20.35 feet, tank diameter of 160 feet, and hatch size of 12 inches, pulling water from the lower level of the tank and pushing it upward, high flow.

B. Approximately 1.6 MGD will pass through the reservoir tank per day.

C. Complete Water Circulation Required. To meet the project objectives, the tank or reservoir circulation shall be achieved by a single or multiple submerged units within the reservoir capable of providing long distance circulation of water. The mixer shall have a direct measurable flow rate where suction shall enter specified mixer's intake positioned within 2 inches of reservoir floor and discharging water vertically in a sheet flow pattern to induce a large volume, low velocity flow to reach the tank or reservoir water surface. The mixer must be placement flexible in design to allow best hydraulic positioning for tank or reservoir conditions to prevent hydraulic short circuiting within tank or reservoir. Suction not within 2 inches of tank or reservoir floor is not allowed.

D. Complete Mix: The mixer manufacturer guarantees that the subject tank will be completely mixed by the mixer. In continuous operation of the mixer:
   1. At least once per 24 hours all water temperatures within the tank shall converge to within 0.8 degrees C, and
   2. At least once per 72 hours all chlorine concentrations within the tank shall converge to within 0.18 mg/L.

E. Fit Through Small Hatch Opening. The mixer shall be capable of fitting through a clear, unobstructed opening of 12" diameter without requiring disassembly or assembly.

F. Continuous Operation With 120VAC, 20 Amp Power Source. The mixer shall operate continuously during day and night while connected to electric grid power.

G. Stainless Steel Construction. The mixer shall be constructed of Type 316 stainless steel metal for strength and superior corrosion resistance.

H. Motor. The mixer shall be mechanically operated by a submersible motor that meets the following criteria.
   1. Direct Drive, with no gearbox and no lubrication maintenance required.
   2. Designed for submersible operation. Mixer design shall include flow sleeve or housing around motor to provide water flow past motor per submersible motor design criteria to lower the total motor temperature and increase winding life.
   3. Designed for Continuous Operation without overheating or compromising motor life expectancy. Constant, full speed operation, variable frequency drive or other method of speed reduction not required and not allowed.
   4. 120 VAC, 20 Amp power source shall be supplied by others and not the mixer manufacturer.

I. Exposed Rotating Protection. The mixer shall not have any rotating equipment openly exposed. Rotating shafts, impellers, and motors shall not be openly exposed, and in the event of any part of the mixer exterior contacting the floor or cord, it shall not cause damage to either.

J. Low Elevation Intake: The mixer shall be supplied with an intake capable of being positioned at the lowest elevation of the tank or reservoir floor. The intake level shall bring water into the mixer at horizontal layer within 2 inches of the tank or reservoir floor to prevent hydraulic short circuiting of inflow water through the tank.

K. Restraint System. The mixer shall not require any brackets, penetrations, rope, ties, or fixed connections to the tank or reservoir columns, walls, or floor below the overflow elevation. The mixer shall allow for placement and servicing without requiring tank or reservoir to be drained. The mixer shall not require the use of a diver or diving team to enter the tank or reservoir to complete placement or service of the specified equipment.

L. Functional for All Water Levels. The mixer shall function properly and not be negatively impacted by fluctuating water levels down to 24 inches of water depth. Devices requiring more than 24 inches of water depth to properly function without damage not allowed.

M. SCADA and Controls. The mixer shall have the option to add an Electric Control Box including a motor current indicator in a 4-20mA analog output and remote on/off control via 24VDC relay.

N. Chlorine Boost Connection: The mixer shall be supplied with a connection point for injection of sodium hypochlorite. The connection point shall be compatible with a 1/2-inch (1.3 cm) diameter hose and be rated for contact with 12.5 percent Sodium Hypochlorite solution.

O. The complete mixer shall be NSF/ANSI Standard 61 and NSF/ANSI Standard 372 listed for safe contact with potable water. The mixer shall be NSF/ANSI Standard 61 listed to be safely in contact with a potable water volume as low as 5,000 gallons.

P. Maintenance Requirements. The mixer shall operate normally with the following maintenance features.
   1. No scheduled lubrication is required of any system components including motor.
   2. No spare parts shall be required to be kept on hand.

Q. Equipment Support. The mixer manufacturer shall offer full factory support with the following staff and support services.
   1. Customer Service, Application Engineering, and Equipment Engineering staff available by email or toll-free phone.
   2. Field personnel for placing and servicing the specified mixer.
   3. Public website with detailed information available describing the mixer for this project and related applications of this equipment into potable water tanks and reservoirs.
   4. Service plans for preventative maintenance and continued technology improvements for the specified mixer.

1.03 SUBMITTALS

A. Mixing System:
   1. Mixing unit Size and Model Number.
   2. Mixing system Specifications & Dimensions.
   3. Head Capacity & Horsepower Curves.
   4. Motor Specifications.
   ~~5. Interior Water Wiring Plan~~
   6. Installation diagram and instructions showing wiring and mounting assembly.
   7. Operations and Maintenance Manual.

PART 2 PRODUCTS

2.01 ELECTRIC SUBMERSIBLE MIXER

A. GridBee GS-12 or approved equal.

B. Nominal Dimensions:
   1. Length: 36 inches.
   2. Height: 10 inches.
   3. Width: 10 inches.

C. Weight - 80 pounds maximum.

D. 120 Volt AC.

E. NSF/ANSI Standard 61 and NSF/ANSI 372 approved components.

2.02 ACCESSORIES

A. Include items for a complete system including, but not limited to, the following.
   1. NEMA 4x Control Box with SCADA Monitoring: ~~Control Box~~:
      a. UL listed, NEMA 4X.
      b. 120VAC, 1 Ph, 60 Hz.
      c. SCADA Monitoring and Control Capability.
      d. HAND-OFF-AUTO switch.
      e. Indicator light.
      f. Locking hatch.
      g. Control Box shall include a 4-20 mA current transducer providing analog output for motor current allowing for monitoring proper operation.
      h. Control Box shall include a 24 VDC relay to allow for remote on and off control of the mixer.
      i. Integration of 4-20 mA output and remote on/off relay into existing PLC/RTU shall be provided by an approved controls system integrator.
   2. Manufacturer supplied submersible electrical cable. ~~Power Cord~~.
   3. Retrieval Chain.
   4. Cord penetrator bolt.
   5. ~~Power cable penetration thru~~ Through-tank fitting for power cord pass-through and cord strain relief.
   6. Chemical Injection hose penetration thru-tank fitting. Allow for conversion from 2 inches electrical conduit to tank fitting. Fitting design shall be such that the chemical injection hose is not damaged during operation.
   7. Suspension kit.
   8. Grip cord.
   9. Mounting accessories.
   10. Junction Box.
   ~~11. NEMA 4x Control Box with SCADA Monitoring.~~
   12. Chain grab tools.
   13. O&M Manual.
   14. Installation Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of other ~~riser~~ reservoir amenities (exterior and interior) to avoid conflicts with system installation.

3.02 INSTALLATION

A. Install mixer in accordance with manufacturer recommendations through existing ~~vent~~ hatch opening at top of tank. Location is shown on the Drawings on sheet 01 P101 – Process Plan.

B. Install retrieval chain within reach of the tank access manway.

C. Contractor shall take care as to not allow debris to enter the tank. If debris enters the tank, Contractor shall disinfect the tank according to AWWA C652, Method 3.

D. Install mixer control panel (CP-RM) with Hand-Off-Auto switch and on/off indicating light at location as shown on the electrical plans ~~in Chemical Feed Station.~~

E. Demonstrate proper operation.

F. Install ~~standard 75-foot~~ manufacturer cable, retrieval chain, top of tank ~~roof~~ junction box, through-tank fitting, and cord seal using the necessary manufacturer recommended tools and practices.~~, chain grab tools, 1 5/16-inch hole saw, Lexel sealant, kellem grip and cord seal.~~

~~3.03 ELECTRICAL~~

A. ~~Secure and pay for the services of a licensed electrician.~~

B. ~~Furnish and install all necessary electrical components to provide power to mixer.~~

C. ~~Route power inside appropriate rigid PVC conduit.~~

D. ~~Maintain electrical devices and equipment including SCADA features.~~

E. ~~Complete all work in a workmanlike manner.~~

3.04 FIELD QUALITY CONTROL

A. Manufacturer Field Services:
   1. Representative to supervise and inspect mixer installation.

3.05 DISINFECTION

A. Disinfect mixing system prior to placing unit into tank.

B. If the Contractor causes debris to enter the tank, disinfection of the entire tank will be required according to AWWA C652, Method 3.

3.06 WARRANTY

A. 5-year extended warranty.

END OF SECTION

SECTION 40 23 30

PROCESS PIPING SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Miscellaneous process piping items.

B. Related Sections:
   1. Section 40 23 00 - Process Piping General Provisions
   2. Section 40 23 10 - Process Water and Waste Piping

1.02 REFERENCES

A. ASTM:
   1. C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
   2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005
   3. E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2000

B. NFPA:
   1. 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006

C. UL:
   1. 723 - Standard for Test for Surface Burning Characteristics of Building Materials, 2003

1.03 SUBMITTALS

A. Submit Product Data which includes the following for each item furnished:
   1. Manufacturer and model.
   2. Component materials.
   3. Dimensions.

B. Seal Installation Through Fire-rated Wall, Roof, or Floor:
   1. Provide Engineer and Code Official with 2 copies each of proposed firestop system for each pipe penetration.
   2. System information shall include:
      a. UL system numbers.
      b. F and T ratings.
      c. Detailed drawing.
      d. Manufacturer name.
      e. Installation procedure.
      f. List of components.

PART 2 PRODUCTS

2.01 EXPANSION JOINTS

A. EPDM or Teflon single-filled arch spool type.

B. Full face steel flanges.

C. Temperature Range: 40 to 100 degrees F.

D. Design for UV exposure.

E. Maximum Working Pressure: 125 psi.

F. Furnish tie rods, limiter sleeves, and retaining brackets where indicated on Drawings.

G. Acceptable Manufacturers:
   1. Proco Products, Inc.
   2. Red Valve Co., Inc.
   3. Approved equals.

2.02 PRESSURE GAGES AND COCKS

A. Pressure Gage:
   1. Size: 4-1/2 inch dial.
   2. Range: 0-160 psi, unless shown on Drawings.
   3. Graduation: 2 psi.
   4. Accuracy: 1/2 percent.
   5. Movement: Heavy-duty stainless steel.
   6. Case: Fiberglass Reinforced Polypropylene.
   7. Mounting: Direct (stem).
   8. Connection: 1/4-inch NPT, bottom.
   9. Glycerin - filled.
   10. Manufacturer: Weksler AY04 or approved equal.

B. Isolation Cock:
   1. Ball valve.
   2. Suitable to 200 psi.
   3. 1/4-inch NPT male and female connections.

2.03 PIPE COUPLINGS

A. Sleeve type.

B. Furnish to match pipe being coupled.
   1. Size.
   2. Material.
   3. Pressure.
   4. Service of pipe.

C. Acceptable Manufacturers/Models:
   1. Dresser, Style 38.
   2. Smith Blair, Type 411.
   3. Approved equal.

2.04 FLANGED ADAPTERS

A. Furnish to match the pipe being connected:
   1. Size.
   2. Material.
   3. Pressure.
   4. Service of pipe.

B. Acceptable Manufacturers/Models:
   1. EBBA Iron Series 2100 Megaflange.
   2. Dresser, Style 127.
   3. Smith Blair, Type 911.
   4. Approved equal.

2.05 PIPE SLEEVES

A. Material: Steel Pipe.
   1. Furnish zinc-coated steel pipe in the following installations:
      a. Masonry walls and floor.
      b. Fire-rated gypboard partitions.
      c. Masonry or steel deck roofs.
   2. Furnish zinc-coated sheet steel in the following installation:
      a. Non fire-rated gypboard partitions.

B. Size:
   1. Minimum: 2 nominal pipe sizes larger than respective pipe.

C. Acceptable Manufacturers/Models:
   1. American Cast Iron Pipe, Model A-01770.
   2. Approved equal.

2.06 SEALS

A. Furnish positive hydrostatic pipe link seal.
   1. Sealing Element: Synthetic rubber material expanded by tightening of zinc galvanized plate carbon bolts.

B. Acceptable Manufacturers:
   1. Thunderline Corp.
   2. Approved equal.

2.07 WALL PIPES

A. Material: Ductile iron.

B. Size and End Connections: Match adjacent pipe.

C. Furnish with welded or integrally-cast waterstop collar.

D. Acceptable Manufacturers:
   1. Clow Pipe.
   2. American Cast Iron Pipe.
   3. Approved equal.

2.08 FLOATING SUCTION STRAINERS AND HOSES

A. Contractor shall furnish and install a floating suction strainer in each backwash reclaim tank.
   1. Dimensions of tank are shown in contract drawings.

B. Approved Manufacturer:
   1. Megator Corporation Dolphin Floating Suction Strainer.
   2. Pureflow Filtration Division Floating Decanter System.

C. Provide two 4-inch suction strainer with a minimum capacity of 300 gallons per minute for installation in the rehabilitated lagoon.

D. Materials and construction:
   1. Stainless steel construction.
   2. Floating chamber of polyurethane foam.
   3. Freely turning tube to prevent hose from twisting.
   4. Eye for providing mooring or for attaching weight.
   5. Anti-vortex plates.

E. Non-floating hose:
   1. Approved Manufacturer: Dayco U-10 non-floating hose or Engineer approved equal.
   2. Floating suction strainer manufacturer shall provide 20-feet of hose.
   3. Cut hose to fit during installation.
   4. Hose shall connect to 4-inch DIP flange.

F. Contractor shall fabricate a cable system to keep floating suction from drifting and to allow vertical movement of flexible hose.

2.09 SPRAY NOZZLES

A. Approved Manufacturers:
   1. Spraying Systems Company, Wheaton Illinois.
   2. Or Engineer approved equal.

B. Materials and Construction.

C. Uni-Let Model 1/4 TT4060 brass nozzles:
   1. Qty: As called for in the Drawings.

D. Uni-Let Model 1/4 TT1560 brass nozzles:
   1. Qty: As called for in the Drawings.

E. Provide the following nozzles assembly for each nozzle listed above:
   1. Nozzle body.
   2. Spray tip.
   3. Tip retainer.
   4. No. 5540 swivel assembly.

F. In general, installation of the spray wash nozzles is as described:
   1. The head end of the tanks, are the shallow ends and the hopper end is the deep end of the tanks.
   2. Along the head ends of the tanks, four (4) 1560 type nozzles are to be installed in the center of the tanks along the springline (equator) of the spray wash pipe.
   3. Four (4) 1560 type are to be installed on the bottom of the head end pipe, two near the pipe center pointing in toward the center of the head end of the tank, and two installed near the corner 90's oriented in the same manner.
   4. Along the long sides of the tanks, 1560 type nozzles are to be installed along the bottom of the spray wash pipes at 6 feet - 0 inch spacing starting 6 inches away from the head end 90's.
   5. Along the spring-lines of the long side pipes, 4060 type nozzles are to be installed where spacing is greater than 6 inches on center.
   6. Use 1560 type nozzles at the head of the tanks where nozzles are spaced at 6 inches on center.
   7. The spring-line nozzle spacing notes are identified per one side of the tank and apply equally to all long sides.

2.10 STATIC MIXER

A. Furnish and install two (2) static mixers for blending chemical with the water.
   1. Number of units: 2.
   2. Location: See sheet GP 002 and 01-P101 Keynote 9 and 32.
      a. One (1) in the raw water pipe.
      b. One (1) in the filtered water pipe.
   3. Pipeline Diameter: 12-inch.

4. Flow Rate: 2,300 gpm.
5. Chemical Feed Taps on each mixer:
   a. Qty: 3.
   b. Sizes on raw water:
      1) one (1) 1.5-inch for chlorine feed.
      2) one (1) 0.75-inch spare.
      3) one (1) 0.75-inch spare.
   c. Sizes on finished water:
      1) one (1) 0.75-inch for fluoride feed.
      2) one (1) 0.75-inch spare.
      3) one (1) 0.75-inch spare.
6. Elements: One set of six (6) vane style elements designed to suit the mixer with a length to diameter ratio of 1D (Element length = 1 nominal mixer diameter).
7. Maximum Pressure Drop: 0.4 psi.
8. Overall Length of Unit: 12-inch.
9. Construction: 316SS.
10. Manufacturer
    a. Statiflo DSM Series (1D Version).
    b. Or equal pre-approved by Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
   1. Install all items in accordance with manufacturer's recommendations.
   2. Install items only where indicated on the Drawings.
   3. Installation at other location only with prior approved by the Engineer.

B. Pipe Sleeves:
   1. Sleeve each pipe individually.
   2. Floor Installation: Extend sleeve 2 inches above finished floor.
   3. Roof Installation:
      a. Extend sleeve from 4 inches below to 12 inches above roof deck.
      b. Furnish with welded attachment brackets.
      c. Furnish with weather skirt for each sleeve.
   4. Provide continuously welded waterstop collar on sleeves set in masonry or concrete.

C. Seals:
   1. Installation through fire-rated wall, floor, or roof.
   2. Seal annular space between piping and sleeve with approved brand fire barrier caulk or putty.

END OF SECTION

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SECTION 40 92 13

CONTROL PANELS AND SCADA SYSTEM COMPONENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control Panels

B. Local Control Stations

C. Installation, Identification, Testing and Commissioning, and Training.

1.02 RELATED SECTIONS

A. Section 40 23 20 - Process Piping Valves

B. Section 40 90 00 - Control System Functional Descriptions

C. Section 40 90 05 - Commissioning

D. Section 40 91 19 - Instrumentation

E. Section 40 92 40 - Process Valve Actuators

1.03 REFERENCES

A. National Fire Protection Association (NFPA), latest adopted version.

B. National Electrical Manufactures Association (NEMA)
   1. NEMA ICS-2 Industrial Control Devices, Controllers, and Assemblies.
   2. NEMA 250 Enclosures for Electrical Equipment.

C. Underwriters Laboratories (UL)
   1. UL 508 Industrial Control Equipment.
   2. UL 698A Industrial Control panels for Hazardous Locations.
   3. UL 913 Intrinsically safe Apparatus and associated apparatus for use in Class I, II and III, Division 1, Hazardous Locations.

1.04 SCOPE

A. Furnish and install a new control system for the Deep Well #19 facility as described herein. This shall include but not be limited to:
   1. New Main Control Panel SCP-19 at the well facility.
      a. Controls Systems Integrator shall design and provide all aspects of the PLC control panel as specified herein, except that the City of Madison will provide the Hope Industrial Computer/OIT, The Dell Optiplex computer to the Controls Systems Integrator for installation and integration with the PLC control panel.
   2. New Remote Control Panel RCP-19 at the well facility.
      a. Controls Systems Integrator shall design and provide all aspects of the control panel as specified herein, except that the City of Madison will provide the Hope Industrial Computer/OIT and the Dell Optiplex computer to the Controls Systems Integrator for installation and integration with the PLC control panel.
   3. Motor Control Center as specified in Section 26 24 19.

B. Software Licenses and Programming
   1. The City of Madison will provide all PLC, computer, OIT, HMI software licenses and programming as part of this project. Programming will follow the functional descriptions outlined in Section 40 90 00.
   2. Controls System Integrator shall closely coordinate with the City's programmer to make sure that the PLC control panel design coordinates with the programming and operating requirements.

C. It is the intent of the Contract Documents that all equipment specified in this Section of the specifications be supplied by a single-source supplier ("Systems Integrator"). The supplier shall assume full responsibility along with the Contractor for furnishing, installing and start-up procedures so as to make the system operate per the intent of the Contract Documents.

D. The work specified in this Section includes furnishing, installing, start-up, testing, and adjusting of all required equipment, including instruments, equipment, hardware, software, wiring, accessory equipment, and training to provide a completely operational process instrumentation and control system.

E. It shall be the responsibility of the Contractor to furnish a complete and fully operating system. The Contractor shall be responsible for all details which may be necessary to properly install, adjust and place in operation the complete installation. The contractor shall assume full responsibility for additional costs which may result from unauthorized deviations from the Contract Documents.

F. It shall be the responsibility of the Contractor and supplier to examine all new and existing equipment that is transmitting a signal to, or receiving a signal from, equipment specified in this Section. The Contractor shall be responsible for providing signal converters, buffer amplifiers, and isolation devices to make signal levels, reference to ground, etc. compatible between devices specified in this Section and existing equipment or equipment specified in other Sections.

G. It is the intent of the Contract Documents that a complete plant control system be provided and installed to include but not limited to PLCs, programming, instruments, controls, and ancillary devices for a complete and operational system.

H. The labor specified herein includes but is not limited to engineering software development, panel fabrication, equipment calibration and adjustment, testing, training, and documentation.

I. This section includes coordination with the work of other sections and requires identification of exact interface requirements with motor and control devices provided under other portions of this specification. It shall be the responsibility of the Systems Integrator specified under this section to execute this coordination during the shop drawing submittal phase of the work.

J. This section includes coordination with electrical contractor to ensure that the proper number and type of conductors are installed. It shall be the responsibility of the Systems Integrator to coordinate this work with the installing electrician.

1.05 SUBMITTALS

A. Technical data in conformance with Division 1 and including:
   1. All equipment and components indicated on the Drawings and specified in Part 2 of this Section.
   2. Software packages including complete description of features and capabilities.

B. Shop Drawings in conformance with Division 1 and including:
   1. Panel Drawings including system schematic drawings, terminal numbering, wire numbering, component schematic drawings, dimension drawings, layout drawings and nameplate schedule.
      a. Panel exterior general arrangement drawings showing location of surface and flushed mounted equipment.
      b. Panel interior arrangement drawings including:
         1) Locations and identification of terminal blocks.
         2) Locations and identification of racks/chassis and equipment mounted within.

3) Arrangement of other equipment mounted inside panel identified by instrument tag number.

c. Exterior panel wiring interface termination diagrams.

2. Provide complete new drawings for all existing panels that are modified under this Contract. Re-draw existing circuitry based on record drawings furnished by Owner. Drawings shall include all existing components and circuitry, and shall include all proposed components and circuitry.
3. Overall system diagram showing all components, converters, cables, and connectors.
4. Proposed computer and operator interface unit graphic displays. Submit "rough" or hand-drawn copies prior to programming.
5. Proposed report formats written specific to the project.

C. Operational and Maintenance data in conformance with Division 1 and including:
1. Panel equipment, field devices and instruments, including "as-build" system schematics.
2. Removeable media containing final PLC program, final operator interface application files and final distributed control software application fillies.
3. Removeable media containing final system record drawings, wiring diagrams and panel details. The drawings files shall be in AutoCAD format (.DWG files).
4. Complete software documentation including programming information and operator's guides. Include hard copies of all operator interface unit and computer graphic screens.

D. Start-up report from system supplier per requirements of Division 1.

E. Spare Equipment Lists- Provide a list of recommended spare parts and equipment that is considered spare parts and equipment that is considered crucial to the operation of the system.

F. All submittals shall be bound in 3-ring binders with labeled tabs separating sections.

1.06 TESTING AGENCY CERTIFICATION

A. All new panels and subpanels furnished under this Section shall be constructed in accordance with Underwriter's Laboratories (UL) Standard 508 - "Industrial Control Equipment", and applicable portions of UL Standards 698A - "Industrial Control Panels for Hazardous Locations" and UL Standard 913 - "Intrinsically-Safe Apparatus and Associated Apparatus for use in Class I, II and III, Division 1, Hazardous Locations".

1.07 QUALITY ASSURANCE

A. All materials, equipment, and parts shall be new and unused of current manufacture.

B. System Integrator shall be responsible for providing all necessary accessories required for a complete and operational system.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

D. Products: Listed and classified by UL or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicted.

1.08 SOFTWARE - GENERAL

A. Any software purchased shall be licensed directly to the Owner who will maintain final ownership and control. Provide proof of licensing to the Owner and any passwords or codes to the Owner. Include this information with the O&M Submittals. Note that the Owner will provide the licenses for the PLC program, the HMI program, and the Dell Optiplex and Hope Industrial computer software.

1.09 FUNCTIONAL DESCRIPTIONS

A. See Section 40 90 00.

PART 2 PRODUCTS

2.01 INTEGRATOR

A. Systems integrator shall be one of the following:
   1. L.W. Allen, Madison, WI, Mark Kane, (608) 222-8622.
   2. Integrated Process Solutions, Inc., Waunakee, WI, Eric Fisher, 608-849-4375
   3. No substitutions.

2.02 SCP-19 CONTROL PANEL FABRICATION – GENERAL

A. Enclosures for indoor control panels shall meet the following minimum requirements:
   1. NEMA 12 unless otherwise specified.
   2. Fabricate control panel of 12-gage carbon steel plate with all-welded construction throughout. Welds shall be ground smooth, corners shall be rounded, and weld spatter cleaned. Corner construction shall be minimum of 1/8 inch inside radius.
   3. 90 inches high, 20 inches deep, multiples of 36 inches wide, unless shown otherwise.
   4. Surface of control panel shall be free from mars and defects. Finished panel surfaces shall be flat within 1/16 inch in 6'-0" and be smooth with rounded edges. Finished panel surfaces shall be 3/16-inch (5 mm) thick. Instrument cutouts and drilling shall be straight and true.
   5. Provide 10-gage full height access doors. Access doors shall have triple-point latch, stainless steel handle and lock, full-length stainless steel "piano" type hinge, and sponge rubber gaskets. Door shall be supplied with devices to hold door in 105° position when fully opened.
   6. Provide, full-width, full height, real rectangular subpanel for surface mounting of programmable controller, other surface-mounted instruments, wiring troughs, and terminals strips.
   7. Provide full-length, side-mounted subpanels for installation of terminal strips.
   8. Base of control panel shall be adequately reinforced to permit anchoring to concrete pad.
   9. Supply 4 identical master keys which will operate all locks of control panel.
   10. All inside and exterior surfaces treated to prevent oxidation and painted. White on interior, manufacturer's standard color on exterior.
   11. Devices mounted on control panel door.
      a. Hope industrial touchpanel.
      b. PLC SCAN FAIL red pilot light.
      c. Chlorine room horn silence Pushbutton.
      d. RJ-45 jack.
      e. Programming power outlet.
      f. Reservoir Control Selector Switch (REMOTE-OFF(RESET)/BACKUP FLOATS)
         1) This needs to be clarified through control loops.

B. 12-inch by 12-inch by 1-inch pocket for drawing storage on inside face of panel or inside exterior door.

C. Provide each panel/enclosure with industrial corrosion inhibitor emitters of sufficient size and quantity to protect contents of enclosure size selected. Emitters shall contain additional red metal inhibitors to protect brass and copper material in addition to ferrous metals. Hoffman A-HC110E or equal.

D. All components labeled per shop drawings.
   1. Engraved labels attached with screws.

E. All wiring terminated on barrier-type terminal strips. Terminal strips shall be labeled with engraved plastic labels.
   1. Labels shall be attached with two-part epoxy adhesive.
   2. 600-volt terminal strips.
   3. Ring or spade type clamp connectors.
   4. Wiring laced using plastic ties and plastic wiring troughs.
   5. Wiring held down with straps attached to enclosure with screws.
   6. Separate power, control and signal conductors.
   7. Power wiring: #14 AWG, stranded, 600V copper minimum.
   8. Control wiring: #18 AWG, stranded, 600V copper minimum.
   9. Signal wiring: shielded, 300V copper minimum. See Division 26.

10. Provide 15-amp, 10,000 AIC breaker on power circuits using #14 wire.
11. Connections to instruments via terminal strip or connectors. Soldering wired to terminal strips in not acceptable.

F. Tag all wires at each end with wire number matching shop drawings.

G. Programmable Logic Controller (PLC)
1. Programmable logic controller capable of performing relay logic, timing, counting, sequencing, mathematical, proportional-integral-derivative (PID) control, and other functions as required by the functional descriptions in this section. Provide complete unit with rack, power supply, modules, cables, and connectors.
2. Auto start-up after power failure. Retain program and setpoints so that system starts automatically when power is restored.
3. Provide live digital and analog inputs/outputs as indicted on Drawings, plus live spares and extra slots as specified in Part 1 of this Section. Minimum total inputs/outputs capability shall be 480 points per PLC.
4. Provide 20 percent additional I/O point for each type of I/O (DI, DO, AI, AO). Spare I/O shall be wired to terminal block inside panel.
5. I/O Requirements
   a. Digital inputs
      1) Optically isolated input rated to withstand up to 1500 VAC transients.
      2) Voltage as indicated, ±10 percent.
      3) Maximum of sixteen (16) inputs points per common neutral.
      4) LED indicator.
   b. Digital outputs
      1) Voltage as indicated.
      2) Capable of continuously driving up to 0.5-amp load.
      3) LED indictor.
   c. Analog inputs
      1) Field selectable 4-20mAdc or 1-5 VDC input on each channel.
      2) Input isolation rated 500 volts minimum.
      3) 16-bit analog-to-digital conversion having overall accuracy of ±0.75 percent of full scale or better.
      4) 250-ohm input impedance (on 4-20 mA input).
      5) 1 Megohm input impedance (on 1-5 VDC input).
   d. Analog outputs
      1) 0 to 20mAdc range. Nominal span of 4-20mAdc.
      2) Digital-to-analog conversion having overall accuracy of ±0.75 percent of full scale or better.
      3) Capable of driving up to 750ohm load.
6. Programmable in ladder logic using IBM-compatible computer as described in the functional description in this Section. Provide programming software that is standard product of the PLC manufacture. Software shall allow on-line program editing without interrupting PLC operation. Software shall have an advanced instruction set including timing, sequencing, relay logic, close-loop PID control, mathematical, trigonometric, Boolean, floating-point and integer calculations, and time and event-based interrupts.
7. PLCs shall have Ethernet ports and RD-232 serial ports to allow communications between systems components, all as described in the functional descriptions in this Section. Provide all required interface modules and converters.
8. Environmental
   a. Operating temperature - 0° to 50°C.
   b. Humidity – 0 to 95 percent (non-condensing).
   c. Noise immunity – comply with NEMA ICS-2-230.
9. Manufacturer
   a. Allen-Bradley "CompactLogix" Model 5069-L320ER processor with associated I/O cards, including options specified, and manufacturer's programming software.
   b. No Substitutions.

H. Operator Interface Terminal
   1. Hope Industrial Touchpanel Computer will be provided by the City for installation on the control panel door. Integrator to show on all design drawings and install and wire.

I. Industrial Computer
   1. Dell Optiplex industrial computer will be provided by the City for installation inside the control panel. Integrator to show on all design drawings and install and wire.

J. Industrial Ethernet Switch
   1. All Ethernet communications from the PLC Control Panel shall be routed to the wall-mount data rack. This includes the PLC, Dell Optiplex, Hope Industrial Computer.

K. Surge protection
   1. 120VAC, 15 Amp rated in-line device. Listed for protection from ANSI/IEEE CG62.41 Category A and B Transients.
   2. 300 V peak Clamping voltage.

L. Terminals
   1. NEMA - style, barrier type, 0.4-inch spacing, nominal.
   2. 600V RMS, 55-amp rating.
   3. UL listed.
   4. Allen-Bradley 1492-CA1 series, or equal.
   5. Terminals for larger power circuits shall be 600 VAC barrier-type, sized for the conductors.

M. Surge suppressor terminal blocks.
   1. Provide surge suppressor terminal blocks for analog and discrete signals that leave building structure:
      a. Analog signal blocks: Voltage rating 24-volt ac/dc; Phoenix Contact TT-SLKK5-S-24DC, Allen Bradley 1492-HM2K024 Series, or equal.
      b. Discrete signal blocks: Voltage rating 120-volt ac/dc; Phoenix Contact TT-SLKK5/110AC, Allen Bradley 1492-HM2K120 Series, or equal.

N. Direct current power supply
   1. Series pass semiconductor type, adjustable with ±1.0 percent regulation, no load to full load from all causes, total.
   2. Operating source: 120 VAC, 69 Hz.
   3. Output protection: current limiting and "crowbar" circuit. Fused not permitted.
   4. At initial operation power supply loading shall not exceed 50 percent of rating under any condition.
   5. Convection cooled.
   6. All power supplies on the project shall be identical.

O. Uninterruptible Power Supply (UPS) – in control panels
   1. 120 VAC, 60 Hz single-phase input and output.
   2. Size at 150 percent of connected panel load or 700 VA capacity (continuous), whichever is larger, with 5-minute battery reserve time (at full-load).
   3. Continuous on-line, double-conversion type that continuous rectifies, stores, recreates the 120 VAC sinusoidal output waveform for the load. Include features that allow operation in critical environments and high-harmonic and/or noisy applications. Include adjustable input voltage parameters so that the input stage will accept low-quality input power.
   4. Eaton Powerware Series Model 9130 or approved equal.

P. Circuit Breakers:
   1. Circuit breakers will be UL labeled and shall be of the size shown. Provide breakers with an interrupting rating of not less than 22,000 amperes, symmetrical.
   2. Circuit breakers that are downstream of a main breaker or control panel step-down transformer may have 10,000 amperes interrupting rating.

Q. Control Switches
   1. Electronic Circuits
      a. Selector, momentary pushbutton or momentary selector as required. Positions as required for application.
      b. Heavy duty, oil-tight, contacts as required.
      c. Gold flashed contacts; initial resistance, 0.01 ohms; 0.5 amps at 120 VAC, resistive.
   2. Control Circuits
      a. Selector, momentary pushbutton, or momentary selector as required. Positions as required for application.
      b. Heavy duty, oil-tight, contacts as required.
      c. Contact rating shall conform to NEMA A-600.
   3. Pushbutton Color
      a. Red: Stop.
      b. Green: Run.
      c. White: Power on.

R. Control Relays and Timing Relays
   1. Plug-in type with dust cover, socket and locking spring when relay mounted horizontally.
   2. Coil: continuous operation at 120 VAC ±10 percent unless shown otherwise.
   3. Contacts, 3 pole, double throw, minimum.
      a. 10 amps, make-break, 120 VAC, resistive.
      b. Insulation resistance: 1000 megohms at 500 VDC.
      c. Dielectric: 2000 VAC, 60 Hz.
   4. Operating time
      a. 35 milliseconds (nominal) energization.
      b. 100 milliseconds (nominal) de-energization.
   5. Mechanical life: 106 operations.
   6. Temperature: 0 to 70 degrees C.
   7. Timing relays shall be of the same manufacturer and series as control relays. Provide electronic timers with range as indicated.

S. Indicating Lights.
   1. Sunlight visible, 30.5mm, high visibility LED.
   2. "Push-to-Test" type.
   3. Heavy-duty, oil-tight.
   4. NEMA 4 rating.
   5. Allen Bradley 800T, or equal.
   6. Colors.
      a. Required: Amber.
      b. Running: Green.
      c. Off: Red.
      d. Power on: White.
      e. Alarm: Red.

T. Other devices as necessary for a complete control panel installation.

U. Corrosion inhibitors: Hoffman A-HC110E or equal.

2.03 RCP-19 CONTROL PANEL FABRICATION - GENERAL

A. Enclosures for indoor control panels shall meet the following minimum requirements:
   1. NEMA 12 unless otherwise specified.
   2. Fabricate control panel of 12-gage carbon steel plate with all-welded construction throughout. Welds shall be ground smooth, corners shall be rounded, and weld spatter cleaned. Corner construction shall be minimum of 1/8 inch inside radius.
   3. Wall-mount 36 inches high, 18 inches deep, 36 inches wide, as minimum size. Provide larger size if required to meet panel layout requirements.

4. Surface of control panel shall be free from mars and defects. Finished panel surfaces shall be flat within 1/16 inch in 6'-0" and be smooth with rounded edges. Finished panel surfaces shall be 3/16-inch (5 mm) thick. Instrument cutouts and drilling shall be straight and true.
5. Provide 10-gage full height access doors. Access doors shall have triple-point latch, stainless steel handle and lock, full-length stainless steel "piano" type hinge, and sponge rubber gaskets. Door shall be supplied with devices to hold door in 105° position when fully opened.
6. Provide, full-width, full height, real rectangular subpanel for surface mounting of controllers, other surface-mounted instruments, wiring troughs, and terminals strips.
7. Provide full-length, side-mounted subpanels for installation of terminal strips.
8. Base of control panel shall be adequately reinforced to permit anchoring to concrete pad.
9. Wall-mount anchors.
10. All inside and exterior surfaces treated to prevent oxidation and painted. White on interior, manufacturer's standard color on exterior.
11. Devices mounted on control panel door.
    a. Hope industrial touchpanel.
    b. RJ-45 jack.

B. 12-inch by 12-inch by 1-inch pocket for drawing storage on inside face of panel or inside exterior door.

C. Provide each panel/enclosure with industrial corrosion inhibitor emitters of sufficient size and quantity to protect contents of enclosure size selected. Emitters shall contain additional red metal inhibitors to protect brass and copper material in addition to ferrous metals. Hoffman A-HC110E or equal.

D. All components labeled per shop drawings.
1. Engraved labels attached with screws.

E. All wiring terminated on barrier-type terminal strips. Terminal strips shall be labeled with engraved plastic labels.
1. Labels shall be attached with two-part epoxy adhesive.
2. 600-volt terminal strips.
3. Ring or spade type clamp connectors.
4. Wiring laced using plastic ties and plastic wiring troughs.
5. Wiring held down with straps attached to enclosure with screws.
6. Separate power, control and signal conductors.
7. Power wiring: #14 AWG, stranded, 600V copper minimum.
8. Control wiring: #18 AWG, stranded, 600V copper minimum.
9. Signal wiring: shielded, 300V copper minimum. See Division 26.
10. Provide 15-amp, 10,000 AIC breaker on power circuits using #14 wire.
11. Connections to instruments via terminal strip or connectors. Soldering wired to terminal strips in not acceptable.

F. Tag all wires at each end with wire number matching shop drawings.

G. Operator Interface Terminal
1. Hope Industrial Touchpanel Computer will be provided by the City for installation on the control panel door. Integrator to show on all design drawings and install and wire.

H. Industrial Computer
1. Dell Optiplex industrial computer will be provided by the City for installation inside the control panel. Integrator to show on all design drawings and install and wire.

I. Industrial Ethernet Switch
1. All Ethernet communications from the PLC Control Panel shall be routed to the wall-mount data rack. This includes the Dell Optiplex, Hope Industrial Computer.

J. Surge protection
1. 120VAC, 15 Amp rated in-line device. Listed for protection from ANSI/IEEE CG62.41 Category A and B Transients.
2. 300 V peak Clamping voltage.

K. Terminals
   1. NEMA – style, barrier type, 0.4-inch spacing, nominal.
   2. 600V RMS, 55-amp rating.
   3. UL listed.
   4. Allen-Bradley 1492-CA1 series, or equal.
   5. Terminals for larger power circuits shall be 600 VAC barrier-type, sized for the conductors.

L. Surge suppressor terminal blocks.
   1. Provide surge suppressor terminal blocks for analog and discrete signals that leave building structure:
      a. Analog signal blocks: Voltage rating 24-volt ac/dc; Phoenix Contact TT-SLKK5-S-24DC, Allen Bradley 1492-HM2K024 Series, or equal.
      b. Discrete signal blocks: Voltage rating 120-volt ac/dc; Phoenix Contact TT-SLKK5/110AC, Allen Bradley 1492-HM2K120 Series, or equal.

M. Uninterruptible Power Supply (UPS) – in control panels
   1. 120 VAC, 60 Hz single-phase input and output.
   2. Size at 150 percent of connected panel load or 500 VA capacity (continuous), whichever is larger, with 5-minute battery reserve time (at full-load).
   3. Continuous on-line, double-conversion type that continuous rectifies, stores, recreates the 120 VAC sinusoidal output waveform for the load. Include features that allow operation in critical environments and high-harmonic and/or noisy applications. Include adjustable input voltage parameters so that the input stage will accept low-quality input power.
   4. APC SmartUPS, or approved equal.

N. Circuit Breakers:
   1. Circuit breakers will be UL labeled and shall be of the size shown. Provide breakers with an interrupting rating of not less than 22,000 amperes, symmetrical.
   2. Circuit breakers that are downstream of a main breaker or control panel step-down transformer may have 10,000 amperes interrupting rating.

O. Other devices as necessary for a complete control panel installation.

P. Corrosion inhibitors: Hoffman A-HC110E or equal.

2.04 LOCAL CONTROL STATIONS (SHOWN AS "LCS" ON DRAWINGS)

A. Provide local control stations to house selector switches, pushbuttons, and pilot lights at the equipment location to meet the configurations shown on the drawings.
   1. Outdoor control stations shall be NEMA 4X, 316 stainless steel construction. Allen-Bradley 800T or equivalent.
   2. Indoor control stations shall be NEMA 4X, Gray thermoplastic polyester blend. Allen-Bradley 800H or equivalent.
   3. Local control station pilot devices shall be per the requirements of the drawings. If no requirements are shown, provide a three-position selector switch (Hand-Off-Auto), a red alarm pilot light, and a green running pilot light.

2.05 TERMINATION ENCLOSURES

A. Enclosures shall meet the following minimum requirements:
   1. NEMA 4X, Type 316 stainless steel.
   2. Removable steel inner panel, painted white.
   3. Minimum 24 inches high, 8 inches deep, 16 inches wide. Actual size shall be by the Systems Integrator.
   4. Panels shall be flanged, corners welded ground smooth.
   5. Stainless steel continuous hinge.
   6. Clamp type with padlocking.
   7. Manufacture by Hoffman, or equal.

B. All wiring terminated on barrier-type terminal strips. Terminal strips shall be labeled with engraved plastic labels.
   1. Labels shall be attached with two-part epoxy adhesive.
   2. 600-volt terminal strips.
   3. Ring or spade type clamp connectors.
   4. Wiring laced using plastic ties and plastic wiring troughs.
   5. Wiring held down with straps attached to enclosure with screws.

PART 3 EXECUTION

3.01 LABELING

A. Label all field mounted control devices, instrumentation, switches, etc., with tag number and item description.

B. Labels shall be engraved laminated plastic with ¼" high lettering. Labels shall be attached with stainless steel screws to the device or nearby wall.

3.02 CALIBRATION, ADJUSTING AND TESTING

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

B. GENERAL
   1. Contractor and Systems Integrator to work together to complete the testing specified herein.
   2. Track results of all testing on an Owner-approved project specific status sign off form or similar document.
   3. Required tests are as follows:
      a. Factory Testing:
         1) Unwitnessed Factory Test (UFT).
         2) Witnessed Factory Test (WFT).
      b. Field Testing:
         1) Operational Readiness Test (ORT).
         2) Functional Demonstration Test (FDT).
         3) Network Outage Test (NOT).
         4) Power Outage Test (POT).
         5) Site Acceptance Test (SAT).
   4. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provide all special testing materials and equipment required for a suitable means of simulation.
   5. Coordinate all required testing with Contractor, affected Subcontractors, Engineer, and Owner.
   6. Do not ship equipment to the project location until Engineer and Owner has received all Factory Testing results and approved the system as ready for shipment.
   7. Engineer and Owner reserve the right to test or re-test any functions.
   8. Correction of Deficiencies:
      a. Correct deficiencies in workmanship and/or items not meeting specified testing requirements to meet specification requirements at no additional cost to Owner.
      b. Repeat testing after correction of deficiencies is made until specified requirements are met, and at no additional cost to Owner.

C. FACTORY TESTING – UNWITNESSED FACTORY TEST (UFT)
   1. Purpose: to check system prior to Engineer/Owner attending factory testing.
   2. Temporary network connections will be required to confirm the network configuration. Temporary wiring of primary elements, final control elements, and field-mounted transmitters is not required.
   3. Include all control system devices shown on System Architecture drawings in the UFT, except for equipment-vendor provided equipment.

4. Include the following in the tests to be performed. Address each of these tests in Test Procedure submittal.
   a. Thoroughly inspect panels and enclosures being provided to verify integrity of cabinet enclosures, frame structures, paint work and finish, etc. Review panel drawings to ensure they accurately reflect panel layout and wiring.
   b. Perform a system audit to verify all components have been staged for test and have been documented properly with correct model numbers, serial numbers, etc. Provide the following documentation of audit at factory test and submit as part of O&M Manual Documentation:
      1) For each microprocessor-based component connected to control communication backbone in system (PLCs, managed switches, protocol converters, communication cards on final field devices, radios, etc.), list firmware revision, vendor and local distributor information, and system, warranty information, configuration parameters (e.g., communication settings, fail position settings, etc.)
      2) Ensure all equipment running firmware (processors, controllers, switches, routers, modems) are updated with the current firmware at the time of testing.
   c. Perform pull tests on panel wiring to ensure all wiring is terminated with appropriate torque to prevent wires from coming loose.
   d. Test UPS to verify UPS switches power correctly while keeping all UPS powered loads online. Testing of UPS to determine if they have been sized correctly to maintain specified run time shall be performed during field testing.
   e. Load program into PLC, set PLC to RUN mode; cycle power to the PLC and confirm the PLC follows the proper procedure for safe shutdown and then returns to the RUN mode.
   f. If the panel contains an OIT, load the program into the OIT, then cycle the power to confirm the OIT returns in a ready state.
   g. Physically remove network cable from PLC, wait 20-30 seconds, then reconnect network cable to PLC; confirm PLC reconnects to network and returns to proper operation.
   h. Physically remove network cable from OIT, wait 20-30 seconds, then reconnect network cable to OIT; confirm OIT reconnects to network and returns to proper operation.
   i. Perform 100 percent I/O point checkout to verify proper operation of input/output points from panel terminations to HMI nodes. At a minimum, I/O checkout consists of four steps.
      1) Jumper discrete input signals at field terminal blocks in control panels to verify proper status in HMI nodes.
      2) Connect analog input signals to a signal generator at field terminal blocks in control panels to verify proper status in HMI nodes. Verify signals at zero percent, 50 percent, and 100 percent of full scale.
      3) Test discrete output signals by switching equipment to manual control at HMI nodes and turning the output on or other means to turn the output on. Verify command from PLC has properly executed contact by connecting a digital multimeter to measure continuity at terminations.
      4) Test analog output signals by switching the equipment to manual control at HMI nodes and turning output on or other means to turn the output on. Verify output by utilizing a digital multimeter to measure current or voltage generated at termination points. Verify signals at zero percent, 50 percent and 100 percent of full scale.
   j. Verify control strategies using simulation or other means to verify logic performs as expected. Verify faults and logical failure conditions for control strategies, such as instrument failures, equipment failures, out of range testing (over and under scale) for analog inputs, and all other strategies specified in control strategy document.
   k. Inspect hardware enclosures for the following: cabinet enclosures, frame structure, paint work and finish, dimensions, and hardware operability (i.e., fans, door hinges, keylocks, etc.).
   l. Inspect enclosure subpanels for the following: I/O subsystem physical layout, power supply sizing and mounting, cable routing, wire runs across hinges properly installed, fans and blowers unobstructed and mounted to maximize air flow, power conditioning correctly installed, and overall layout and installation of components meets manufacturer's recommendations and standard industry accepted practices.
   m. Inspect other control panel circuitry not covered in tests above.
5. Upon successful completion of UFT. Notify Engineer and Owner in writing that system is ready for WFT. No other notice of Factory test will be accepted. Engineer and/or Owner, at their discretion, can schedule a test date within 15 days of receipt of this submittal.

D. FACTORY TESTING – WITNESSED FACTORY TEST (WFT)
   1. Purpose: to allow Engineer and/or Owner representatives to witness functionality, performance, and stability of entire hardware and software system as a complete integrated system, located at panel fabrication facility.
   2. Required Documents for Test:
      a. Clean set of Owner-approved panel drawings and wiring diagrams.
      b. Set of Contract Documents - all drawings and specifications.
      c. All design-change related documentation.
      d. Master copy of the Owner-approved factory testing signoff forms.
      e. Testing procedures.
   3. Operate system continuously throughout WFT without failure, except where initiated per established test procedures. Unanticipated failures may, at Owner or Engineer's option, result in overall WFT being deemed unsuccessful. Correct all deficiencies identified during these tests and re-test prior to completing WFT or shipment of panels to project location, as determined by Owner/Engineer.
   4. Repeat tests specified in the UFT as part of the WFT, using the following daily schedule during these tests:
      a. Morning meeting to review the day's test schedule.
      b. Scheduled tests and sign-offs.
      c. End of day meeting to review day's test results and to review or revise next day's test schedule.
      d. Unstructured testing period by witnesses.

E. FIELD TESTING – OPERATIONAL READINESS TEST
   1. Purpose: to check that process equipment, instrument installation, instrument calibration, instrument configuration, field wiring, control panels, and all other related system components are ready to monitor and control the processes. This test will determine if equipment is ready for operation.
   2. Complete ORT prior to functional demonstration test (FDT) and startup. Install and mechanically test relevant process equipment, instruments, control panels, and complete field wiring prior to starting this test.
   3. Required Documents for Test:
      a. Master copy of the Owner-approved field-testing signoff forms.
      b. Testing procedures.
      c. Calibration forms.
   4. These inspections, calibrations, and tests do not require witnessing; Engineer reserves the right to review and spot-check testing process periodically. Correct deficiencies found prior to commencement of FDT.
   5. Maintain Sign-off forms and Calibration forms at project location and make them available to Engineer/Owner as requested.
   6. Perform the following tests as part of ORT:
      a. Instrument calibration, configuration, and set-up.
      b. Communications Testing.
      c. Input/Output (I/O) Testing to HMI.
      d. Testing of control strategies.
   7. Instrument calibration, configuration, and set-up:
      a. Calibrate, configure, and set-up all components and instruments to perform specified functions.
      b. Calibration form:
         1) Maintain a calibration form in field for any component or instrument requiring dip switch settings, calibration, or custom configuration, documenting this information. These forms shall provide a summary of the actual settings used in the field to allow complete replacement of the device and reconfiguration to function as it did before.
         2) Add this information to Instrument data sheet, shall be added to a copy of manufacturer's standard "Configuration Sheet", or create a separate form.
            a) If a separate form, list Project Name, Loop Number, ISA Tag Number, I/O Module Address, Manufacturer, Model Number/Serial Number, Output Range and Calibrated Value on the form.

3) Some examples of required information are:
   a) For Discrete Devices: Actual trip points and reset points.
   b) For Instruments: Any configuration or calibration settings entered into instrument
   c) For Controllers: Mode settings (PID).
   d) For I/O Modules: Dip switch settings, module configuration (if not documented in native programming documentation).
4) Maintain a copy of these forms in field during testing and make them available for inspection at any time.
5) For any device that allows a software back-up of configuration files to a laptop, make configuration files available to Engineer/Owner for inspection.

8. Communications Testing:
   a. Purpose: to check that the cellular telemetry system has been properly configured, including all intermediary devices, and is communicating successfully from the remote location back to the main system location and vice versa.
   b. Test bi-directional communications over the cellular telemetry system. Complete the following for a successful test:
      1) Communicate one digital input, one digital output, one analog input, and one analog output from the remote location to the HMI nodes at the main system location.
      2) Enter one start/stop command and one setpoint at the HMI nodes at the main system location and verify reception by the PLC at the remote location.
9. I/O Testing:
   a. Purpose: is to check that process equipment, instrument installation, calibration, configuration, field wiring, and control panels are set-up correctly to monitor and control the processes. This test is commonly referred to as a "loop test" or an I/O checkout.
   b. Test signals under process conditions, as close as possible to end elements and utilizing them whenever possible. For example, preferred test will prove valve open/close limit switches by operating valve, not by installing a jumper on limit switch contacts. However, if equipment or process is not available to test a signal over its entire calibrated range, test using simulation methods and make a note on sign-off form.
   c. Perform the following I/O tests:
      1) Discrete Input: At device or instrument, change signal condition from inactive to active state. Observe results on all indicators within loop such as HMI screens, pilot lights, horns, beacons, etc.
      2) Analog Input: Test analog signal over entire engineering range at various intervals including 0, 50%, and 100% as well as on increasing and decreasing range. Observe results on all indicators within loop such as HMI screens, recorders, digital indicators, etc.
      3) Discrete output signals shall be tested by switching equipment to manual control at the HMI nodes and turning output on or using other means to turn output on. Then verify equipment responds accordingly.
      4) Analog output signals shall be tested by switching equipment to manual control at HMI nodes and turning output on or other means to turn output on. Then verify equipment responds accordingly.
10. Testing of Automatic Control Strategies:
    a. Test automatic control strategies in conjunction with the Contractor.
    b. Verify all automatic control strategies using actual process equipment and instruments, or other means, to verify logic performs as expected. Verify faults and logical failure scenarios for control strategies such as instrument failures, equipment failures, loss of communication between HMI Server and PLC, loss of peer-to-peer communication, out of range testing for analog inputs, loss of power, and all other strategies specified in control strategy document.
11. Repeat all systems tests specified under factory testing.
12. Test UPS to verify UPS switches power correctly while keeping all UPS powered loads online. Also, test sizing of UPS by switching offline power to UPS and verify if they maintain specified run time.
13. Test internal panel temperature for all panels with enclosures modified by this Contract under full running conditions to ensure proper cooling/ventilation is being provided.
14. Upon successful completion of ORT, request scheduling of FDT.

F. FIELD TESTING – FUNCTIONAL DEMONSTRATION TEST
   1. After facility is started-up and running treatment process in automatic control to extent possible, perform a Functional Demonstration Test (FDT), to allow Engineer and/or Owner representatives to witness actual functionality, performance, and stability of system while connected to process equipment.
   2. Required documents for FDT include:
      a. Set of panel drawings and wiring diagrams from ORT with corrections noted.
      b. Set of Contract Documents - all drawings and specifications.
      c. All design-change related documentation.
      d. Signed-off master copy of the Contractor-developed field-testing signoff forms.
      e. Testing procedures.
      f. Copy of completed calibration forms.
      g. One copy of all O & M Manuals for Contractor-supplied equipment.
   3. Perform a witnessed FDT on each process area. Repeat testing performed during ORT, to the extent possible.
   4. Follow daily schedule specified to be followed during factory tests during FDT.
   5. After coordinating with Operations, perform a "Black Start" of the pump station to confirm pump station operation recovers as specified in Contract Documents. Black start means shutting off power to the pump station and turning it back on.
   6. Document punch list items and resolutions noted during test on Punch list/Resolution form. In event of rejection of any part or function test procedure, perform repairs, replacement, and/or retest within 10 days.

G. FIELD TESTING – NETWORK OUTAGE TEST (NOT)
   1. After successful completion of the FDT, perform a Network Outage Test (NOT) to allow Engineer and/or Owner representatives to witness response of SCADA system equipment to loss of network connectivity and response of system once connectivity is restored.
   2. Required documents for the NOT include:
      a. Set of panel drawings and wiring diagrams from FDT with corrections noted.
      b. Set of Contract Documents - all drawings and specifications.
      c. All design-change related documentation.
      d. Signed-off master copy of the Contractor-developed field-testing signoff forms.
      e. Testing procedures.
      f. Copy of completed calibration forms.
      g. One copy of all O & M Manuals for Contractor-supplied equipment.
   3. After coordination with Operations, perform a witnessed NOT on each SCADA control panel, by disconnecting the panel completely from the rest of the SCADA network for a minimum of [X] minutes and observing the response of the controls, both associated with the control panel and within the rest of the SCADA network. After the proposed testing period has elapsed, reconnect the SCADA network to the control panel and observe the response of the controls, both associated with the control panel and within the rest of the SCADA network.
   4. Document punch list items and resolutions noted during test on Punch list/Resolution form. In event of rejection of any part or function test procedure, perform repairs, replacement, and/or retest within 10 days.

H. FIELD TESTING – POWER OUTAGE TEST (POT)
   1. After successful completion of the FDT, perform a Power Outage Test (NOT) to allow Engineer and/or Owner representatives to witness response of SCADA system equipment to loss of power and response of system once power is restored.
   2. Required documents for the POT include:
      a. Set of panel drawings and wiring diagrams from FDT with corrections noted.
      b. Set of Contract Documents - all drawings and specifications.
      c. All design-change related documentation.
      d. Signed-off master copy of the Contractor-developed field-testing signoff forms.
      e. Testing procedures.
      f. Copy of completed calibration forms.
      g. One copy of all O & M Manuals for Contractor-supplied equipment.
   3. After coordination with Operations, perform a witnessed POT on each SCADA control panel, by powering down the panel completely for a minimum of [X] minutes and observing the response of

the controls, both associated with the control panel and within the rest of the SCADA network. After the proposed testing period has elapsed, restore power to the control panel and observe the response of the controls, both associated with the control panel and within the rest of the SCADA network.

4. Document punch list items and resolutions noted during test on Punch list/Resolution form. In event of rejection of any part or function test procedure, perform repairs, replacement, and/or retest within 10 days.
5. Upon successful completion of the POT, submit a record copy of test results as specified in "Part 1 - General".

I. FIELD TESTING – SITE ACCEPTANCE TEST (SAT)

1. Once FDT, NOT and POT are completed, and system is started-up and running treatment process in automatic control to extent possible, operate system for a period of 30 consecutive days, without a single non-field repairable malfunction. The 30-day acceptance test may occur concurrently with the FDT. Continue network performance monitoring throughout the 30-day test period.
2. While this test is proceeding, Engineer and Owner shall have full use of system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes. Plant operations shall remain responsibility of Owner and decision of plant operators regarding plant operations shall be final.
3. Ensure availability of Contractor and Systems Integrator personnel, knowledgeable in the equipment, hardware and software that make up the system, to address any potential issues that would impact system operation throughout the duration of the SAT. When not on-site, provide cell phone numbers that Owner personnel can use to ensure that support staff is available by phone and/or on-site within four hours of a request by operations staff.
4. Analyze and correct any malfunction during the tests. Engineer will determine whether any such malfunctions are critical and warrant a repeat of this test. Network performance excursions that exceed the maximum levels for errors are considered a system malfunction.
5. Any malfunction during this 30-day (consecutive) test period which cannot be corrected within 24 hours of occurrence. or more than two similar failures of any duration, will be considered as a non-field-repairable malfunction.
6. Repeat the test, as specified herein, upon completion of repairs.
7. Perform repairs or replacement within 5 days in the event of rejection of any part or function.
8. All computer equipment, network equipment, controllers, data base, process controller logic, and graphical interface system errors must be functioning as required per the specifications prior to the start of each test period. The 30-day test will not be considered successful until all data base points, and logic functions are tested and verified to be correct.
9. For acceptance, the total availability of the system must exceed 99.5 percent during this test period. Availability, in the context of this test, is defined as:
   a. AVAILABILITY = (TOTAL TIME – DOWN TIME)/TOTAL TIME
10. Down times due to power outages or other factors outside the normal protection devices or backup power supplies provided, do not contribute to the availability test times above.
11. Throughout duration of SAT, do not modify software or hardware without prior approval from Owner or Engineer.

3.03 PROJECT MANAGEMENT

A. Supplier shall provide engineering and administrative services necessary to fulfill the requirements of this specification.

B. Supplier shall provide the services of an experienced project manager as the overall coordinator during the course of the project.

3.04 PROGRAMMING SERVICES

A. Program the programmable logic controllers (PLCs) and computer as required by the functional descriptions.

B. Provide additional programming during start-up, training, and call-back periods as specified.

3.05 INSTALLATION AND START-UP

A. Supplier shall provide a skilled programmer/instrumentation engineer or technician who shall complete troubleshooting and star-up to place the entire system into satisfactory operation. The engineer or technician shall make the necessary inspection of the completed installation, make the necessary final field adjustments, and make program revisions are required for start-up.

B. Conduct a two-day demonstration of all system features and functions to Owner and Engineer.

C. Coordinate installation and start-up scheduling with Owner and Engineer.

~~3.06 ACCEPTANCE TESTING~~

~~A. On-Site Testing and Commissioning:~~
~~1. Provide services of a systems integrator technician checkout, test, and commission the system on Project Site.~~
~~2. Place equipment into service and provide operation as specified.~~
~~3. Provide actual activation of each control function and alarm in the system. If actual activation is not possible, the function shall be simulated. The Owner or Engineer shall witness and sign off on each function.~~
~~4. Record all Changes in the Control Systems:~~
~~a. Revise all wiring diagrams and schematic diagrams to show final installation.~~
~~b. Insert revised diagrams into each operation and maintenance manual in place of original diagrams.~~

~~B. After the installation is complete, and proper operation has been demonstrated, a 60-day acceptance test shall begin. The entire system shall be required to operate for 60 days with no malfunctions, field repairable malfunctions excepted. Any malfunction during the 60-day test which cannot be corrected within 24 hours by the supplier shall be considered a non-field repairable malfunction and after repairs are complete, the test shall be repeated.~~

~~C. The acceptance test shall apply to all equipment furnished under this Section.~~

3.07 ON-SITE SERVICES

A. In addition to other services specified, provide a competent programmer/instrumentation engineer or technician to perform the following services:
1. Software revisions - Five (5), eight (8) hour days on-site to make software revisions per Owner and Engineer direction. Days shall be no-continuous, number trips five (5).
2. Training - One (1) eight (8) hour days on-site to train Owner's personnel on:
   a. Operation and maintenance of all equipment furnished.
   b. Computer software operation and programming including building reports, building graphics and modifying tags and database.

B. All on-site services shall be at times approved by Owner.

C. At project completion, supplier shall certify in Writing that all un-used service hours will be provided at Owner's request during the first three years of operation. The remaining service hours shall be fulfilled by either a software engineer or field service technician as required by the task required by the Owner, at no cost.

3.08 CALL-BACK SERVICES

A. In addition to other services specified, provide a competent programmer/instrumentation engineer or technician to return to the project site for two (2), non-consecutive eight (8) hour days during the first year of operations. During each trip, the supplier's representative shall be prepared to calibrate and check equipment furnished under this contract, give miscellaneous training, and make software revisions.

B. Call-back trips shall be at times determined by the Owner.

3.09 SUPPLIES

A. Contractor shall provide all expandable items such as lamps, fuses, etc. For system startup, checkout, and during the acceptance test.

3.10 SPARE PARTS

A. Contractor shall furnish the following spare parts to the Owner. Spares shall be delivered in boxes labeled on the outside with manufacturer and part number identified on the box:
   1. Two (2) DC power supplies (as used in control panels)
   2. Six (6) each of every type of control relay used in control panels.
   3. Twenty (20) percent spare fuses and lamps of each type furnished, but not less than six (6) of each type.

3.11 MAINTAINING AUTOMATIC CONTROLS DURING CONSTRUCTION

A. Contractor shall coordinate construction activities to keep the existing plant instrumentation and controls system operational throughout the course of the project. Contractor shall furnish and install temporary controls and wiring as required to maintain automatic operation, and shall remove such temporary controls and wiring once permanent controls and wiring are operational and accepted.

B. When existing panel or instruments are modified or replaced under this Contract, Contractor shall schedule the work in advance with Owner and Engineer, and shall perform the Work so as to minimize the impact on Owner's operation of the facility. Controls shall only be removed from automatic operation during normal working hours, Monday thru Friday.

C. For scheduled outages or cutovers, once the control system revisions begin, Contractor shall work continuously until automatic operation is restored.

3.12 PLC INPUT AND OUTPUT LIST

A. **The estimated input/output list is provided below.** This list shall not be considered all-inclusive and Contractor shall estimate input/output requirements based on all information provided in each specification section and the drawings. This list is prepared to give an estimation of the inputs and outputs that are required, but it is up to the Contractor to provide a complete control system that is inclusive of all the control system requirements described in this, and other specification sections and shown on the drawings to function as required.

SCP-19 SUPERVISORY CONTROL PANEL		
DEVICE	**DESCRIPTION**	**I/O TYPE**
LE-R-H	FLOAT SWITCH HIGH	DI
LE-R-L	FLOAT SWITCH LOW	DI
LE-R-LL	FLOAT SWITCH LOW-LOW	DI
R-LT-1	LEVEL TRANSMITTER	AI
GP-LT-1	LEVEL TRANSMITTER	AI
WP-19-LT-1	LEVEL TRANSMITTER	AI
BW-LT-1	LEVEL TRANSMITTER	AI
BW-LT-2	LEVEL TRANSMITTER	AI
LE-BW1-H	FLOAT SWITCH HIGH	DI
LE-BW1-L	FLOAT SWITCH LOW	DI
LE-BW1-LL	FLOAT SWITCH LOW-LOW	DI
LE-BW2-H	FLOAT SWITCH HIGH	DI
LE-BW2-L	FLOAT SWITCH LOW	DI
LE-BW2-LL	FLOAT SWITCH LOW-LOW	DI
FT-FW-1	FLOW METER SIGNAL	AI
FT-FW-2	FLOW METER SIGNAL	AI

SCP-19 SUPERVISORY CONTROL PANEL		
DEVICE	**DESCRIPTION**	**I/O TYPE**
FT-WP-19-1	FLOW METER SIGNAL	AI
FT-BWR-1	FLOW METER SIGNAL	AI
FT-BWW-1	FLOW METER SIGNAL	AI
FT-SW-1	FLOW METER SIGNAL	AI
FT-SW-2	FLOW METER SIGNAL	AI
MP-FL-1 START	START CHEM METER PUMP RECEPTACLE	DO
MP-FL-1 AO	CHEM FEED PACING SIGNAL	AO
HZ-CL2	GAS SHUT-OFF ACTIVATED	DI
GF1-CL2	GAS FEEDER RATE SIGNAL	AO
GF1-CL2	GAS FEEDER RUN	DO
GF1-CL2	GAS FEEDER FAIL	DI
SV-CL2-1	SOLENOID VALVE SIGNAL	DO
AIT-CL2-1 DETECTOR	GAS LEAK DETECTOR LEVEL	AI
AIT-CL2-1 ALARM	GAS LEAK DETECTOR ALARM	DI
AIT-CL2-1 TROUBLE	GAS LEAK DETECTOR TROUBLE	DI
AIT-CL2-2	CHLORINE ANALYZER	AI
AIT-CL2-3	CHLORINE ANALYZER	AI
WIT-FL-1	SCALE	AI
WIT-CL2-1	SCALE CYLINDER 1	AI
WIT-CL2-1	SCALE CYLINDER 2	AI
KEYSCAN	DOOR ACCESS CONTROLLER ALARM	DI
FD-1	FLOOD ALARM SWITCH	DI
DC-1	DOOR CONTACT OPEN	DI
DC-2	DOOR CONTACT OPEN	DI
DC-3	DOOR CONTACT OPEN	DI
DC-4	DOOR CONTACT OPEN	DI
DC-5	DOOR CONTACT OPEN	DI
DC-6	DOOR CONTACT OPEN	DI
DC-7	DOOR CONTACT OPEN	DI
DC-8	DOOR CONTACT OPEN	DI
DC-9	DOOR CONTACT OPEN	DI
DC-10	DOOR CONTACT OPEN	DI
DC-11	DOOR CONTACT OPEN	DI
DC-12	DOOR CONTACT OPEN	DI
DC-13	DOOR CONTACT OPEN	DI
DC-14	DOOR CONTACT OPEN	DI
DC-1	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-2	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-3	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-4	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-5	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-6	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-7	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-8	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-9	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-10	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-11	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-12	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-13	DOOR CONTACT OPEN TO KEYSCAN	DO
DC-14	DOOR CONTACT OPEN TO KEYSCAN	DO
TS-1	LOW TEMPERATURE ALARM THERMOSTAT	DI
TS-2	LOW TEMPERATURE ALARM THERMOSTAT	DI
TS-3	LOW TEMPERATURE ALARM THERMOSTAT	DI
TS-4	LOW TEMPERATURE ALARM THERMOSTAT	DI

SCP-19 SUPERVISORY CONTROL PANEL		
DEVICE	**DESCRIPTION**	**I/O TYPE**
TS-5	LOW TEMPERATURE ALARM THERMOSTAT	DI
SV-F1	SOLENOID VALVE SIGNAL	DO
SV-F2	SOLENOID VALVE SIGNAL	DO
SV-F3	SOLENOID VALVE SIGNAL	DO
SV-F4	SOLENOID VALVE SIGNAL	DO
SV-F5	SOLENOID VALVE SIGNAL	DO
SV-F6	SOLENOID VALVE SIGNAL	DO
SV-F7	SOLENOID VALVE SIGNAL	DO
SV-F8	SOLENOID VALVE SIGNAL	DO
SV-F9	SOLENOID VALVE SIGNAL	DO
SV-F10	SOLENOID VALVE SIGNAL	DO
SV-F11	SOLENOID VALVE SIGNAL	DO
SV-F12	SOLENOID VALVE SIGNAL	DO
SV-F13	SOLENOID VALVE SIGNAL	DO
SV-F14	SOLENOID VALVE SIGNAL	DO
SV-F15	SOLENOID VALVE SIGNAL	DO
SV-F16	SOLENOID VALVE SIGNAL	DO
SV-BWW-1	SOLENOID VALVE SIGNAL	DO
LSO-SV-BWW-1	VALVE LIMIT SWITCH OPEN	DI
LSC-SV-BWW-1	VALVE LIMIT SWITCH CLOSE	DI
SV-BWW-2	SOLENOID VALVE SIGNAL	DO
LSO-SV-BWW-2	VALVE LIMIT SWITCH OPEN	DI
LSC-SV-BWW-2	VALVE LIMIT SWITCH CLOSE	DI
SV-SW-1	SOLENOID VALVE SIGNAL	DO
LSO-SV-SW-1	VALVE LIMIT SWITCH OPEN	DI
LSC-SV-SW-1	VALVE LIMIT SWITCH CLOSE	DI
SV-SW-2	SOLENOID VALVE SIGNAL	DO
LSO-SV-SW-2	VALVE LIMIT SWITCH OPEN	DI
LSC-SV-SW-2	VALVE LIMIT SWITCH CLOSE	DI
PT-DP-1	FILTER DIFFERENTAL PRESSURE TRANSDUCER	AI
PT-DP-2	FILTER DIFFERENTAL PRESSURE TRANSDUCER	AI
SV-BFV-RF-1	SOLENOID VALVE SIGNAL	DO
LSO-BFV-RF-1	VALVE LIMIT SWITCH OPEN	DI
LSC-BFV-RF-1	VALVE LIMIT SWITCH CLOSE	DI
FCV-FW-1 AO	MOTORIZED VALVE POSITION SIGNAL	AO
FCV-FW-1 AI	MOTORIZED VALVE POSITION SIGNAL	AI
PT-WP-19-1	PRESSURE TRANSDUCER	AI
PT-FW-1	PRESSURE TRANSDUCER	AI
PT-FW-2	PRESSURE TRANSDUCER	AI
CP-GPS	GRINDER PUMPS COMMON ALARM	DI
MCC-PM	MCC MOUNTED POWER METER MONITORED OVER ETHERNET. MONITOR: VOLTAGE THREE PHASES, AMPERAGE THREE PHASES, kW, kVA	ETHERNET
VFD-WP-19 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-WP-19 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-WP-19 RUNNING	PUMP RUNNING CONTACT	DI
VFD-WP-19 FAIL	PUMP FAIL CONTACT	DI
VFD-WP-19 START	PUMP CALL TO RUN SIGNAL	DO
VFD-WP-19 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-WP-19 VIBRATION N/S	HIGH VIBRATION TRANSDUCER NORTH/SOUTH DIRECTION	AI
VFD-WP-19 VIBRATION E/W	HIGH VIBRATION TRANSDUCER EAST/WEST DIRECTION	AI
VFD-WP-19 VIBRATION	PLC VIBRATION LOCKOUT RELAY	DO
VFD-BP-1 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI

SCP-19 SUPERVISORY CONTROL PANEL		
DEVICE	**DESCRIPTION**	**I/O TYPE**
VFD-BP-1 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BP-1 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BP-1 FAIL	PUMP FAIL CONTACT	DI
VFD-BP-1 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BP-1 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BP-1-LSO	VALVE LIMIT SWITCH OPEN	DI
LS-BP VIA TD3	VALVE FAIL TO OPEN LIMIT SWITCH LOCKOUT	DI
VFD-BP-2 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BP-2 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BP-2 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BP-2 FAIL	PUMP FAIL CONTACT	DI
VFD-BP-2 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BP-2 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BP-2-LSO	VALVE LIMIT SWITCH OPEN	DI
LS-BP-2 VIA TD3	VALVE FAIL TO OPEN LIMIT SWITCH LOCKOUT	DI
VFD-BP-3 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BP-3 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BP-3 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BP-3 FAIL	PUMP FAIL CONTACT	DI
VFD-BP-3 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BP-3 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BP-3-LSO	VALVE LIMIT SWITCH OPEN	DI
LS-BP-3 VIA TD3	VALVE FAIL TO OPEN LIMIT SWITCH LOCKOUT	DI
VFD-BWW-1 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BWW-1 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BWW-1 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BWW-1 FAIL	PUMP FAIL CONTACT	DI
VFD-BWW-1 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BWW-1 LLCO	BACKWASH TANK LOW LEVEL CUT OUT	DO
VFD-BWW-1 LLCO	LOW LEVEL CUTOUT RELAY	DI
VFD-BWW-1 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BWW-2 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BWW-2 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BWW-2 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BWW-2 FAIL	PUMP FAIL CONTACT	DI
VFD-BWW-2 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BWW-2 LLCO	BACKWASH TANK LOW LEVEL CUT OUT	DO
VFD-BWW-2 LLCO	LOW LEVEL CUTOUT RELAY	DI
VFD-BWW-2 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BWR-1 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BWR-1 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BWR-1 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BWR-1 FAIL	PUMP FAIL CONTACT	DI
VFD-BWR-1 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BWR-1 LLCO	BACKWASH TANK LOW LEVEL CUT OUT	DO
VFD-BWR-1 LLCO	LOW LEVEL CUTOUT RELAY	DI
VFD-BWR-1 OVERTEMP	PUMP OVERTEMP RELAY	DI
VFD-BWR-2 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
VFD-BWR-2 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
VFD-BWR-2 RUNNING	PUMP RUNNING CONTACT	DI
VFD-BWR-2 FAIL	PUMP FAIL CONTACT	DI
VFD-BWR-2 START	PUMP CALL TO RUN SIGNAL	DO
VFD-BWR-2 LLCO	BACKWASH TANK LOW LEVEL CUT OUT	DO
VFD-BWR-2 LLCO	LOW LEVEL CUTOUT RELAY	DI

SCP-19 SUPERVISORY CONTROL PANEL		
DEVICE	**DESCRIPTION**	**I/O TYPE**
VFD-BWR-2 OVERTEMP	PUMP OVERTEMP RELAY	DI
STR-BP-CL2 IN HAND	PUMP HOA SWITCH IN HAND POSITION	DI
STR-BP-CL2 IN AUTO	PUMP HOA SWITCH IN AUTO POSITION	DI
STR-BP-CL2 RUNNING	PUMP RUNNING CONTACT	DI
STR-BP-CL2 START	PUMP CALL TO RUN SIGNAL	DO
FACP ALARM	FIRE ALARM CONTROL PANEL ALARM	DI
FACP TROUBLE	FIRE ALARM CONTROL PANEL TROUBLE	DI

END OF SECTION

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SECTION 40 92 43

ELECTRIC ACTUATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. The furnishing and installation of electric valve actuators.

1.02 SUBMITTALS

A. Performance test certificate
   1. Each actuator must be performance tested and individual test certificates shall be supplied. The test equipment should simulate a typical valve load, and the following parameters should be recorded.
      a. Current at maximum torque setting
      b. Torque at maximum torque setting
      c. Flash test voltage
      d. Actuator output speed or operating time
   2. In addition, the test certificate should record details of specification such as gear ratios for both manual and automatic, and second stage gearing if provided, drive closing direction, wiring diagram number.

B. A list of valve operating torques, including seating and unseating torques, shall be provided to Engineer with shop drawing submittal. This list shall accompany a list of actuators selected for each application and the actuators' torque capabilities.

C. Operation and Maintenance Manuals

PART 2 PRODUCTS

2.01 GENERAL

A. The actuators shall be suitable for use on a nominal 120 volt, single phase, 60 Hz power supply and are to incorporate motor integral reversing starter, local control facilities and terminals for remote control and indication connections housed within a self-contained, sealed enclosure.

B. The actuator shall include a device to ensure that the motor runs with the correct rotation for the required direction of valve travel irrespective of the connection sequence of the power supply.

C. In order to maintain the integrity of the enclosure, setting of the torque levels, position limits, and configuration of the indication contacts shall be carried out without the removal of any actuator covers. Commissioning tools shall be provided with the actuators and must meet the enclosure protection and certification levels of the actuators.

D. Commissioning tools shall not form an integral part of the actuator and must be removable for secure storage/authorized release. In addition, provision shall be made for the protection of configured actuator settings by a means independent of access to the commissioning tool.

2.02 MANUFACTURERS

A. Rotork Controls IQ Series.

B. Auma 2000 Series.

C. EIM Control Series 2000.

D. Or equal pre-approved by engineer.

2.03 ACTUATOR SIZING

A. The actuator shall be sized to guarantee valve closure at the differential pressure for each valve location. The Contractor shall be responsible for coordinating with the valve manufacturer to ensure that the actuator will be sized correctly for each valve model and size. Differential pressures for each valve shall be verified by the Contractor as necessary, and each actuator shall be adjusted to ensure correct operation under all plant conditions.

B. It shall be the responsibility of the Contractor to verify the maximum valve operating torque for existing valves that are to be fitted with electric actuators prior to actuator selection. The actuator selected shall be capable of operating the valve in its existing condition.

C. A list of valve operating torques, including seating and unseating torques, shall be provided to Engineer with shop drawing submittal. This list shall accompany a list of actuators selected for each application and the actuators' torque capabilities.

D. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10 percent below nominal.

E. The operating speed shall be such as to give valve closing and opening at approximately 10-12 inches per minute unless otherwise determined necessary in coordination with Owner during Start-up (see Article 3.02). All actuator operating speeds shall be verified by Owner during Start-up.

2.04 ENCLOSURE

A. Actuators shall be O-ring sealed, watertight to NEMA 4, 6/IP68 and shall at the same time have an inner watertight and dustproof O-ring seal between the terminal compartment and the internal electrical elements of the actuator.

B. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site for cabling.

C. Enclosure must allow for temporary site storage without the need for electrical supply connection.

D. All external fasteners shall be of stainless steel, however, the use of unprotected stainless steel fasteners (including grease lubricated) in aluminum alloy casings is not permitted.

2.05 MOTOR

A. The electric motor shall be Class F insulated, with a time rating of at least 15 minutes at 104 deg. F or twice the valve stroking time, whichever is the longer, at an average load of at least 33 percent of maximum valve torque.

B. The motor shall be of the induction type, totally enclosed, non-ventilated, with cooling fans to dissipate the heat generated during operation. The motor shall be designed for severe duty allowing for 1,200 starts per hour without damage to the motor.

C. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gearcase.

2.06 MOTOR PROTECTION

A. Protection shall be provided for the motor as follows:
   1. The motor shall be de-energized in the event of a stall when attempting to unseat a jammed valve.

2. Motor temperature shall be sensed by a thermostat de-energizing the motor in case of overheating.
3. Lost phase protection.

2.07 GEARING

A. The actuator gearing shall be totally enclosed in an oil-filled gearcase suitable for operation at any angle. All drive gearing and components must be of metal construction and incorporate a lost-motion hammerblow feature. For rising spindle valves the output shaft shall be hollow to accept a rising stem, and incorporate thrust bearings of the ball or roller type at the base of the actuator. The design should be such as to permit the opening of the gearcase for inspection or disassembled without releasing the stem thrust or taking the valve out of service.

2.08 HAND OPERATION

A. A handwheel shall be provided for emergency operation, engaged when the motor is declutched by a lever or similar means, the drive being restored to power automatically by starting the motor. The handwheel or selection lever shall not move on restoration of motor drive. Provision shall be made for the hand/auto selection lever to be locked in both hand and auto positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in hand without damage to the drive train.

B. The handwheel drive must be mechanically independent of the motor drive and any handwheel gearing should be such as to permit emergency manual operation in a reasonable time. Clockwise operation of the handwheel shall give closing movement of the valve unless otherwise stated in the job specification.

2.09 DRIVE BUSHING

A. The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. Normally the drive bushing shall be positioned in a detachable base of the actuator. Thrust bearings, when housed in a separate thrust base should be of the sealed for life type.

2.10 TORQUE AND TURNS LIMITATION

A. Torque and turns limitation to be adjustable as follows:
   1. Position setting range 2.5 to 100,000 turns, with resolution to 15 degrees of actuator output.
   2. Torque setting: 40 percent to 100 percent rated torque.

B. "Latching" to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.

C. The electrical circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit.

2.11 REMOTE VALVE POSITION/ACTUATOR STATUS INDICATION.

A. Four contacts shall be provided which can be selected to indicate any position of the valve, Provision shall be made for the selection of a normally closed or open contact form. Contacts shall maintain and update position indication during handwheel operation when all external power to the actuator is isolated.

B. The contacts shall be rated at 5A, 250V AC, 30V DC.

C. As an alternative to providing valve position any of the four above contacts shall be selectable to signal one of the following:
   1. Valve opening, closing or moving
   2. Thermostat tripped, lost phase

3. Motor tripped on torque in mid travel, motor stalled
4. Remote selected
5. Actuator being operated by handwheel

2.12 LOCAL POSITION INDICATION

A. The actuator shall include a digital position indicator with a display from fully open to fully closed in 1 percent increments.

B. Red, green and yellow lights corresponding to Open, Closed and Intermediate position shall be included on the indicator. End of travel indication colors shall be reversible. The digital display shall be maintained and updated during handwheel operation when all external power to the actuator is isolated. The display shall incorporate valve, actuator and control status indication. Provision shall be made to orientate the display through increments of 90 degrees.

2.13 INTEGRAL STARTER & TRANSFORMER

A. The reversing starter, control transformer and local controls shall be integral with the valve actuator suitably housed to prevent breathing and condensation. The starter shall be suitable for 1200 starts per hour and of rating appropriate to motor size. The controls supply transformer shall be fed from two of the incoming three phases and incorporate overload protection. It shall have the necessary tappings and be adequately rated to provide power for the following functions:
   1. Energization of the contactor coils.
   2. 24V DC output where required for remote controls.
   3. Supply for all the internal electrical circuits.

2.14 INTEGRAL LOCAL CONTROL AND CONTROL MODE SELECTOR

A. The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control.

B. The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

C. Provision shall be made to orientate the local controls through increments of 90 degrees.

2.15 HEATERS

A. Exterior valve actuators shall include internal heaters for use in the winter.

2.16 CONTROL FACILITIES

A. The necessary wiring and terminals shall be provided in the actuator for the following control functions:
   1. Open and close external interlocks to inhibit local and remote valve opening and/or closing control. Provision shall be made to configure the interlocks to be active in remote control only.
   2. Remote controls fed from an internal 24V DC supply and/or from an external supply between 20V and 120V AC or 20V and 60 V DC, to be suitable for any one or more of the following methods of control:
      a. Open, Close and Stop control.
      b. Open and Close maintained or "push to run" (inching) control.
      c. Overriding Emergency Shut-down to Close (or Open) valve from a normally closed or open contact.
      d. Two-wire control, energize to close (or open), de-energize to open (or close).
   3. It shall be possible to reverse valve travel without the necessity of stopping the actuator. The starter contactors shall be protected from excessive current surges during travel reversal by an automatic time delay on energization of the contactor coils.

B. The internal circuits associated with the remote control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1.1kV.

2.17 MONITORING FACILITIES

A. Facilities shall be provided for monitoring actuator operation and availability as follows:
   1. Monitor (availability) relay, having one changeover contact, the relay being energized from the control transformer only when the Local/Off/Remote selector is in the Remote position to indicate that the actuator is available for remote (control room) operation.

B. Where required, it shall be possible to provide indication of Thermostat trip and Remote selected as discreet signals.

2.18 WIRING AND TERMINALS

A. Internal wiring shall be tropical grade PVC insulated stranded cable of appropriate size for the control and 3-phase power. Each wire shall be clearly identified at each end.

B. The terminals shall be embedded in a terminal block of high tracking resistance compound.

C. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal and shall be provided with a minimum of 3 threaded cable entries with provision for a minimum of 4.

D. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable.

E. A durable terminal identification card showing plan of terminals shall be provided attached to the inside of the terminal box cover indicating:
   1. Serial number
   2. External voltage values
   3. Wiring diagram number
   4. Terminal layout

F. This must be suitable for the contractor to inscribe cable core identification alongside terminal numbers.

2.19 START-UP KIT

A. Each actuator shall be supplied with a start-up kit comprising installation instruction manual, electrical wiring diagram and cover seals to make good any site losses during the commissioning period. In addition, sufficient actuator commissioning tools shall be supplied to enable actuator set up and adjustment during valve/actuator testing and site installation commissioning.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide at least 1 day of installation supervision by the manufacturer's representative.

B. Install equipment at the locations shown on the Drawings.

C. Install equipment and accessories in accordance with the manufacturer's instructions.

3.02 INSPECTION START-UP & ADJUSTMENT

A. The manufacturer or single source supplier of equipment shall inspect the completed installation, make all necessary adjustments, corrections, or modifications prior to start-up.

B. After start-up is authorized by the Engineer, the manufacturer or supplier shall furnish a qualified representative to inspect the completed installation, to supervise the system's initial start-up, and to train the operating personnel in the operation and equipment maintenance. At least 1 day shall be reserved for start-up and adjustment.

C. After equipment has been placed into operation, the manufacturer's representative shall make all final adjustments for the proper operation of the equipment.

D. Adjust valve closing and opening speeds during Start-up of each unit treatment process associated with a given valve. Valve closing and opening speeds to be determined in coordination with Owner.

E. Adjust actuator seating and unseating torque during Start-up to ensure effective operation of each valve.

3.03 OPERATOR TRAINING

A. Provide a minimum of 4 hours of operator training at the Owner's convenience after equipment is operational.

B. The plant's personnel shall be sufficiently trained and thoroughly acquainted with the operations and maintenance materials to operate all components of the system.

END OF SECTION

GENERAL STRUCTURAL NOTES

1. These notes do not replace the specifications but are to be read in conjunction with them. Any discrepancies or conflicts between the two shall be brought to the attention of the Structural Engineer of Record (SER) for resolution. In these Notes and the Specifications, the word "shall" means "has a duty to."
2. These drawings are for this specific project (SEH project number MADWU-187818) and no other use is authorized. Contact SER, Saura Jost 651.303.7663.

GOVERNING BUILDING CODE:

2018 Wisconsin Commercial Building Code
2015 International Building Code as adopted and amended by the state building code

DESIGN CODES AND STANDARDS:

ACI Manual of Concrete Practice
ACI 318, 301 Building Code Requirements & Specifications for Structural Concrete
ACI 350 Environmental Engineering Concrete Structures
ACI 530 / TMS 402 / ASCE 5 Building Code Requirements & Specifications for Masonry Structures
AISC 360, 303 Specification for Structural Steel Buildings
CRSI Manual of Standard Practice
PCI MNL 116 PCI Manual for Quality Control
PCI MNL 120 PCI Design Handbook - Precast and Prestressed Concrete
PCI MNL 123 PCI Connections Manual

DESIGN LOADS PER ASCE 7-10

Risk category III

1. Live load:	
Floor slabs	150 PSF UNO
Elevated walkways	100 PSF
Roof live load	20 PSF
2. Dead load:	
Superimposed roof load	15 PSF
3. Snow loads:	
Ground snow load	30 PSF
Importance factor	1.10
Roof snow load (Wellhouse)	23.1 PSF + drifting & unbalanced
Roof snow load (Backwash Tank)	25.4 PSF
Snow exposure factor	1.0
Thermal factor (Wellhouse)	1.0
Thermal factor (Backwash Tank)	1.1
4. Wind loads:	
Wind speed (3 sec gust)	120 mph
Wind exposure	C
Mean roof height	15 feet
Kd	0.85
Kzt	1.0
G	0.85 (rigid building)
Structure is:	Enclosed
Internal press coef	+/-0.18
Interior walls	5 PSF lateral load
5. Seismic loads:	
Site class	C
Ss	0.084 g
S_1	0.046 g
Fa	1.2
Fv	1.7
Sds	0.067 g
Sd1	0.052 g
Ie	1.25
Seismic design category	A
6. Soil criteria:	
Allowable soil bearing pressure(assumed)	2,500 PSF
Measured groundwater elevation at the time of drilling	NOT ENCOUNTERED AT THE TIME OF DRILLING
Dewater as required to keep excavations dry	
Frost depth	48 inches (heated building)
	60 inches (unheated structure)
Anticipated max differential settlement	1/2 inch
Anticipated max total settlement	1 inch
Sand backfill (assumed/per geotechnical report):	
Wet unit weight	120 PCF
Angle of Internal Friction	30 degrees
~~At-rest pressure coefficient, k0~~	~~0.5~~
Subgrade modulus Wellhouse	150 PCI
Subgrade modulus Backwash Tank	150 PCI
7. Precast plank loading, where not noted on drawings:	
Superimposed dead load indicated above (roofs)	5 PSF
Hanging live load (suspended MEPP)	10 PSF
Lifting loads	Loads as shown on the drawings
Roof live load	20 PSF

If mechanical units shown on the drawings are greater than 20 PSF within their footprints apply the difference within their footprints.

DESIGN / CONSTRUCTION CRITERIA

1. The contractor shall verify dimensions and conditions before construction and notify the engineer of any discrepancies, inconsistencies, or difficulties affecting the work before proceeding.
2. All material, workmanship, and details shall be in accordance with typical competent construction practices, current manufacturer's recommendations, and all applicable codes and government regulations.
3. The contractor shall coordinate all disciplines, verifying size and location of all openings, whether shown on structural drawings or not, as called for on process, architectural, mechanical, electrical or other drawings. All conflicts, inconsistencies, or other difficulties affecting structural work shall be called to the architect and engineer's attention for direction before proceeding.
4. Equipment and structural anchor rod sizes, types, embedment, and patterns shall be verified with the manufacturer or fabricator. All anchor patterns shall be templated to ensure accuracy of placement.
5. The contractor shall supply all necessary temporary bracing, shoring, guying, or other means to avoid excessive stresses and to hold structural elements in place during construction.
6. Job site safety (including excavations) is the sole responsibility of the general contractor and their subcontractors.
7. The engineer is not responsible for construction means, methods, techniques or practices. Where drawings and details imply this, they are provided to show final construction. If contractor desires to use different means and methods than implied by these drawings, submit similar details for review.
8. Standard or typical structural details are intended to illustrate design concepts and to specify material and required physical dimensions matching or similar to the referenced locations in the drawing set. Standard details apply whether or not they are cut on the drawings.
9. There is no provision for future vertical or horizontal expansion in the design.

EXISTING CONSTRUCTION

1. Before proceeding with any work within the existing facility, the contractor shall familiarize themself with existing structural and other conditions. It shall be the contractor's responsibility to design, provide, and erect all necessary bracing, shoring and other safeguards to maintain all parts of the existing work in a safe condition during the process of demolition and construction and to protect from damage those portions of the existing work which are to remain.
2. The contractor shall field verify the dimensions, elevations, etc. necessary for the proper construction and alignment of the new portions of the work to the existing work. The contractor shall make all measurements necessary for fabrication and erection of structural members. Any discrepancy shall be immediately brought to the attention of the engineer.
3. Any existing construction damaged in the removal of adjacent elements shall be replaced at the contractor's expense.
Where existing concrete elements are to be demolished and reinforcing is not required to remain, cut existing reinforcing flush with concrete to remain and coat with epoxy, unless covered with concrete in final construction.

FOUNDATIONS

1. CAUTION: Existing underground utilities may exist anywhere on the site. Notify owner and Digger's hotline (800) 242-8511 prior to disturbing any grade or excavation.
2. Material Definitions and Gradations:
   a. Non-frost-susceptible fill
      - 100% passing 1" sieve
      - < 50% passing #40 sieve
      - < 6% passing #200 sieve
      - < 2% organic content
   b. Aggregate Base
      - 100% passing 1" sieve
      - 70-100% passing 3/4" sieve
      - 45-90% passing 3/8" sieve
      - 35-80% passing #4 sieve
      - 20-65% passing #10 sieve
      - 10-35% passing #40 sieve
      - 3-10% passing #200 sieve
      - < 2% organic content
      - Large aggregates through #4 have minimum 25% fractured faces or crushed (per gradation)
   c. Aggregate Filter/Base
      - 100% passing 1" sieve
      - 85-100% passing 3/4" sieve
      - 45-90% passing 3/8" sieve
      - 20-60% passing #4 sieve
      - 0-10% passing #10 sieve
      - 0-6% passing #200 sieve
      - < 2% organic content
      - Large aggregates through #4 have minimum 75% fractured faces or crushed
   d. Granular Structural Backfill
      - 100% passing 1" sieve
      - 0-65% passing #10 sieve
      - 0-65% passing #40 sieve
      - 0-10% passing #200 sieve
      - < 2% organic content
3. Structural foundations consist of wall and spread footings established on material capable of safely supporting 2,500 PSF as recommended by CGC inc testing in report C22051-10 dated 01/20/2023. The structural engineer is not responsible for the accuracy or content of the subsurface soil conditions described in the specifications, test borings, or geotechnical report. A licensed geotechnical engineer shall be present during construction to test, inspect and verify all assumed soil conditions as required.
4. Subgrade tank walls shall be backfilled with Granular Structural Backfill or Non-Frost Susceptible Fill (as defined above) within 2 feet of the wall. Tank walls are not designed to resist lateral load (leak testing or backfilling) until the wall concrete has achieved its full design strength, 14 days minimum. Submit concrete testing verifying this before leak testing or backfilling.
5. Foundation walls shall be adequately braced during backfilling and compaction to prevent movement or structural damage. Bracing shall remain in place until permanent bracing is in place and until concrete achieves sufficient strength to resist imposed loads.
6. When placing compacted fill adjacent to foundation walls and piers, place backfill at equal rates on both sides to prevent overturning or structural damage.
7. Refer to the specifications for a list of structures that require leak testing prior to backfilling.
8. Away from walls, place fill in 8 inch loose lifts and compact to 95 percent Modified Proctor beneath foundations. When placing compacted fill adjacent to foundation walls and piers, place backfill at equal rates on both sides to prevent overturning or structural damage.
9. Contractor shall provide for dewatering at excavations from either surface water or seepage.
10. Moisture content in soils beneath building locations should not be allowed to vary after footing excavations and after grading for slabs on grade are completed to a degree that would de-stabilize the compacted soil. If subgrade materials become desiccated or softened by water or other conditions, remove and replace with engineered fill as recommended by the geotechnical engineer. Do not place concrete on frozen ground, nor allow ground beneath foundations to freeze. All foundation work shall be placed on substrate approved and tested by geotechnical engineer of record.
11. Do not place backfill on frozen subgrade. Do not place frozen backfill.
12. Slabs on grade shall be constructed on a subgrade of native material compacted to at least 95 percent modified proctor, and 6 inches of Aggregate Base or Aggregate Filter/Base (as defined above) or WisDOT base aggregate course (dense) below the slab compacted to 95 percent modified proctor density unless noted otherwise in geotechnical report. In wet or potentially wet situations, use Aggregate Filter/Base (as defined above).
13. Grading: where not specifically shown on the plans, it is intended that all excavated and backfilled areas shall be graded to slope away from buildings and other structures.

CONCRETE

1. An independent testing agency shall cast 4 six inch test cylinders (5 if 56 day strength is allowed) or an additional cylinder if four inch cylinders are used, for each 75 cubic yards of each concrete mix placed or for each day's operation, whichever is the lesser amount. The testing agency shall cast, cure, and test the specimens in accordance with ASTM C31 and ASTM C39. Air, temperature, and slump shall be tested at minimum for the first truck and every third truck thereafter (1st, 4th, 7th, etc.) or when a change in properties is noticed, at the final location (test after pump, not at truck).
2. The contractor shall be responsible for the design of formwork to comply with the dimensions indicated on the plans, maintaining proper alignment during concrete pouring operations. Special care shall be taken with formwork for self-consolidating concrete.
3. All concrete except as noted in the following paragraphs shall meet the following requirements:
   - Compressive Strength — f'c = 4,000 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max (0.40 max if exposed to sulfates)
4. Concrete used in exterior flatwork and stoop slabs shall meet the following requirements:
   - Compressive Strength — f'c = 4,500 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max
   - Portland cement content — 450 pounds per cubic yard min
5. Grout fill used in hydraulic structures shall meet the following requirements:
   - Compressive Strength — f'c = 3,000 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max
   - Macro-fibers — per specifications
6. Concrete and grout exposed to frost (including foundation walls) shall be air entrained 6% +/- 1%.
7. Slump shall be 4 inches +/- 1 inch without water reducing admixtures. With water reducing admixtures, concrete mix design shall state design slump and field tests shall be +/- 1 inch. Slump is used primarily as a measure of concrete consistency, truck to truck. If slump is outside these ranges, water content (water:cementitious ratio) shall be checked against allowable; and concrete rejected, accepted, or adjusted on that basis.
8. Water-reducing admixtures conforming to ASTM C494 added to the mix at manufacturer's dosage rates may be used for improved workability.
9. Do not add water to concrete at the jobsite without written approval of the SER, and in no case in excess of the water in the approved mix design.
10. No chloride containing admixtures are allowed.
11. Concrete used in tank slabs and walls shall have Xypex, Euclid Vandex AM-10, Penetron, or BASF Masterlife 300d admixture added to the mix at manufacturer's dosage rates (minimum 2% of cementitious content; maximum of 2 percent of cementitious content in potable water tanks). Concrete used in areas subject to de-icing salts (including stoop slabs and aprons) shall have Cortec MCI added to the mix at manufacturer's recommended dosage rates.
12. All concrete is normal weight unless specifically noted otherwise.
13. Cement shall be Portland cement type 1 conforming to ASTM C150 or Portland Limestone Cement type 1L conforming to ASTM C595. Up to 30% cement can be replaced with flyash and up to 50% with GGBFS (50% combined max.). Aggregate for normal weight concrete shall conform to ASTM C33. Water is to be potable or demonstrated to have no harmful effects on concrete. Fly ash shall be demonstrated by test to contain minimum 18 percent CAO except as noted in next paragraph. When fly ash is used in concrete to be air entrained, air entraining shall be adjusted as required for LOI per recent experience of ready mix supplier.
14. Measured from the time water and cement are batched together, no more than 90 minutes shall elapse until concrete is placed. This time shall be reduced by two minutes for every degree that concrete temperature exceeds 75 degrees Fahrenheit. These criteria may be relaxed by the use of set-controlling admixtures.
15. Protect concrete in accordance with ACI 305 and ACI 306 for hot weather concreting and cold weather concreting respectively. In cold weather, heat is required if outside temperature falls below 30 degrees any time during first three days. Reinforcing shall be 40 degrees or warmer at time of concrete placement. Concrete temperature shall be recorded every morning and shall be kept above 40 degrees in all locations for 7 days. Concrete shall not be exposed to combustion products (use electric heat, ducted heater or ground thaw). Keep protection in place minimum 24 hours after cessation of heating to provide gradual cool-down.
16. When air temperature is above 85 degrees, provide mist, shading, windscreens and other protection as required for 12 hours after placing.
17. Concrete being placed shall be protected from rain. If rain falls on concrete before it has set, or within 3 hours of placement in any event, contractor shall bear cost of testing to prove concrete is unaffected, and shall remove and replace affected concrete to the satisfaction of the engineer.

23. Wet cure (poly and burlap or proprietary blankets kept moist daily) for a minimum of 7 days; sides of footings may be buried after 24 hours. Add one day of cure for flyash in excess of 15 percent or GGBFS in excess of 10 percent of cementitious. Contractor is responsible for staining caused by burlap in visible areas. Spray-on curing compounds shall not be used as a substitute for wet curing without written permission of the SER except as follows. Liquid-containing structures must use a wet cure on all surfaces. Spray-on curing compounds may be substituted for wet curing in areas of non-liquid-holding structures that are not visible in the final condition and in liquid holding structures in winter conditions where water curing may be hazardous or difficult. When spray-on curing compounds are used, they should be applied in two layers perpendicular to each other and according to manufacturer's instructions.
24. Cementitious grout shall be non-shrink and non-metallic grout. Place according to manufacturer's recommendations and trim neatly where visible.
25. Coordinate with other trades for sleeves, conduit, electrical grounding wires, inserts, underground utilities, and other items to be embedded into concrete and verify that they are properly installed and supported before casting concrete. Holes through slab or wall shall leave minimum 1 inch clear to reinforcing; shift reinforcing as required. Placement of such items shall be coordinated with reinforcing placement where they would otherwise displace each other. For instance, in areas with a single mat of reinforcing, east-west conduit should be placed with east-west reinforcing and north-south conduit is placed with north-south reinforcing.
26. Embedments shall not significantly impair the strength of the structure and shall not reduce fire protection. In no case shall embedments violate the required concrete cover. Conduit and pipes, with their fittings, embedded in concrete shall not be larger in outside dimension than 1/3 the overall thickness of slab, wall, or beam in which they are embedded and shall not be spaced closer than three diameters on center. Conduit and pipes placed within 2 feet below bottom of slabs and footings shall not be spaced closer than three diameters on center and shall be encased in CLSM or concrete vibrated to flow around conduit.
27. No uncoated aluminum items shall be embedded in any concrete. All aluminum surfaces in direct contact with concrete shall receive one coat of 8-12 mil dry film thickness bitumastic.
28. Unless shown on drawings, concrete shall be placed without construction joints except where specifically shown on shop drawings approved by the engineer. The contractor shall submit shop drawings showing additional or alternate construction joint locations to the engineer for approval.
29. Bevel all exposed corners of concrete 3/4"x3/4".
30. Verify size and location of all equipment bases and housekeeping pads.
31. All cast-in-place concrete floors on grade shall be provided with a min. 1/8" per FT slope to floor drains unless noted otherwise. All interior slabs on grade shall be placed over 10 MIL vapor retarder meeting ASTM E1745 class A, with joints welded or lapped and sealed according to manufacturer's recommendations. Vapor retarder shall permit less than 0.01 perm after conditioning. All damage and penetrations shall be sealed according to manufacturer's recommendations.
32. All concrete to be trowel finished shall be tested for air content, whether or not it is purposely air entrained. If concrete contains more than 2 percent entrained air, delay start of finishing to preclude weakened air-rich plane just below surface.
33. Where placing new concrete against previously existing concrete, bush-hammer existing to leave a profile of 1/8 inch and blow clean with oil-free compressed air or water blast. To the extent possible, leave a smooth zone under hydrophilic waterstop; see next section. This roughening does not apply to recently placed concrete at a keyed construction joint.
34. All slabs and stairs not shown otherwise shall be 5" thick with #4 bars at 18" on center each way. All exterior stoops not otherwise detailed may be constructed in any standard manner, solid or hollow, but must be reinforced with epoxy coated #4 bars at 12" on center each way minimum. Porches and stoops shall be doweled to adjacent walls or grade beams with #4 bars at 18" on center, hooked or embedded 40 diameters into both members. Slope stoops minimum 1/8" per foot for drainage unless noted otherwise.
35. Unless specifically noted otherwise, building sections may not illustrate all dowels, keyways, or waterstops required by design. All base slab or footing to wall joints shall have vertical dowels crossing the joint. All elevated slabs (including base slabs above the lowest base slab elevation) to tank or foundation walls shall have horizontal dowels crossing the joint. Slabs on grade may either be independent (with expansion joint) or doweled in; provide dowels where slabs on grade are shown to bear on walls in sections. Refer to typical details in the drawings for design intent.

JOINTS IN CONCRETE STRUCTURES

1. Because of the effects of concrete consolidation, workmanship, detailing, cure, temperature, aggregate size, and other factors; Contractor is responsible for cracking in base slabs and walls of liquid-holding structures, and shall repair any leaking cracks by sealing, injecting, or otherwise filling them. Where sealing is judged necessary by either Contractor or Engineer, Contractor shall submit material and description of sealing to be used for review by Engineer. Note that crystalline waterproofing will heal tight cracks (less than approximately 1/64") over time in warm temperatures, but wide cracks or leak tests attempted in cold temperatures will require additional measures. Any wall which is or may be subject to external groundwater is considered liquid holding.
2. Contractor is encouraged to use well-graded aggregate larger than ¾"; fiber reinforcing; shrinkage reducing admixtures; crystalline waterproofing; extended moist cure; and other means to reduce shrinkage. If used, crystalline waterproofing shall be used at the manufacturer's recommended dosage.
3. Concrete walls in liquid-holding structures:
   a. Concrete walls in liquid-holding structures shall have waterstopped construction joints at a maximum spacing of 20 feet for concrete proportioned according to these Notes and the specification. Full horizontal reinforcing shall extend through those joints and be developed each side of joint. At least 36 hours shall pass between adjacent wall pours in liquid-holding structures. Joint spacing in walls shall be measured at the inside surface between corners in a straight line or along a curve, but not around corners. For example, an 18' square box is not required to have wall joints, but a 22' square box is required to have one in each wall. For this purpose, a T-intersection counts as a corner at the intersecting wall but not at the continuing wall.
   b. Alternatively, a low-shrinkage mix may be proposed, and shrinkage measured for the specific concrete mix to be used in the walls, and the maximum construction joint spacing determined by the equation: $Spacing = 2.0 / (sh + 0.03)$, where "sh" is the shrinkage in percent from the 35-day shrinkage test described below; and the spacing is limited to 50 feet. Concrete placed in the walls shall have the same or lesser water content as that used in the test. If a Shrinkage Reducing Admixture or Shrinkage Compensating Admixture is used, it shall be used at the manufacturer's recommended dosage. Measurement of shrinkage shall be according to ASTM C157, except that the specimens should be cured in a lime saturated bath for 7 days rather than 28 days. Shrinkage shall be reported based on measurements at the end of the 7-day moist cure, and at 28 days after cessation of curing. If Shrinkage Compensating Admixture is used, initial measurement shall be 12 hours after placing rather than 7 days; full 7-day lime bath cure and 28-day drying shall still be followed.
4. Concrete base slabs in liquid-holding structures:
   a. Concrete base slabs in liquid-holding structures shall have waterstopped construction joints at a maximum spacing of 40 feet in each direction, with full reinforcing through the joint and developed each side of each joint. At least 36 hours shall pass between adjacent slab pours in liquid-holding structures.
   b. Alternatively, shrinkage may be measured as specified above for the specific concrete mix to be used in the base slab, and the maximum spacing determined by the equation: $Spacing = 4.0 / (sh + 0.03)$, where "sh" is the shrinkage in percent from the 35-day shrinkage test described above and the spacing is limited to 100 feet. Concrete placed in the base slab shall have the same or lesser water content as that used in the test. If a Shrinkage Reducing Admixture is used, it shall be used at the manufacturer's recommended dosage.
5. Concrete slabs on grade in non-liquid-holding structures:
   a. Contraction joint spacing in non-liquid-holding steel-reinforced slabs on grade (building floors) shall be spaced at a maximum of 24 x Thickness, but not more than 15 feet, in each direction. Contraction joint spacing in fiber-reinforced slabs on grade shall be spaced at a maximum of 30 x Thickness, but not more than 18 feet, in each direction. A slab of dimension 20 feet or less does not need to be divided by a contraction joint in that direction except as required by aspect ratio. The aspect ratio of any panel shall not exceed 1.50. Unless noted on drawings, Contractor shall submit proposed contraction joint spacing for review. Joints shall intersect columns. Where slab is reinforced with bars #4 or greater, cut or interrupt every other bar at each contraction joint. Joint depth shall be slab thickness / 4, with a minimum of 1". If sawcut, joints shall be cut as soon as it is possible to do so without raveling the concrete, but no later than 12 hours after placement.
   b. Contraction joint spacing in steel-reinforced slabs on grade (building floors) with two mats of reinforcing shall have a 1 ½" chamfer strip at bottom of slab and a sawcut or formed joint 1 ½" deep at same location, top of slab. Cut or interrupt every other bar of each mat at each contraction joint.
   c. Construction joints in building floor slabs on grade shall provide for shear transfer across the joint, using plate dowels such as Diamond dowels. Round or square dowel rods shall not be used. Reinforcing bars may be used where shown on drawings, e.g. at stoop or apron joints. Plate dowels shall be sized per manufacturer's recommendations and spaced at manufacturer's recommended spacing (18 inches max for wheeled traffic on slab, 24 inches max otherwise). If subject to de-icing salt, plate dowels shall be galvanized or epoxy coated.
6. Concrete in non-liquid-holding structures other than slabs on grade:
   a. Concrete walls in non-liquid-holding structures shall have construction or contraction joints at a maximum spacing of 60 feet.
   b. Footings carrying such walls shall have construction or contraction joints at a maximum spacing of 120 feet.
   c. Half the longitudinal reinforcing shall be interrupted at these joints unless noted otherwise.
   d. Space control joints at maximum 10'-0" on center each way for topping slabs on precast plank.

WATERSTOPS

1. Waterstops in new construction shall be 6-inch PVC, center bulb, ribbed, unless specifically noted otherwise.
2. At splices, miter all intersecting connections at 45 degrees and use a manufacturer approved heating iron to make full contact butt joints. At areas under more than 10 feet of hydrostatic head, all welded field splices shall receive a bead of flowable hydrophilic waterstop such as Adeka P-201 on each side of waterstop at weld.
3. For construction joints at hardened concrete, hydrophilic waterstops may be proposed by the contractor in lieu of adhered split-T PVC waterstop. Such material shall be selected considering water head to be resisted, concrete cover in all directions, reinforcing present through the joint, and whether waterstop is continually immersed. Contractor's proposal shall include waterstop information and contact information for a technical representative of the waterstop supplier along with the representative's written recommendation of the type of waterstop to be used. Hydrophilic waterstop shall not be used unless this process is followed.

PRECAST CONCRETE

1. Prior to installation, the precast concrete manufacturer shall submit structural calculations and plans to the architect/engineer for review. The structural calculations shall contain an original Professional Engineer's seal and signature by the design engineer licensed in the state where the project is located. Where precast is used as a structural shear diaphragm, calculations shall include shear capacity data for the members in question, topped or untopped.
2. Precast concrete units shall be designed for all potential loading conditions including initial handling and erection stresses, all superimposed dead, live, and lateral loads shown on the contract drawings, and all concentrated loads from mechanical equipment and lifting points. General contractor shall verify mechanical loads with the mechanical contractor and provide to precast designer and SER before design.
3. The precast concrete manufacturer shall be responsible for the design and installation of all precast connection hardware including hangers, embed plates, anchors, clip angles, headers at openings, etc. that are cast into or form a part of the precast units. Precast manufacturer shall provide 1/8 inch thick continuous bearing strips beneath hollowcore slabs and masonry or concrete supports.
4. All roof and wall opening dimensions and locations shown on the plans shall be verified by the contractor and roof manufacturer. Wall openings not contained within a panel width shall be protected by posts or other means during transit and erection.
5. Precast wall panels shall be fully grouted at base.
6. Joints between plank shall be pulled flush and grouted. Maximum distance between edges of planks is 4 inches at any joint. Where partial width planks are required, edge of ripped plank shall be smooth and straight.

7. Where topping is called for, plank shall receive a transverse broom finish at plant and shall have keys grouted minimum 4 days before topping is placed. Immediately before placing topping, pressure-wash surface of plank and blow clean with oil-free compressed air, then rub with cement slurry as a bonding agent, working just ahead of concrete placement. Surface to be free of standing water but slurry must be wet when topping is placed. Wet cure topping (burlap/poly) for a minimum of 7 days. Topping slabs shall be reinforced with 6x6 - W2.9 x W2.9 welded wire fabric (flat sheets only) macrosynthetic fibrous reinforcement integral to the mix.
8. All horizontal joints and reveals in wall panels shall align within 1/2 inch or 1/2 of joint dimension, whichever is less, at all joints between panels.
9. All exposed connection components shall be stainless steel type 316 / painted steel / steel with three coat paint system: moisture-cured zinc-rich urethane primer, epoxy, urethane. (pick one)

REINFORCING STEEL

1. All concrete is reinforced concrete unless specifically called out as unreinforced. Reinforce all concrete not otherwise shown with same steel as in similar sections or areas. Any details not shown shall be detailed per ACI 315 and meet requirements of ACI 318, current editions.
2. All reinforcing steel shall conform to the requirements of ASTM A615 grade 60 steel. Reinforcing steel shall not be welded without authorization of the SER, and if welded shall be A706 grade 60 steel. Reinforcing to be welded shall only be welded to structural steel, not other reinforcing, unless specifically noted on the drawings. Welded plain wire fabric shall be supplied in sheets, not rolls, and conform to the requirements of ASTM A185.
3. Clear minimum cover of concrete over reinforcing steel shall be as follows unless specifically noted otherwise:
   - 3" Concrete placed against earth
   - 2" Top mat of base slabs to receive waterstops at wall joint
   - 2" All other concrete
4. All reinforcing shall be tied to crossing reinforcing on at least every other bar (every bar at perimeter), and sufficiently to resist displacement from workers and placement of concrete.
5. All footing dowels shall be accurately positioned and wired in place before casting footing concrete. Where not noted, provide and install hooked dowels of same size and spacing as vertical reinforcement in all columns and walls. Position all anchor bolts with templates.
6. Bar lap table can be found on the first general sheet of the structural drawings.
7. Bar lap lengths in concrete and 90 degree end hooks shall be in accordance with the bar lap table unless noted otherwise. This table lists class 'B' laps. For epoxy coated reinforcing steel, increase lap length by 50% with c-c bar spacing < 6db and cover to center of bar <3db, otherwise increase by 20%. For masonry reinforcing, use f'c' = 3000 psi values.
8. Bars marked continuous, corner bars, and all vertical steel shall be lapped in accordance with table above at splices and embedments, unless shown otherwise. Splice top bars near midspan and splice bottom bars over supports, unless noted otherwise.
9. Bar support accessories shall be as specified in latest edition of the ACI detailing handbook and the concrete reinforcing steel institute design handbook. Maximum accessory spacing shall be 4'-0" on center, and all accessories on exposed surfaces shall have plastic coated ends. Chairs shall be supported on sand plates as required to keep from sinking into subgrade. WWF shall be supported by continuous bolsters or bars on chairs sufficiently close to prevent sheets from sagging appreciably during concrete placement. Support rebar used at contractor's option shall be extra bars supplied by contractor, not taken from design reinforcing.
10. Where potentially exposed to de-icing salts; stoop, apron, sidewalk and floor reinforcing shall be epoxy coated.

CONCRETE REPAIR

1. Locate and remove areas of loose, delaminated, or damaged concrete. Saw cut outside perimeter of damaged areas to a minimum depth of approximately 3/4 inch; do not cut reinforcing. Tally areas removed for payment. Sandblast area to be patched and blow clean. Protect surroundings and workers from dust and hazards associated with this work.
2. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide minimum 3/4 inch clearance behind bar. Clean and coat exposed surface of bar with bonding agent (Sika Armatec 110, Sonoprep, or Euclid Corr-Bond).
3. Dampen patch area and apply mortar scrub coat, keeping moist until patch is applied.
4. Patch with polymer-modified cementitious patching mortar (Dayton Superior HD-50, Euclid Verti-coat, Master Builders Emaco R320, Sikatop 121, or Sonopatch 100). Cure according to manufacturer's recommendations.

CONCRETE BLOCK MASONRY

1. Concrete block used in exterior walls or load bearing walls shall meet the following minimum requirements:
   - Masonry assembly — f'm = 2,000 PSI
   - Concrete masonry units: — 2,000 PSI
   - Mortar, ASTM C-270-10 — Type S UNO
   - Grout, ASTM C-476-10 — f'g = 3,000 PSI, Slump: 8-11 inches
2. The contractor shall provide adequate temporary bracing for all masonry walls during construction.
3. Concrete block shall be laid in running bond pattern typical unless noted otherwise. No vertical (head) joint shall be continuous for more than one block height. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities which are to be reinforced or to be filled with concrete or grout.
4. Pilasters and columns shall be laid up in running bond in each direction to provide a monolithic unit.
5. All joints shall be concave tooled joints above and below grade.
6. Masonry walls shall be reinforced with hot dipped galvanized truss horizontal reinforcing (per ASTM A153) with 9 gage side and cross rods. Reinforcing shall be continuous in horizontal joints every other block course (16 inches OC) in walls, every course (8 inches OC) in parapets, with prefabricated corner and tee sections.
7. Unless noted otherwise, concrete block shall be reinforced as follows in 6", 8", 10", and 12" walls:
   - Vertical reinforcing shall be a minimum of (1) #5 bar in 6" and 8" walls and (2) #4 bars in 10" and 12" walls at 4'-0" on center.
   - Provide bar or bars of same size as wall reinforcing at each corner, at each door, window, and opening jamb, each side of control joints and in the end void of each length of wall.
   - Lap splices for masonry vertical reinforcing shall be according to the table above, for "wall top bar."
   - Stack bond CMU shall have continuous horizontal bond beams at 48" OC, reinforced with (2) #4 continuous.
   - Continuous horizontal bars shall be included per section or detail in bond beam or optional running bond beam where noted. Where not detailed, use (2) #5 continuous. Where bond beams are continuous at corners of walls, supply corner bars matching size of horizontal bars. All bond beam reinforcing shall have standard laps or hooked development reinforcing bars at wall corners and intersections.
8. Grouting and reinforcing: all masonry, grouting, and reinforcing work shall be performed by mason craft workers who have successfully completed the International Masonry Institute (1-800-IMI-0988) training course for grouting and reinforced masonry construction, or equal.
9. When grouting is stopped for more than one hour, stop grout approximately 1 ½ inches below top of CMU to provide key.
10. Masonry block cells with vertical reinforcing and bond beams with horizontal reinforcing shall be grouted solid. Mortar is not an acceptable corefill. Provide a cleanout hole at the base of all grouted cells where grout lift exceeds 5'-4". Account for fly ash in grout during winter construction by protecting and heating as required to assure set and strength gain.
11. Non-load bearing concrete block walls shall be isolated from adjacent structural elements with vertical 1/2 inch control joints and at the top of the wall with minimum 1/2 inch air space or compressible material and support per details on the drawings.
12. Unless otherwise covered on architectural plans or specifications, vertical control joints in masonry construction shall be 3/8" wide, full height of wall. Joints shall be spaced at a maximum of 18'-0" on center and coordinated with the architect/engineer. Install control joints in locations as required and as directed by engineer/architect.
13. All horizontal joint reinforcing shall be discontinuous at control joints in masonry. All bond beam horizontal reinforcing shall be continuous through control joints.
14. Lintels over all openings in walls not otherwise noted, of 4'-0" span or less, shall be one L6 x 3-1/2 x 5/16 angle for each 4" of masonry (2 angles for 12" CMU); or an 8 inch deep bond beam with 2 - #5. All exterior steel lintels to be hot-dip galvanized. Bear minimum 8 inches on jambs grouted and reinforced full height.
15. Walls shall be anchored at bottom by hooked dowels matching wall vertical reinforcing (unless noted otherwise) set on footing bottom mat. Where walls rest on cast-in-place concrete foundation walls, dowels may be straight and lapped with concrete wall reinforcing below. Non-bearing walls shall be anchored at top by bracing angles per details on drawings.
16. Bond beam lintels shall be standard horse collar type (U shaped) block. Continuous bond beams may be, and upper courses of multi-course bond beams shall be, flow through block.

SEH

REVISED

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187818
Checked By	NRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/20/2023

GENERAL STRUCTURAL NOTES

GS002

POST INSTALLED ANCHOR RODS AND DOWELS

1. Unless noted otherwise, anchors and reinforcing dowels installed in concrete or concrete masonry shall be as noted below. Post-installed anchors shall only be used where shown on the construction documents. Anchors not shown or noted on the drawings, those required by the contractor solely for his means and methods, or those required by mechanical/electrical and carrying less than 100 pounds of non-safety-related items, do not require special inspection.
2. Approved manufacturers are: HILTI, ITW / Redhead, Simpson, Dewalt / Powers, and Rawl.
   a. Post installed anchors shall have current ICC approval in accordance with ACI 355 and ICC ES corresponding to anchor base material.
   b. Submit product data and current ICC ES report or IAPMO report showing product is compliant with project code requirements for review.
   c. Contractor shall arrange for manufacturer's rep to train all installers on the complete installation process. A letter of procedure stating method of drilling, the product for use, the complete installation procedure, manufacturer training date and a list of the personnel trained on anchor installation shall be submitted to the engineer.
   d. Substitution requests of alternate products must be approved in writing by structural engineer of record prior to use by providing technical data that the substituted product is capable of meeting performance requirements of specified products including but not limited to the following basis of design parameters ACI 355.2 or ACI 355.4 qualifications.
3. Permanent anchors exposed to earth, weather, or corrosive environments, including all anchors in wet areas of WWTP and water treatment plant work, and anchors engaging stainless steel or aluminum members, shall be stainless steel type AISI 304 or 316; anchors in contact with sewage or chloride deicer runoff shall be type 316. Otherwise, anchors shall be zinc plated, minimum ASTM A36 material unless ASTM A193 grade B7 is noted in the drawings, and shall be according to ASTM F1554. Reinforcing dowels shall be of the same size (U.N.O.), material and coating (if any) as the continuing reinforcing.
4. Where expansion anchors are called for, contractor may substitute screw type anchors with self-tapping threads or adhesive anchors of the same size and embedment, subject to review of capacity by the engineer for the product substituted. Where adhesive anchors are called for, other types shall not be substituted. Screw type anchors shall not be re-used on permanent work.
5. Adhesive shall have a current ICC ES report. Use high viscosity adhesive and placement devices in consultation with the manufacturer for overhead work. Adhesive anchors in overhead or horizontal installation shall be subject to continuous special inspection during installation and shall only be performed by installers certified per ACI/CRSI Adhesive Anchor Certification Program Section 17.8.2 or Engineer approved equivalent. Use low temperature formulations for cold weather work. Do not apply load to anchors until their capacity has been assured.
6. Anchors installed in concrete masonry and precast hollow core concrete shall be installed in cores grouted solid. Minimum grout strength f'g = 3,000 PSI. Minimum 12 inches of grout each way along horizontal cores from anchor. Vertical cores shall be grouted full height. Anchors installed in masonry shall not be installed within 1 1/2 inches of any head joint unless block are square end and mortared across full width of head joint, or filled bond beam.
7. Holes shall be drilled dry, cleaned, and maintained until installation in accordance with manufacturer's recommendations and ICC-ES report using standard rotary-impact bits and oil-free compressed air. Diamond core bits shall not be used unless specifically approved by the manufacturer.
8. The general contractor shall engage a testing company to locate existing reinforcing bars, PT tendons, and embedded items, by non-destructive means (GPR, X-ray, or other approved means) prior to drilling for installation of anchors. Notify EOR of any conflicts with existing embedded items. Do not cut or damage existing reinforcing or embedded items unless approved by the EOR.
9. Maintain critical spacing and and edge/corner distances as recommended by manufacturer unless specifically noted otherwise in the drawings.
10. Unless noted otherwise, anchors shall be installed to the following minimum embedments:

	Diameter	CIP Concrete	Grouted CMU
Expansion:	3/8 inch	3 inches	
	1/2 inch	3 1/4 inches	4 1/2 inches
	5/8 inch	4 inches	5 inches
	3/4 inch	4 3/4 inches	6 1/4 inches
Screw:	3/8 inch	3 inches	
	1/2 inch	4 1/2 inches	
	5/8 inch	4 3/4 inches	
	3/4 inch	6 1/4 inches	
Adhesive*:	3/8 inch	3 3/8 inches	
	1/2 inch	4 1/2 inches	5 1/2 inches
	5/8 inch	5 5/8 inches	5 5/8 inches
	3/4 inch	6 3/4 inches	6 3/4 inches

*For adhesive at reinforcing bars, increase embedment above by 33%.

11. Except as noted, all anchors shall have intermittent special structural inspection by one of the following. Load tests shall be to 150 percent of service capacity or 75 percent of ultimate strength, with no appreciable slip, permanent deformation, or concrete damage. Anchors which fail this test shall be replaced at no cost to the project. Two failures in a given installation shall result in mandatory load testing at double the rate noted below.
    a. Expansion and screw anchors:
       - Witness installation with torque wrench according to manufacturer's recommendations and requirements of ICC report;
       - Test all anchors with torque wrench after installation (including load test of 5 percent of installed anchors); or
       - Load test of 10 percent of installed anchors by supplier or third party inspector
    b. Adhesive anchor rods and dowels:
       - Witness installation according to manufacturer's recommendations and requirements of ICC report; or
       - Load test of 10 percent of installed anchors by supplier or third party inspector

STRUCTURAL METALS / FRP

1. All structural steel shall be as follows:
   - Wide flange beams and columns shall be ASTM A992, grade 50 steel.
   - All miscellaneous steel (angles, channels, plate) shall be ASTM A992, A529, or A36 steel (min. Fy = 36 KSI).
   - Rectangular steel tubes (HSS) shall be ASTM A500, grade C steel (fy = 50 KSI).
   - Pipe shall be ASTM A53 (fy = 35 KSI) unless A500 grade C (46 KSI) is noted.
   - Other shapes shall be ASTM A36 (36 KSI).
2. Splicing or modification of members in the field is prohibited without prior written approval of the SER.
3. All primary member bolted connections shall be two bolt minimum.
4. Fabrication and erection shall be in accordance with the latest edition of the AISC Manual of Steel Construction, Code of Standard Practice for Steel Buildings and Bridges, except as follows:
   - To paragraph 3.1, add "The project architectural drawings are a part of the structural steel design drawings by reference and must be used concurrently with the structural steel design drawings for any information not shown on the structural steel design drawings".
   - Delete paragraph 3.2 and insert the following: "architectural, process, electrical and mechanical plans shall be used as a supplement to the structural steel design drawings to define detail configurations and construction information".
   - Paragraph 3.3 modify the last sentence to read, "in case of discrepancies between the structural steel plans and plans of other disciplines or existing conditions, such discrepancies shall be called to the architect / engineer's attention for resolution".
5. All aluminum shapes shall be ASTM B209, B308, alloy 6061-T6; except handrail may be 6063-T5 or -T6. All welding shall be performed by a certified welder using compatible electrodes in accordance with the requirements of AWS D1.2 and visually inspected. Where designed by the fabricator, aluminum alloy and temper shall be stated on shop drawings.
6. All steel shall receive a primer coat unless galvanized, refer to specification manual.
7. Unless galvanized, all steel shall receive a three coat paint system: moisture-cured zinc-rich urethane primer, epoxy, urethane. All steel shall be cleaned to SSPC SP-10 (near white blast clean) and maintained in this state until painted. Refer to specification manual. (Revision 1)
8. All exposed steel shall be galvanized. Damaged galvanizing shall be repaired by application of cold galvanizing compound such as ZRC (minimum 3 coats). Paint finish per architectural.
9. All steel welding shall be performed by a certified welder using E70 electrodes in accordance with the requirements of AWS D1.1 "Structural Welding Code" and visually inspected. Full-pen welds shall also be inspected by NDT methods such as ultrasonic, mag particle, or dye pen.
10. All field welded connections shall be chipped, ground where required, wire brush cleaned and painted to match the paint system.
11. All bolts not otherwise specified shall be 3/4" diameter high strength (ASTM A325-N). All bolts shall be fully pretensioned. Any non-twist off bolts shall have 10 percent checked with a torque wrench by the special inspector. All beam connections shall be designed per the AISC Manual of Steel Construction "Framed Beam Connections" for the indicated reactions but at least 0.60 x beam total shear capacity shown in the allowable uniform load tables, whichever is greater.
12. All copes shall be made with a 1 inch minimum radius.
13. All anchor rods shall be minimum 3/4" diameter ASTM F1554 grade 36 / ASTM A276 Stainless Steel type 304 OR 306 unless noted otherwise. Where headed rods are noted or specified, bent rods shall not be furnished; rods may be headed or nutted, with the nut tack welded at the bottom end of the anchor or double nutted.
14. Metal/FRP stairways, platforms and grates shall be provided and constructed with adequate design characteristics (100 PSF live load capacity UNO) and structural configurations in accordance with the fabricator's shop drawings as approved by the engineer. All stairways, platforms and grates shall satisfy all requirements of the project documents. All stair runs longer than 10 feet between laterally rigid supports, and all two-post bents, shall have diagonal bracing fastened to the bottom flanges of the stringers and center of posts UNO.
15. All cut or raw surfaces of FRP shall be coated with compatible epoxy meeting NSF 61.

METAL DECK

1. Metal deck shall span a minimum of two continuous spans UNO. Deck design is based on products of Vulcraft Corporation, and any substitutions shall meet that standard. Where not explicitly noted, roof deck is wide rib.
2. Openings through deck which cut one flute need not be reinforced. Openings which cut two flutes shall be reinforced with a hot rolled equal-leg angle the size of the deck depth, minimum 1/8 inch thick, extending 12 inches past the opening, on each side of the opening, fastened with minimum 2 - #10 screws each side of opening. Openings which cut more than two flutes shall be framed to surrounding supports with frames as detailed in the drawings.
3. Manufacturer shall be a member of the Steel Deck Institute (SDI). Detail, manufacture, and install deck and accessories in accordance with SDI and OSHA.
4. Welding and welder qualifications shall be in accordance with AWS D1.3.
5. Deck shall be fastened to underlying framing with 5/8 inch diameter puddle welds at spacing as indicated on the drawings, unless headed studs are to be applied. Contractor may submit shot pins (PAF) for approval as a substitute for puddle welds. Side lap edges shall be joined with minimum of one #10 screw in each deck span, unless more screws are indicated in the drawings.
6. Where spray-on fireproofing is required, the general contractor shall verify that the deck finish is compatible with fireproofing. Coordinate with architect.
7. All roof opening dimensions and locations shown on the plans shall be verified by the contractor and roof manufacturer.

SHOP DRAWING REVIEW

1. Short Elliott Hendrickson Inc. (SEH) will review the general contractor's (GC) shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall structural system designed by SEH. In general, submittals will not be reviewed for correct quantities or construction considerations. SEH shall review shop drawings and related materials with comments provided that each submission has met the requirements herein. SEH shall return without comment unrequired material or submissions without GC approval stamp
2. Any items requiring submittal of calculation packages shall have calculations submitted prior to or as part of the shop drawing submittal they accompany. Shop drawings submitted prior to submittal of required calculations will be rejected. All calculations shall be sealed and signed by an engineer licensed in the state of the project. The supplier's engineer must provide calculations for all systems and connections that differ from the drawings. Design shall comply with the requirements in these notes, the drawings and the specifications.
3. Prior to submittal of a shop drawing or any related material to SEH, the GC shall:
   - Review each submission for conformance with the means, methods, techniques, sequences and operations of construction and safety precautions and programs incidental thereto, all of which are the sole responsibility of the GC.
   - Review and approve each submission.
   - Stamp each submission as approved.
4. SEH shall assume that no submission comprises a variation from the contract documents unless the GC advises SEH with written documentation. Should SEH require more than ten (10) working days to perform the review, SEH shall so notify the GC. Submittals shall include drawings and related material (if any) as indicated below.
   - Concrete mix designs and material certificates including admixtures, compounds applied to the concrete after placement, and associated product data. See specifications.
   - Aggregate tests and concrete test history for each mix design, with the submission of concrete mix designs.
   - Reinforcing steel shop drawings including erection drawings and bending details. Bar list will not be reviewed for correct quantities. Include elevations of all reinforced concrete masonry walls and all concrete walls with footing steps or other elevation changes, at a scale no smaller than 1/8" = 1'-0" showing all required reinforcing.
   - Grout mix designs (for CMU) and CMU block certification.
   - Structural steel and metal fabrication shop drawings including erection drawings and piece details.
   - Stairs and railing. Details on the drawings for the following items have been designed by the SER: railing systems, connection of railings and stringers to the primary structure. All other items shall be designed by the supplier's engineer to match intent of the construction drawings.
   - Metal deck shop drawings.
   - Precast shop drawings including reinforcing, bearing details, and design calculations.

REQUIRED INSPECTION

1. Required inspection and testing is required according to the table on the first general sheet of the structural drawings. Refer to specification section 01 45 10 for responsibilities. Contractor shall coordinate with SER, testing agency and geotechnical engineer throughout the project.
   - Required Inspections shall be performed in accordance with IBC Chapter 17.
   - Required Inspection of reinforcing steel and anchor rod placement shall be performed prior to concrete placement or during anchor rod installation for adhesive anchors.
   - Continuous inspection during concrete placement is required.
   - Conduct concrete slump tests in accordance with ASTM C143.
   - Obtain set of a four (4) concrete test cylinders each time concrete is placed. Make test cylinders in accordance with ASTM C30.
   - See these Notes for testing of Post-installed anchors and rebar where installation is not witnessed.
   - It is assumed that shop welding will be performed on the premises of a fabricator registered and approved to perform such work without Required Inspection. G/C shall submit fabricator documents, standards, and procedures in accordance with IBC 1705.2.
   - It is assumed that precast concrete will be cast on the premises of a fabricator registered and approved to perform such work without Required Inspection. G/C shall submit fabricator documents, standards, and procedures in accordance with IBC 1705.2.
   - Reports of Required Inspections shall be provided, at the frequency noted above, to the Owner, Contractor, and Engineer of Record by the firm contracted to perform Required Inspections.
   - Special Inspection criteria presented above and in specification shall apply to all footings and foundation walls, but does not apply to non-structural slab on grade and site work concrete.

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CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	NRD, SMJ
Drawn By	ALM
Project Status: BIDDING DOCUMENTS	Issue Date: OCTOBER, 2023

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GENERAL STRUCTURAL NOTES

GS003

FOUNDATION & FLOOR PLAN GENERAL NOTES:

(TYPICAL UNLESS NOTED OTHERWISE)

1. VERIFY ALL DIMENSIONS AND CONDITIONS WITH ARCHITECTURAL DRAWINGS.
2. VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS WITH MECH, ELEC, & PROCESS DRAWINGS. REINFORCE AS NECESSARY PER TYP DETAILS ON DS501 & DS511.
3. VERIFY ALL SIZES AND LOCATIONS OF STOOPS, APRONS, AND OTHER WALL OPENINGS WITH ARCHITECTURAL DRAWINGS.
4. SEE ARCH AND CIVIL DRAWINGS FOR REFERENCE DATUM.
5. SLAB CONSTRUCTION JOINTS ARE NOT INDICATED ON PLAN. REFER TO GENERAL STRUCTURAL NOTES FOR SPACING AND SUBMIT PROPOSED LOCATIONS FOR APPROVAL.
6. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS.
7. ALL FOOTINGS ARE CENTERED UNDER WALLS AND PIERS UNLESS NOTED OTHERWISE.

FOUNDATION PLAN KEYNOTES:

(1) 96K FILTER SKID - SEE PROCESS DRAWINGS FOR LOCATION. SEE TYPICAL DETAIL FOR CONCRETE PAD.

(2) 8" NON-BEARING CMU WALL TYP - SEE ARCH, REINF W/ #5 @ 48" OC, TYP

(3) THICKENED SLAB - TYP BELOW INTERIOR NON-BEARING CMU WALLS - SEE DTL 4/DS511

(4) ~~CONTRACTOR TO FIELD VERIFY EXISTING~~ BOT FTG ELEV AND MATCH BOT FTG ELEV WITH EXISTING. SIMILAR TO DETAIL 5/DS502 (1)

(5) PIPE BLOCKOUT - SEE PROCESS FOR LOC AND ELEVATION SEE TYPICAL DETAIL FOR REINF, AT CONC WALL OPNG.

(6) PIPE PENETRATION THROUGH EXISTING STRUCTURE - SEE 12/DS501 (1)

(7) DEMO EXISTING CMU WALL FOR WALL OPENING - SEE ARCH DRAWINGS. CONTRACTOR TO PROVIDE ADDITIONAL LATERAL BRACING AT TOP OF EXISTING WALL AS REQUIRED PER 3/DS511

(8) DEMO EXISTING CONC WALL. CONTRACTOR TO PROVIDE TEMPORARY SHORING OF ADJACENT ROOF STRUCTURE PRIOR TO CUTTING WALL OPENINGS - SEE ARCH DRAWINGS FOR EXTENT AND LOC. SEE STRUCTURAL ROOF PLAN FOR LINTEL INFORMATION

(9) REMOVE AND REPLACE EXISTING SLAB ON GRADE FOR ELECTRICAL WORK. SEE ELECTRICAL DRAWINGS FOR SIZE AND LOCATION. SEE TYPICAL DETAIL 3/DS502

(10) CONTRACTOR TO FIELD VERIFY EXISTING FOOTING STEP AND MATCH ELEVATIONS AT STOOP FOOTING STEP

(11) AT (E) SLAB ON GRADE, PROVIDE #4 DOWELS @ 24" OC INTO EXISTING SLAB ON GRADE W/STRUCT ADHESIVE

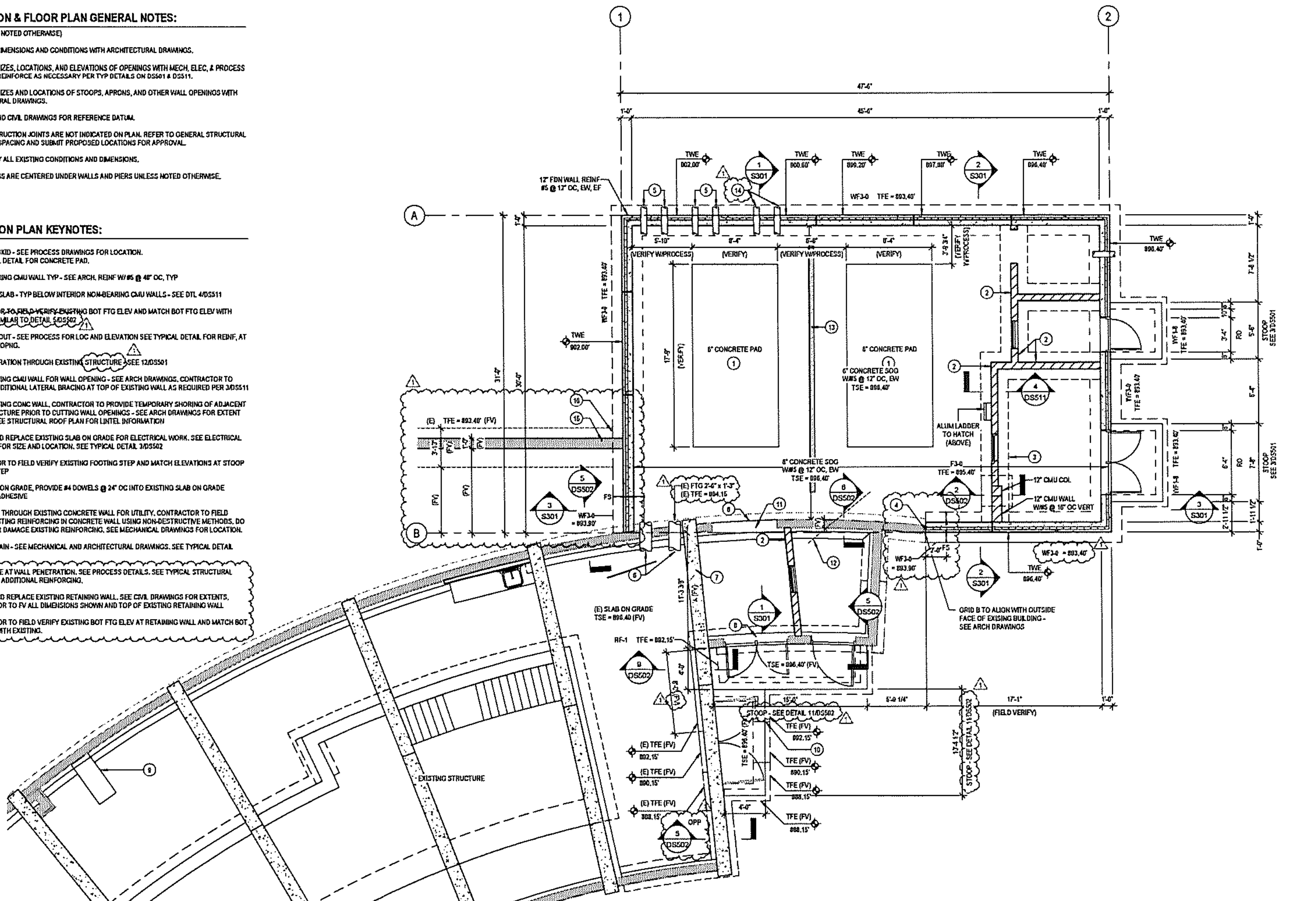
(12) CORE DRILL THROUGH EXISTING CONCRETE WALL FOR UTILITY. CONTRACTOR TO FIELD VERIFY EXISTING REINFORCING IN CONCRETE WALL USING NON-DESTRUCTIVE METHODS. DO NOT CUT OR DAMAGE EXISTING REINFORCING. SEE MECHANICAL DRAWINGS FOR LOCATION.

(13) TRENCH DRAIN - SEE MECHANICAL AND ARCHITECTURAL DRAWINGS. SEE TYPICAL DETAIL 12/DS502.

(1) (14) CAST IN PIPE AT WALL PENETRATION. SEE PROCESS DETAILS. SEE TYPICAL STRUCTURAL DETAIL FOR ADDITIONAL REINFORCING.

(15) REMOVE AND REPLACE EXISTING RETAINING WALL. SEE CIVIL DRAWINGS FOR EXTENTS. CONTRACTOR TO FV ALL DIMENSIONS SHOWN AND TOP OF EXISTING RETAINING WALL

(16) CONTRACTOR TO FIELD VERIFY EXISTING BOT FTG ELEV AT RETAINING WALL AND MATCH BOT FTG ELEV WITH EXISTING.



(1/S101) FOUNDATION & FLOOR PLAN
3/16" = 1'-0"

PROJECT NORTH

FOOTING SCHEDULE		
MARK	SIZE	REINFORCING
~~F3-0~~	~~3'-0" x 3'-0" x 1'-0"~~	~~(3) #5 EA WAY, BOTTOM~~
RF-1	1'-0" x 1'-0" (FV) TO MATCH EXISTING DEPTH	SEE DETAIL 9/DS502
~~WF1-0~~	~~1'-0" WIDE x 1'-0" DEEP x CONTINUOUS~~	~~(2) #5 REBAR CONTINUOUS, BOTTOM~~
WF3-0	3'-0" WIDE x 1'-0" DEEP x CONTINUOUS	(3) #5 REBAR CONTINUOUS, BOTTOM

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CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167918
Checked By: NRD, SMJ
Drawn By: ALM

Project Status: BIDDING DOCUMENTS
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FOUNDATION & FLOOR PLAN

01

S101

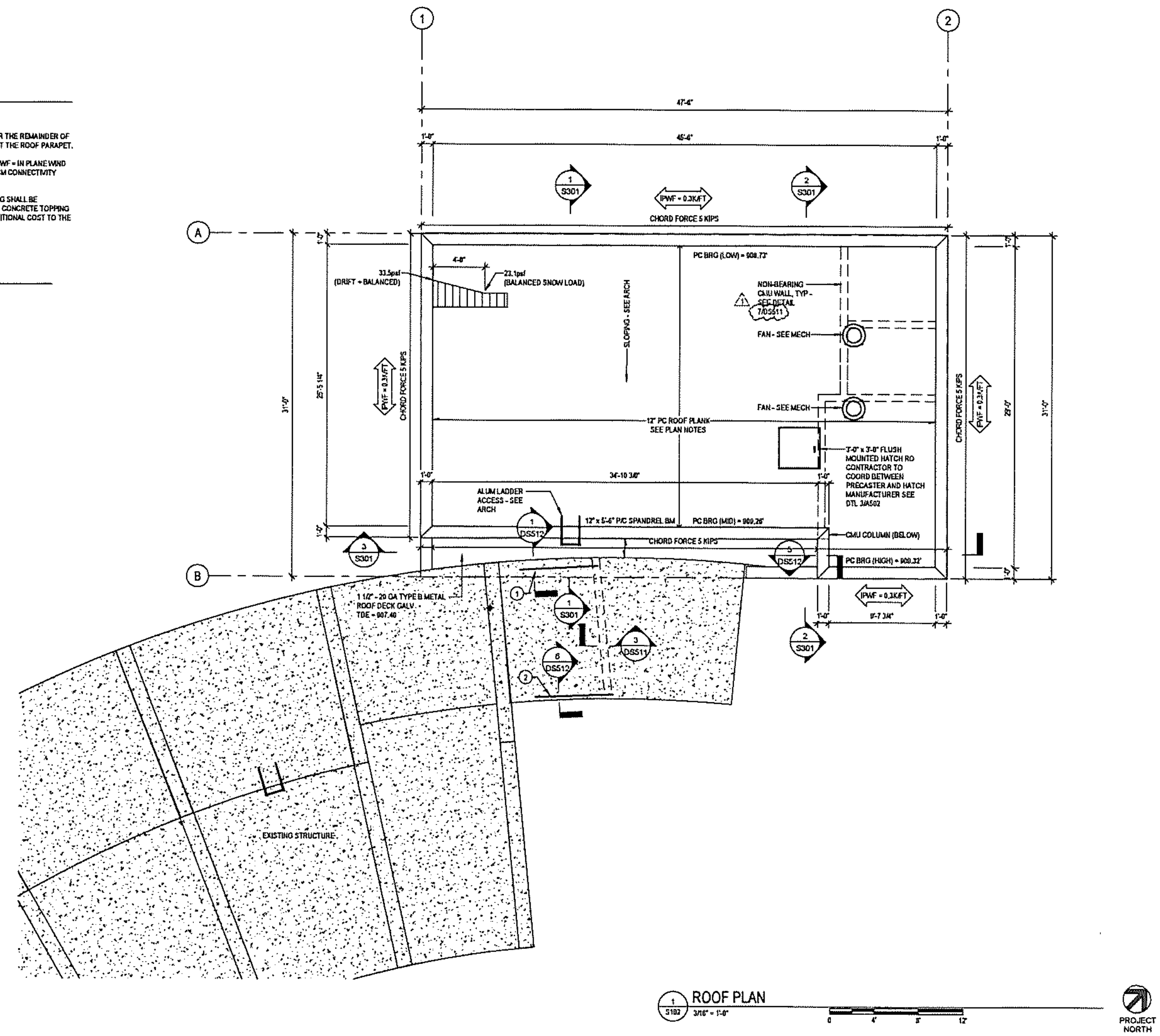
ROOF PLAN GENERAL NOTES:

(TYPICAL UNLESS NOTED OTHERWISE)

LOADS THUS: [load diagram]
1. ARE SNOW DRIFT LOADS AND BALANCED OR FLAT ROOF SNOW LOAD FOR THE REMAINDER OF THE ROOF. THEY ARE TYPICAL AROUND THE PERIMETER OF THE ROOF AT THE ROOF PARAPET.
2. PRECAST DESIGN LOADS: - OUT OF PLANE WIND: 27.1PSF (STRENGTH). IPWF = IN PLANE WIND FORCE PER ASCE 7-10 (STRENGTH LEVEL). MINIMUM PRECAST DIAPHRAGM CONNECTIVITY T_U = 0.3 K/FT AND V_U = 0.3 K/FT
3. HORIZONTAL PRECAST ROOF TO RECEIVE ADHERED MEMBRANE ROOFING SHALL BE WARRANTABLE BY CONTRACTOR'S ROOF OR SHALL RECEIVE MINIMUM 2" CONCRETE TOPPING SUFFICIENT TO MEET ROOFER'S WARRANTY REQUIREMENTS, AT NO ADDITIONAL COST TO THE OWNER.

ROOF PLAN KEYNOTES:

1. ~~W8x24 GALV LINTEL CURVED TO MATCH~~ (E) CONC WALL. SEE ARCH DRAWINGS FOR LOCATION. △1
2. ~~(2) HSS 14x4x3/8 GALV LINTEL~~ CURVED TO MATCH (E) CONC WALL. SEE ARCH DRAWINGS FOR LOCATION. △1



ROOF PLAN
1/S102 3/16" = 1'-0"

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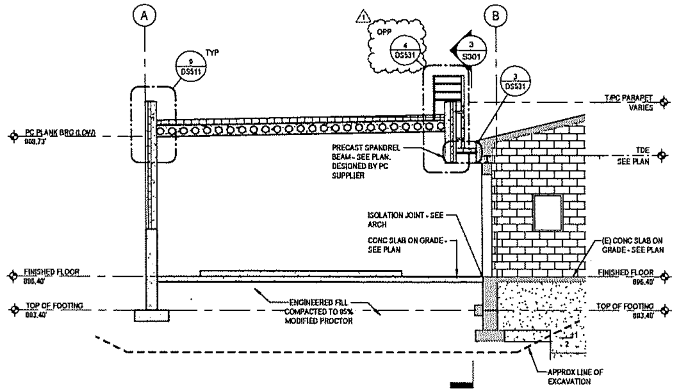
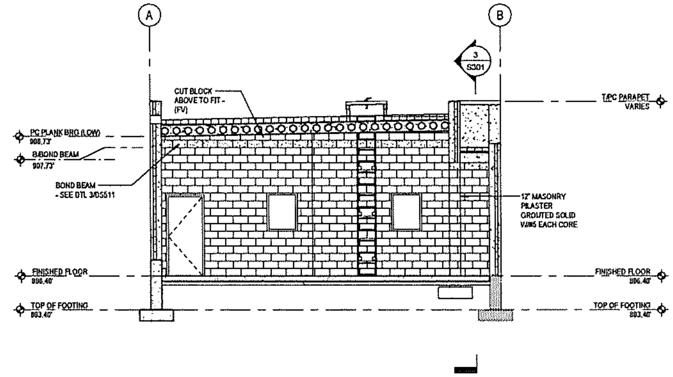
ROOF PLAN

01
S102

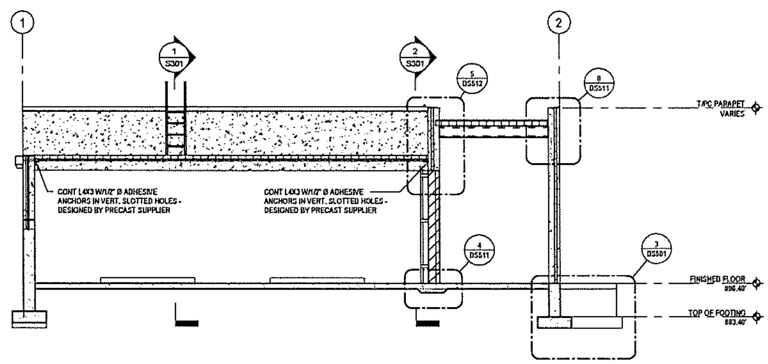


1 S301 BUILDING SECTION
3/16" = 1'-0"

NOTES:
1. DO NOT BACKFILL PORTION OF FOUNDATION WALL ABOVE FFE UNTIL SOG IS POURED.
2. SOIL CORRECTION AND EXCAVATION INFO SHOWN IN THIS SECTION IS REPRESENTATIVE OF THE ENTIRE BUILDING. THIS INFORMATION IS NOT SHOWN IN OTHER SECTIONS VIEWS, BUT SHOULD BE ACCOUNTED THERE ALSO. GEOTECHNICAL ENGINEER TO CONFIRM LIMITS OF EXCAVATION.



2 S301 BUILDING SECTION
3/16" = 1'-0"



3 S301 BUILDING SECTION
3/16" = 1'-0"

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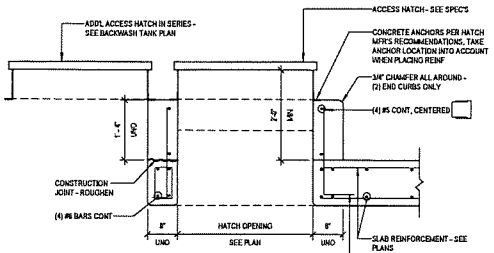
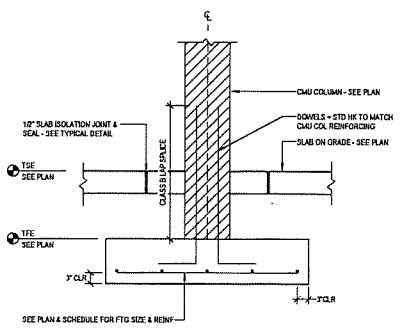
BUILDING SECTIONS

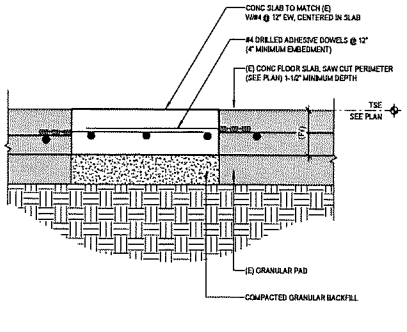
01
S301



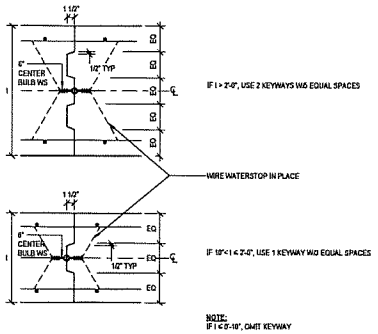
1 DS502 ACCESS HATCH CURB DETAIL
NOT TO SCALE



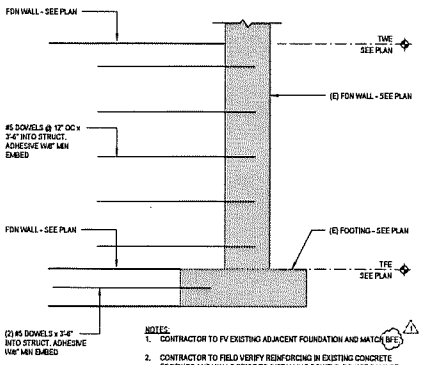
2 DS502 INTERIOR COLUMN FOOTING DETAIL
NOT TO SCALE



3 DS502 DETAIL AT EXISTING SLAB ON GRADE
NOT TO SCALE



4 DS502 WALL CONSTRUCTION JOINT DETAIL
NOT TO SCALE



5 DS502 SECTION
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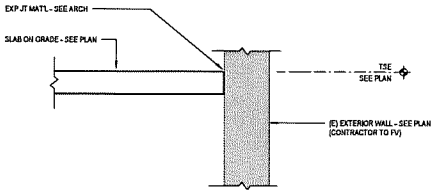

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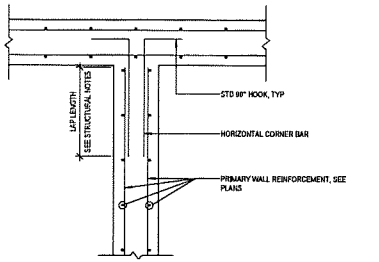
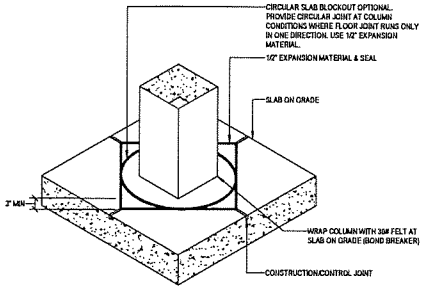
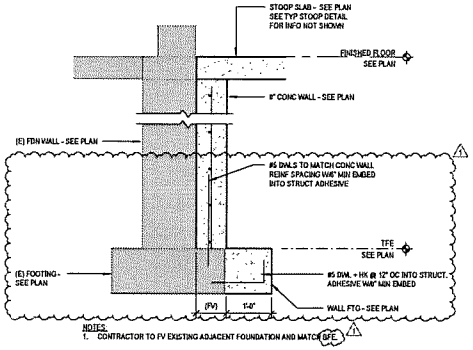


7 DS502 WALL INTERSECTION REINFORCEMENT DETAIL
NOT TO SCALE



8 DS502 ISOLATION JOINT DETAIL AT CONCRETE COLUMN
NOT TO SCALE



9 DS502 SECTION
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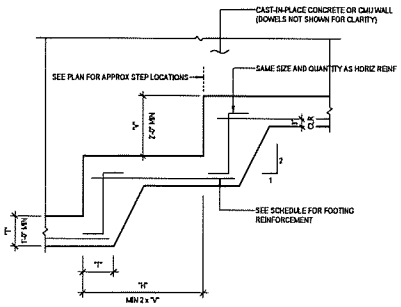
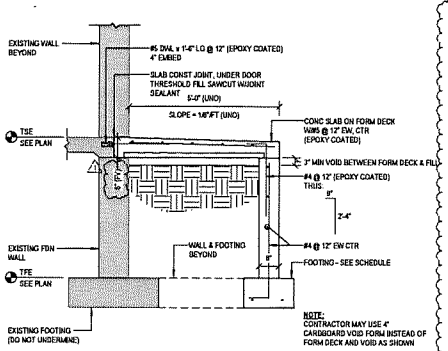
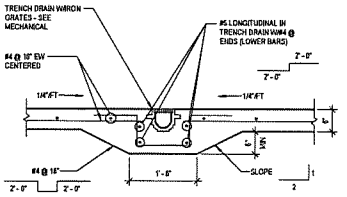


10 DS502 FOOTING STEP DETAIL
NOT TO SCALE



11 DS502 CONCRETE STOOP AT EXISTING BUILDING
NOT TO SCALE



12 DS502 TRENCH DRAIN DETAIL
NOT TO SCALE

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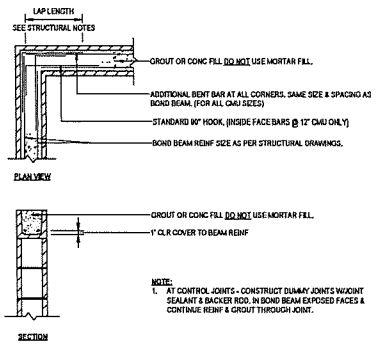
FOUNDATION DETAILS

DS502



1 DS511 BOND BEAM CORNER REINF DETAIL
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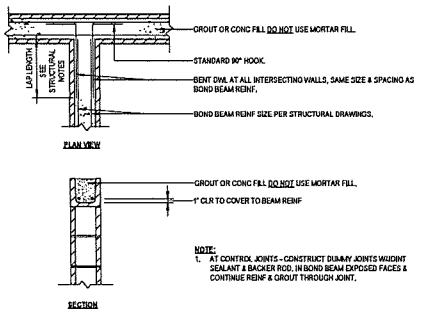
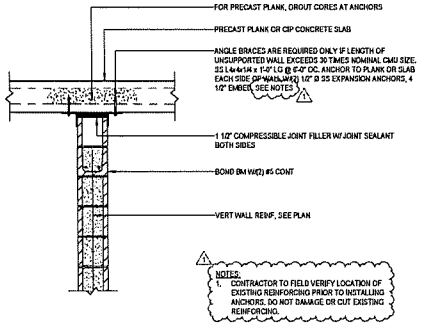
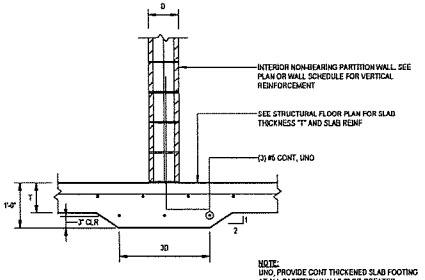


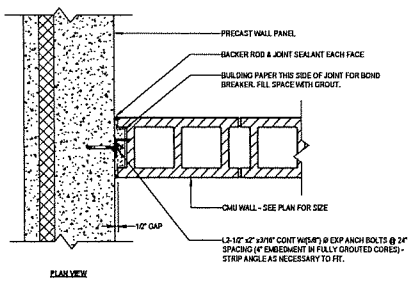
2 DS511 BOND BEAM INTERSECTION REINF. DETAIL
NOT TO SCALE



3 DS511 CMU PARTITION WALL TOP DETAIL
NOT TO SCALE



4 DS511 THICKENED SLAB AT NON-BEARING CMU WALL
NOT TO SCALE



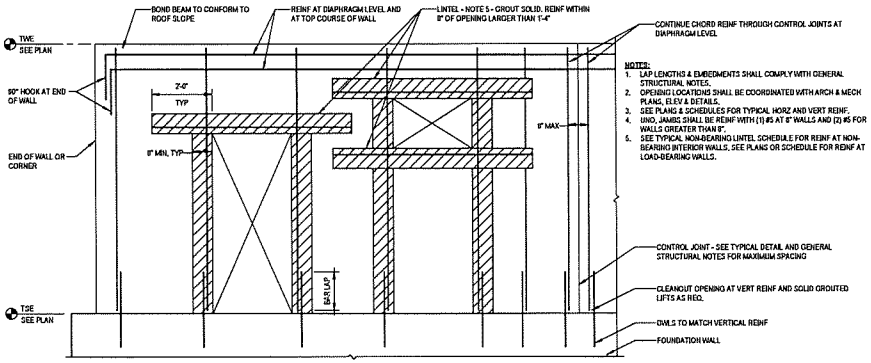
5 DS511 CMU TO PRECAST WALL CONNECTION DETAIL
NOT TO SCALE

NON-BEARING MASONRY LINTEL SCHEDULE

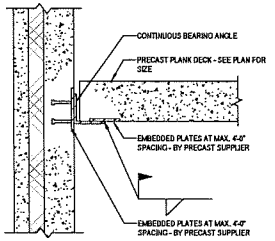
	6" CMU WALL	8" CMU WALL	12" CMU WALL	16" CMU WALL
ROUGH OPENING WIDTH (LINTEL SPAN)				
0'-0" - 3'-4"	(1) #4	(2) #4	(2) #4	(2) #4
3'-5" - 5'-4"		(2) #4	(2) #4	(2) #4
5'-5" - 8'-4"		(2) #5	(2) #5	(2) #5

MASONRY LINTEL NOTES:
1. LINTEL BLOCKS SHALL BE GROUTED SOLID. DO NOT USE MORTAR. F'g' = 3000 PSI MIN
2. 8" MIN BEARING EACH END FOR BLOCK LINTELS. CORES BENEATH LINTEL BEARING SHALL BE GROUTED SOLID. PROVIDE (2) VERTICAL WALL BARS (#5 MIN) BELOW EACH BEARING END UNO.

6 DS511 NON-BEARING MASONRY LINTEL SCHEDULE
NOT TO SCALE

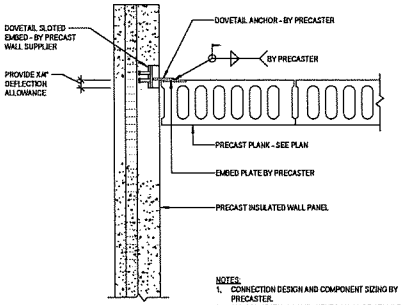


7 DS511 CMU WALL REINFORCING SCHEMATIC
NOT TO SCALE



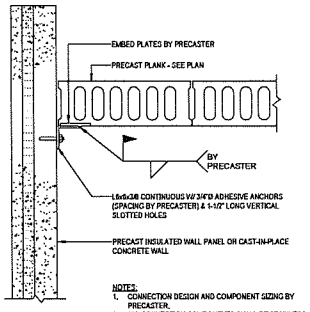
NOTES:
1. CONNECTION DESIGN BY PRECAST CONTRACTOR, SUBMIT CALCS FOR REVIEW.
2. ALL EXPOSED CONNECTION COMPONENTS SHALL BE STAINLESS STEEL TYPE 316
3. HORIZONTAL SHEAR = 215#/FT. SERVICE (WIND) LOAD.
4. VERTICAL SERVICE REACTIONS: DL=670#/FT, LL=273#/FT + POINT LOADS AS SHOWN ON DRAWINGS

8 DS511 PLANK TO WALL PANEL BEARING CONNECTION
NOT TO SCALE



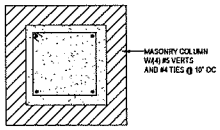
NOTES:
1. CONNECTION DESIGN AND COMPONENT SIZING BY PRECASTER.
2. ALL CONNECTION COMPONENTS SHALL BE STAINLESS STEEL.
3. SEE PLANS FOR LATERAL LOAD TRANSFER REQUIREMENTS

9 DS511 WALL PANEL TO ROOF PLANK CONNECTION
NOT TO SCALE



NOTES:
1. CONNECTION DESIGN AND COMPONENT SIZING BY PRECASTER.
2. ALL CONNECTION COMPONENTS SHALL BE STAINLESS STEEL.

10 DS511 WALL PANEL TO ROOF PLANK CONNECTION
NOT TO SCALE



NOTES:
1. PROVIDE HOOKED DOWELS TO FOUNDATION TO LAP WITH VERTICAL REINFORCING. MATCH SIZE AND NUMBER OF VERTICAL REINFORCING BARS.

11 DS511 MASONRY COLUMN DETAIL
NOT TO SCALE

SEH

REVISED

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2525 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

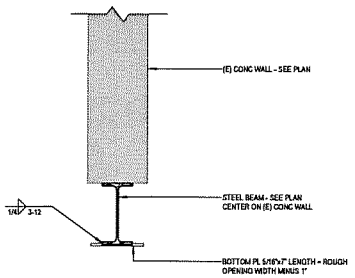
SEH Project	MADWU 167618
Checked By	MRD, SMJ
Drawn By	AJM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2022

REVISION SCHEDULE

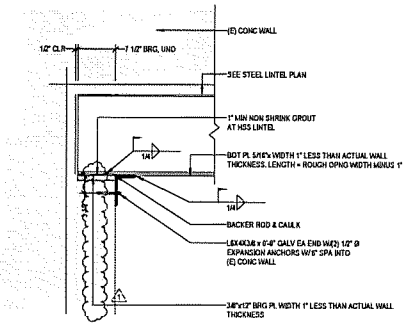
REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/30/2022

FRAMING DETAILS

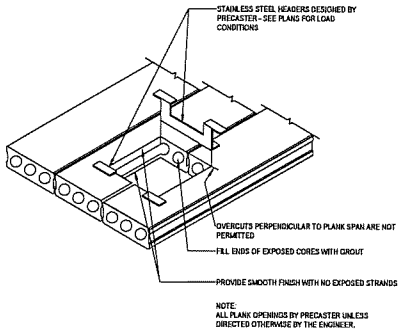
DS511



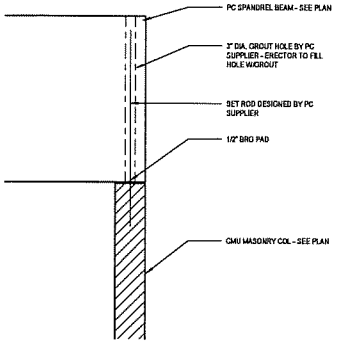
1 / D5512 STEEL LINTEL SECTION
NOT TO SCALE



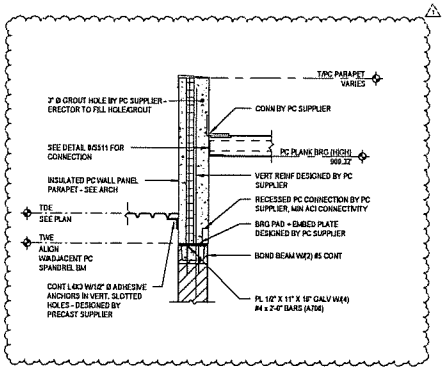
2 / D5512 STEEL LINTEL ELEVATION
NOT TO SCALE



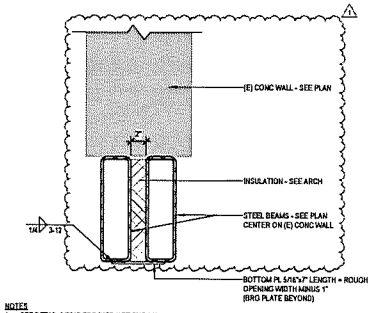
3 / D5512 TYPICAL PLANK OPENING WITH HEADERS
NOT TO SCALE



4 / D5512 PC SPANDREL TO CMU COL
NOT TO SCALE



5 / D5512 PC SPANDREL TO CMU WALL
NOT TO SCALE



NOTES
1. SEE DETAIL 2/S512 FOR INFO NOT SHOWN

6 / D5512 STEEL LINTEL SECTION
NOT TO SCALE

SEH

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MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E. OLIN AVE.
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2525 LAKE NOKOMIS DRIVE
MADISON, WISCONSIN

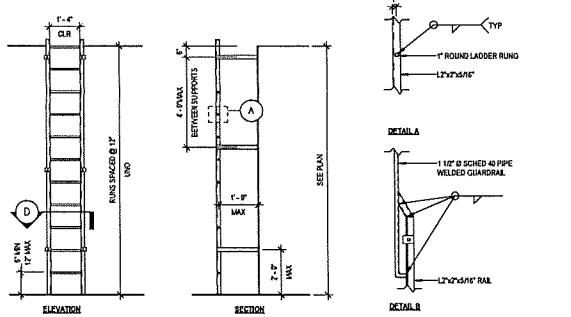
SEH Project	MADWU 187918
Checked By	NRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

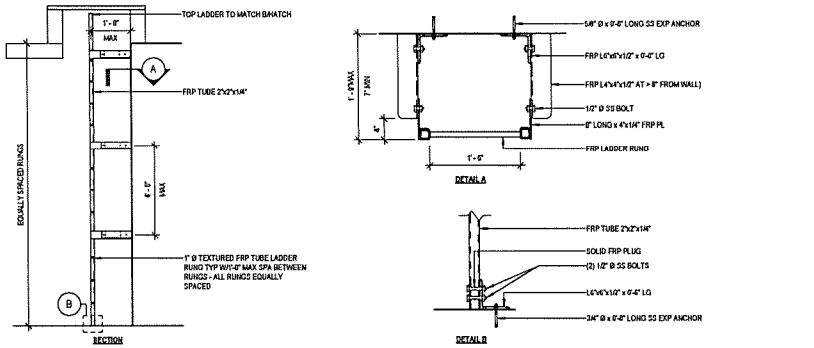
REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/08/2023

FRAMING DETAILS

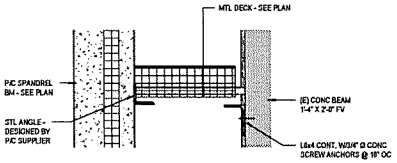
DS512



1 DS531 ALUMINUM LADDER DETAIL
NOT TO SCALE

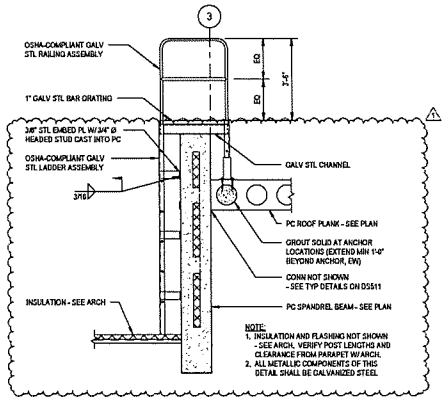


2 DS531 FRP LADDER DETAIL
NOT TO SCALE

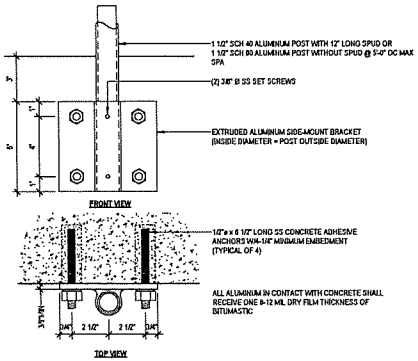


NOTES:
1. LOCATE EXISTING REINFORCEMENT AND OTHER EMBEDED ITEMS PRIOR TO INSTALLATION OF ANCHORS. DO NOT DAMAGE EXISTING REINFORCING OR OTHER EMBEDDED ITEMS.
2. FIELD DRILL HOLES INTO STEEL FRAMING.
3. CONTRACTOR'S OPTION TO SEGMENT CONT. ANGLE AT CURVED EXISTING CONC. BEAM

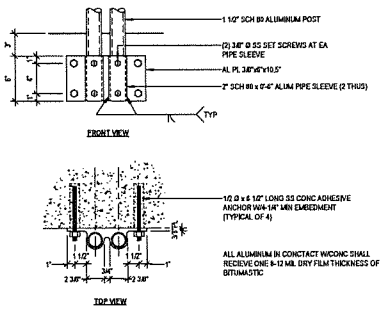
3 DS531 SECTION
NOT TO SCALE



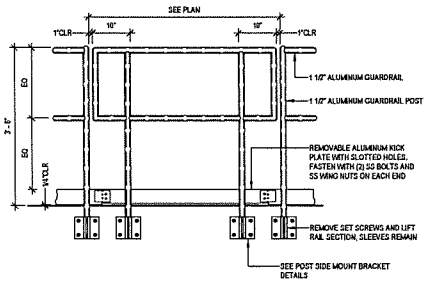
4 DS531 LADDER CONNECTION DETAIL
NOT TO SCALE



5 DS531 ALUM POST SIDE-MOUNT BRACKET
NOT TO SCALE



6 DS531 ALUM POST SIDE-MOUNT BRACKET AT REMOVABLE SECTION
NOT TO SCALE



7 DS531 ALUMINUM REMOVABLE GUARDRAIL SECTION (2 RAILS)
NOT TO SCALE

SEH

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MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187819
Checked By	MKD, DMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

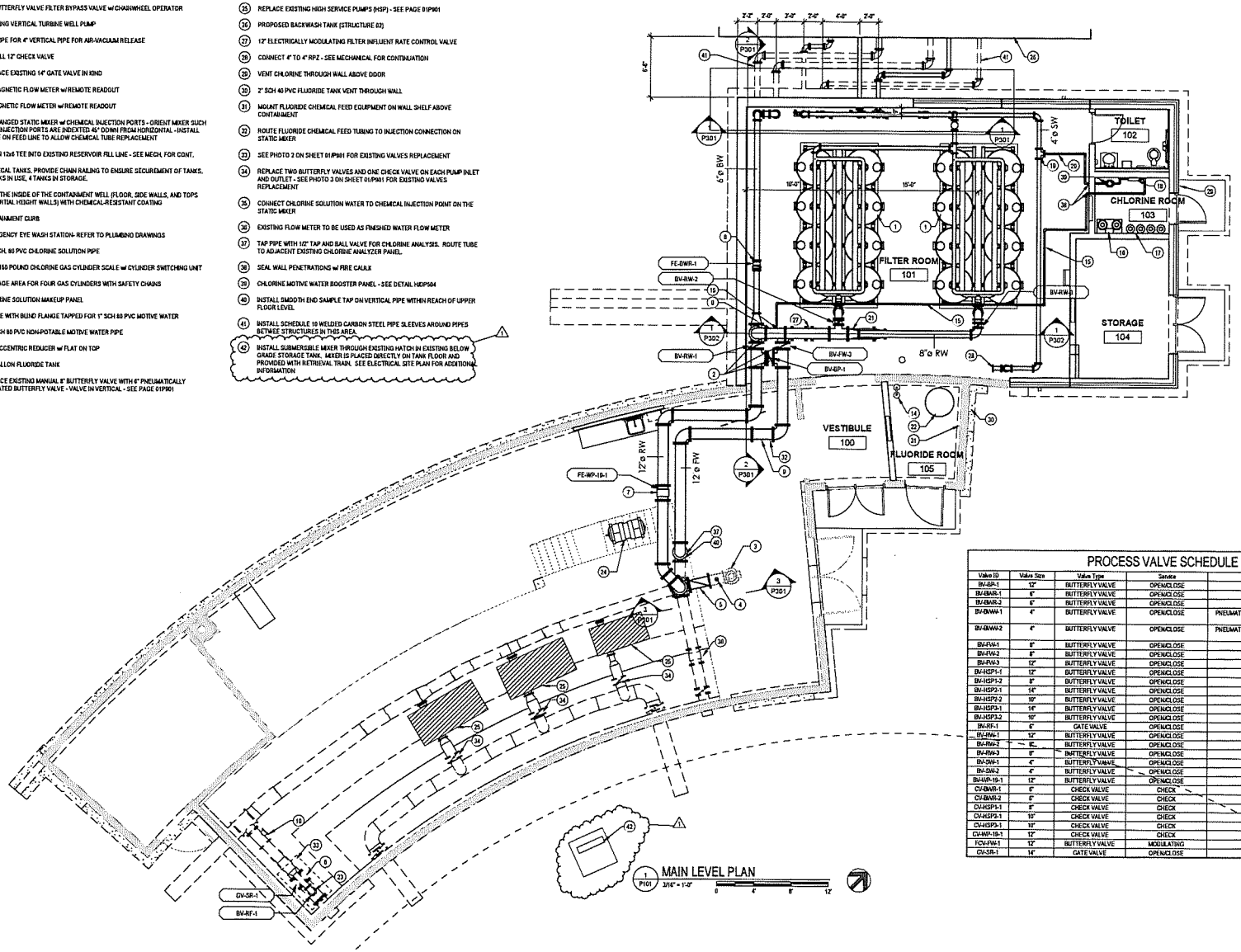
REV. #	DESCRIPTION	DATE
1	ADDENDUM 2	11/20/2023

STEEL DETAILS

DS531

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXTED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS, PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS. 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. COAT THE INSIDE OF THE CONTAINMENT WELL (FLOOR, SIDE WALLS, AND TOPS OF PARTIAL HEIGHT WALLS) WITH CHEMICAL-RESISTANT COATING
13. CONTAINMENT CURB
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH. 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x8 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 150 GALLON FLUORIDE TANK
23. REPLACE EXISTING MANUAL 8" BUTTERFLY VALVE WITH 6" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01P901
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01P901
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL HDP504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEE STRUCTURES IN THIS AREA.
42. INSTALL SUBMERSIBLE MIXER THROUGH EXISTING HATCH IN EXISTING BELOW GRADE STORAGE TANK. MIXER IS PLACED DIRECTLY ON TANK FLOOR AND PROVIDED WITH RETRIEVAL TRAIN. SEE ELECTRICAL SITE PLAN FOR ADDITIONAL INFORMATION



1 MAIN LEVEL PLAN P101 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BP-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWA-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWA-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-RF-1	6"	GATE VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WP-10-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP2-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-WP-10-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

SEH

REVISED

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2225 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: MS
Drawn By: LAP

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

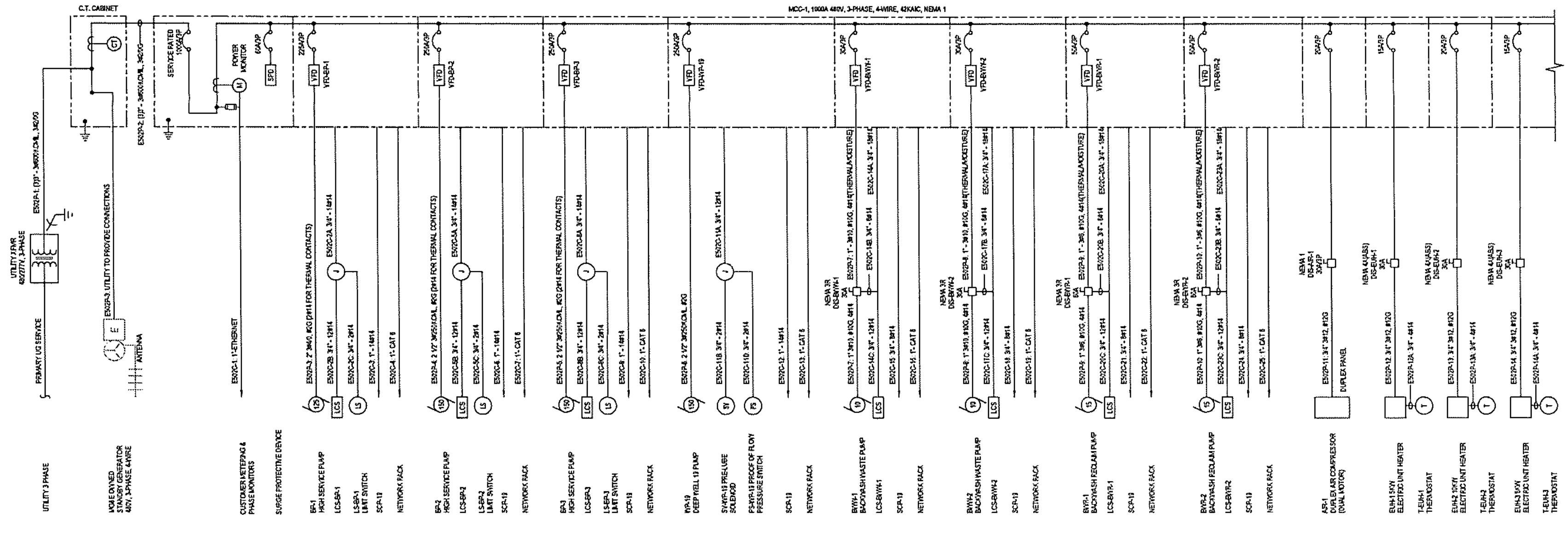
REVISION SCHEDULE

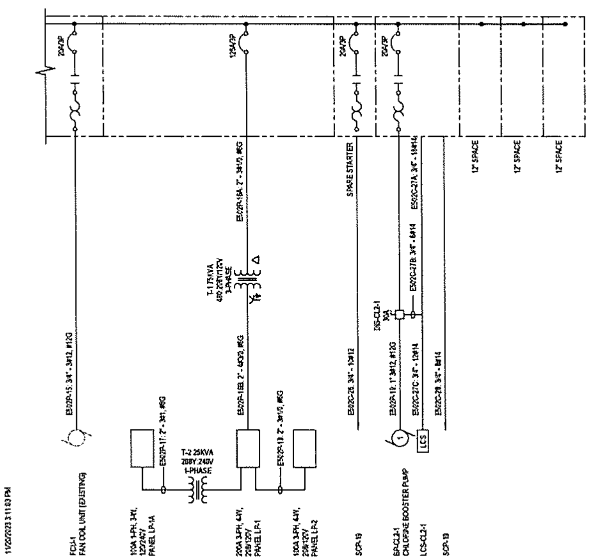
REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 3	11/09/2023

PROCESS PLAN

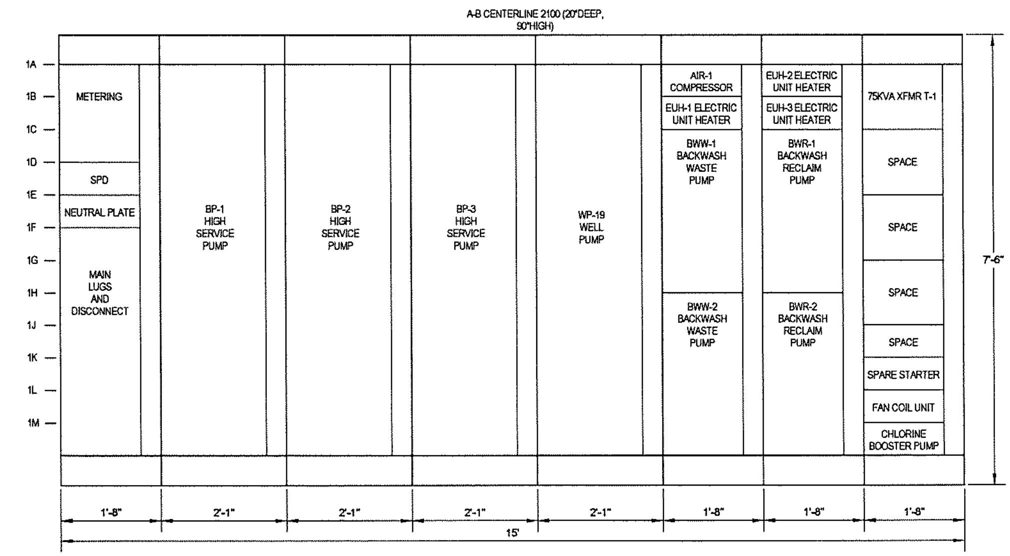
01
P101

1/17/2023 10:53:28 AM





1 MCC ONE-LINE DIAGRAM
E502 NOT TO SCALE



7 MCC ELEVATION
E502 NOT TO SCALE

11/22/2023 3:11:03 PM

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CBW
Drawn By	DDH
Project Status	BIDDING DOCUMENTS
Issue Date	OCTOBER, 2023

REVISION SCHEDULE

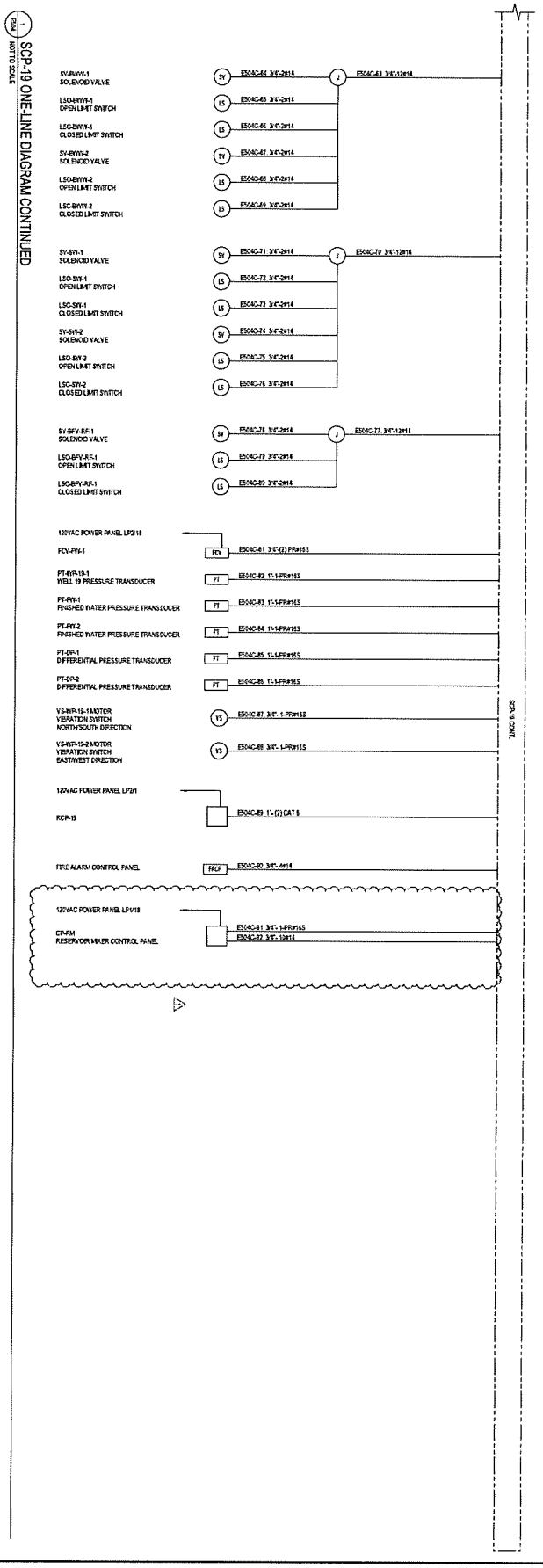
REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/20/2023

ONE-LINE DIAGRAM

01

E502

1/25/2023 3:11:03 PM



CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

ONE-LINE DIAGRAM

01
E504

REVISED

GENERAL STRUCTURAL NOTES
1. These notes do not replace the specifications but are to be read in conjunction with them. Any discrepancies or conflicts between the two shall be brought to the attention of the Structural Engineer of Record (SER) for resolution. In these Notes and the Specifications, the word "shall" means "has a duty to."
2. These drawings are for this specific project (SEH project number MADWU-167818) and no other use is authorized. Contact SER, Sara Jost 651.302.7663.

GOVERNING BUILDING CODE:
2018 Wisconsin Commercial Building Code
2015 International Building Code as adopted and amended by the state building code

DESIGN CODES AND STANDARDS:
ACI Manual of Concrete Practice
ACI 318, 301 Building Code Requirements & Specifications for Structural Concrete
ACI 350 Environmental Engineering Concrete Structures
ACI 530 / TMS 402 / ASCE 5 Building Code Requirements & Specifications for Masonry Structures
AISC 360, 303 Specification for Structural Steel Buildings
CRSI Manual of Standard Practice
PCI MNL 116 PCI Manual for Quality Control
PCI MNL 120 PCI Design Handbook - Precast and Prestressed Concrete
PCI MNL 123 PCI Connections Manual

DESIGN LOADS PER ASCE 7-10
Risk category III

1. Live load:	
Floor slabs	150 PSF UNO
Elevated walkways	100 PSF
Roof live load	20 PSF
2. Dead load:	
Superimposed roof load	15 PSF
3. Snow loads:	
Ground snow load	30 PSF
Importance factor	1.10
Roof snow load (Wellhouse)	23.1 PSF + drifting & unbalanced
Roof snow load (Backwash Tank)	25.4 PSF
Snow exposure factor	1.0
Thermal factor (Wellhouse)	1.0
Thermal factor (Backwash Tank)	1.1
4. Wind loads:	
Wind speed (3 sec gust)	120 mph
Wind exposure	C
Mean roof height	15 feet
Kd	0.85
Kzt	1.0
G	0.85 (rigid building)
Structure is:	Enclosed
Internal press coef	+/-0.18
Interior walls	5 PSF lateral load
5. Seismic loads:	
Site class	C
Ss	0.084 g
S_1	0.048 g
Fa	1.2
Fv	1.7
Sds	0.067 g
Sd1	0.052 g
Ie	1.25
Seismic design category	A
6. Soil criteria:	
Allowable soil bearing pressure(assumed)	2,500 PSF
Measured groundwater elevation at the time of drilling	NOT ENCOUNTERED AT THE TIME OF DRILLING
Dewater as required to keep excavations dry	
Frost depth	48 inches (heated building) 60 inches (unheated structure)
Anticipated max differential settlement	1/2 inch
Anticipated max total settlement	1 inch
Sand backfill (assumed/per geotechnical report):	
Wet unit weight	120 PCF
Angle of Internal Friction	30 degrees
At-rest pressure coefficient, k0	0.5
Subgrade modulus Wellhouse	100 PCI
Subgrade modulus Backwash Tank	150 PCI
7. Precast plank loading, where not noted on drawings:	
Superimposed dead load indicated above (roofs)	5 PSF
Hanging live load (suspended MEPP)	10 PSF
Lifting loads	Loads as shown on the drawings
Roof live load	20 PSF

If mechanical units shown on the drawings are greater than 20 PSF within their footprints apply the difference within their footprints.

DESIGN / CONSTRUCTION CRITERIA
1. The contractor shall verify dimensions and conditions before construction and notify the engineer of any discrepancies, inconsistencies, or difficulties affecting the work before proceeding.
2. All material, workmanship, and details shall be in accordance with typical competent construction practices, current manufacturer's recommendations, and all applicable codes and government regulations.
3. Any material used in contact with drinking water shall be demonstrated to meet NSF 61.
4. The contractor shall coordinate all disciplines, verifying size and location of all openings, whether shown on structural drawings or not, as called for on process, architectural, mechanical, electrical or other drawings. All conflicts, inconsistencies, or other difficulties affecting structural work shall be called to the architect and engineer's attention for direction before proceeding.
5. Equipment and structural anchor rod sizes, types, embedment, and patterns shall be verified with the manufacturer or fabricator. All anchor patterns shall be templated to ensure accuracy of placement.
6. The contractor shall supply all necessary temporary bracing, shoring, guying, or other means to avoid excessive stresses and to hold structural elements in place during construction.
7. Job site safety (including excavations) is the sole responsibility of the general contractor and their subcontractors.
8. The engineer is not responsible for construction means, methods, techniques or practices. Where drawings and details imply this, they are provided to show final construction. If contractor desires to use different means and methods than implied by these drawings, submit similar details for review.
9. Standard or typical structural details are intended to illustrate design concepts and to specify material and required physical dimensions matching or similar to the referenced locations in the drawing set. Standard details apply whether or not they are cut on the drawings.
10. There is no provision for future vertical or horizontal expansion in the design.

EXISTING CONSTRUCTION
1. Before proceeding with any work within the existing facility, the contractor shall familiarize themself with existing structural and other conditions. It shall be the contractor's responsibility to design, provide, and erect all necessary bracing, shoring and other safeguards to maintain all parts of the existing work in a safe condition during the process of demolition and construction and to protect from damage those portions of the existing work which are to remain.
2. The contractor shall field verify the dimensions, elevations, etc. necessary for the proper construction and alignment of the new portions of the work to the existing work. The contractor shall make all measurements necessary for fabrication and erection of structural members. Any discrepancy shall be immediately brought to the attention of the engineer.
3. Any existing construction damaged in the removal of adjacent elements shall be replaced at the contractor's expense.
Where existing concrete elements are to be demolished and reinforcing is not required to remain, cut existing reinforcing flush with concrete to remain and coat with epoxy, unless covered with concrete in final construction.

FOUNDATIONS
1. CAUTION: Existing underground utilities may exist anywhere on the site. Notify owner and Digger's hotline (800) 242-8511 prior to disturbing any grade or excavation.
2. Material Definitions and Gradations:
   a. Non-frost-susceptible fill
      - 100% passing 1" sieve
      - < 50% passing #40 sieve
      - < 6% passing #200 sieve
      - < 2% organic content
   b. Aggregate Base
      - 100% passing 1" sieve
      - 70-100% passing 3/4" sieve
      - 45-90% passing 3/8" sieve
      - 35-80% passing #4 sieve
      - 20-65% passing #10 sieve
      - 10-35% passing #40 sieve
      - 3-10% passing #200 sieve
      - < 2% organic content
      - Large aggregates through #4 have minimum 25% fractured faces or crushed (per gradation)
   c. Aggregate Filter/Base
      - 100% passing 1" sieve
      - 85-100% passing 3/4" sieve
      - 45-90% passing 3/8" sieve
      - 20-60% passing #4 sieve
      - 0-10% passing #10 sieve
      - 0-5% passing #200 sieve
      - < 2% organic content
      - Large aggregates through #4 have minimum 75% fractured faces or crushed
   d. Granular Structural Backfill
      - 100% passing 1" sieve
      - 0-85% passing #10 sieve
      - 0-85% passing #40 sieve
      - 0-10% passing #200 sieve
      - < 2% organic content
3. Structural foundations consist of wall and spread footings established on material capable of safely supporting 2,500 PSF as recommended by CGC Inc testing in report C22051-10 dated 01/20/2023. The structural engineer is not responsible for the accuracy or content of the subsurface soil conditions described in the specifications, test borings, or geotechnical report. A licensed geotechnical engineer shall be present during construction to test, inspect and verify all assumed soil conditions as required.
4. Subgrade tank walls shall be backfilled with Granular Structural Backfill or Non-Frost Susceptible Fill (as defined above) within 2 feet of the wall. Tank walls are not designed to resist lateral load (leak testing or backfilling) until the wall concrete has achieved its full design strength, 14 days minimum. Submit concrete testing verifying this before leak testing or backfilling.
5. Foundation walls shall be adequately braced during backfilling and compaction to prevent movement or structural damage. Bracing shall remain in place until permanent bracing is in place and until concrete achieves sufficient strength to resist imposed loads.
6. When placing compacted fill adjacent to foundation walls and piers, place backfill at equal rates on both sides to prevent overturning or structural damage.
7. Refer to the specifications for a list of structures that require leak testing prior to backfilling.
8. Away from walls, place fill in 8 inch loose lifts and compact to 95 percent Modified Proctor beneath foundations. When placing compacted fill adjacent to foundation walls and piers, place backfill at equal rates on both sides to prevent overturning or structural damage.
9. Contractor shall provide for dewatering all excavations from either surface water or seepage.
10. Moisture content in soils beneath building locations should not be allowed to vary after footing excavations and after grading for slabs on grade are completed to a degree that would de-stabilize the compacted soil. If subgrade materials become desiccated or softened by water or other conditions, remove and replace with engineered fill as recommended by the geotechnical engineer. Do not place concrete on frozen ground, nor allow ground beneath foundations to freeze. All foundation work shall be placed on substrate approved and tested by geotechnical engineer of record.
11. Do not place backfill on frozen subgrade. Do not place frozen backfill.
12. Slabs on grade shall be constructed on a subgrade of native material compacted to at least 95 percent modified proctor, and 6 inches of Aggregate Base or Aggregate Filter/Base (as defined above) or WisDOT base aggregate course (dense) below the slab compacted to 95 percent modified proctor density unless noted otherwise in geotechnical report. In wet or potentially wet situations, use Aggregate Filter/Base (as defined above).
13. Grading: where not specifically shown on the plans, it is intended that all excavated and backfilled areas shall be graded to slope away from buildings and other structures.

CONCRETE
1. An independent testing agency shall cast 4 six inch test cylinders (5 if 56 day strength is allowed) or an additional cylinder if four inch cylinders are used, for each 75 cubic yards of each concrete mix placed or for each day's operation, whichever is the lesser amount. The testing agency shall cast, cure, and test the specimens in accordance with ASTM C31 and ASTM C39. Air, temperature, and slump shall be tested at minimum for the first truck and every third truck thereafter (1st, 4th, 7th, etc.) or when a change in properties is noticed, at the final location (test after pump, not at truck).
2. The contractor shall be responsible for the design of formwork to comply with the dimensions indicated on the plans, maintaining proper alignment during concrete pouring operations. Special care shall be taken with formwork for self-consolidating concrete.
3. All concrete except as noted in the following paragraphs shall meet the following requirements:
   - Compressive Strength — f'c = 4,000 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max (0.40 max if exposed to sulfates)
4. Concrete used in exterior flatwork and stoop slabs shall meet the following requirements:
   - Compressive Strength — f'c = 4,500 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max
   - Portland cement content — 450 pounds per cubic yard min
5. Grout fill used in hydraulic structures shall meet the following requirements:
   - Compressive Strength — f'c = 3,000 PSI min at 28 days
   - Water / (cement + pozzolan) ratio — 0.45 max
   - Macro-fibers — per specifications
6. Concrete and grout exposed to frost (including foundation walls) shall be air entrained 6% +/- 1%.
7. Slump shall be 4 inches +/- 1 inch without water reducing admixtures. With water reducing admixtures, concrete mix design shall state design slump and field tests shall be +/- 1 inch. Slump is used primarily as a measure of concrete consistency, truck to truck. If slump is outside these ranges, water content (water:cementitious ratio) shall be checked against allowable; and concrete rejected, accepted, or adjusted on that basis.
8. Water-reducing admixtures conforming to ASTM C494 added to the mix at manufacturer's dosage rates may be used for improved workability.
9. Do not add water to concrete at the jobsite without written approval of the SER, and in no case in excess of the water in the approved mix design.
10. No chloride containing admixtures are allowed.
11. Concrete used in tank slabs and walls shall have Xypex, Euclid Vandex AM-10, Penetron, or BASF Masterlife 300d admixture added to the mix at manufacturer's dosage rates (minimum 2% of cementitious content; maximum of 2 percent of cementitious content in potable water tanks). Concrete used in areas subject to de-icing salts (including stoop slabs and aprons) shall have Cortec MCI added to the mix at manufacturer's recommended dosage rates.
12. All concrete is normal weight unless specifically noted otherwise.
13. Cement shall be Portland cement type 1 conforming to ASTM C150 or Portland Limestone Cement type 1L conforming to ASTM C595. Up to 30% cement can be replaced with flyash and up to 50% with GGBFS (50% combined max.). Aggregate for normal weight concrete shall conform to ASTM C33. Water is to be potable or demonstrated to have no harmful effects on concrete. Fly ash shall be demonstrated by test to contain minimum 18 percent CAO except as noted in next paragraph. When fly ash is used in concrete to be air entrained, air entraining shall be adjusted as required for LOI per recent experience of ready mix supplier.
14. Measured from the time water and cement are batched together, no more than 90 minutes shall elapse until concrete is placed. This time shall be reduced by two minutes for every degree that concrete temperature exceeds 75 degrees Fahrenheit. These criteria may be relaxed by the use of set-controlling admixtures.
15. Protect concrete in accordance with ACI 305 and ACI 306 for hot weather concreting and cold weather concreting respectively. In cold weather, heat is required if outside temperature falls below 30 degrees any time during first three days. Reinforcing shall be 40 degrees or warmer at time of concrete placement. Concrete temperature shall be recorded every morning and shall be kept above 40 degrees in all locations for 7 days. Concrete shall not be exposed to combustion products (use electric heat, ducted heater or ground thaw). Keep protection in place minimum 24 hours after cessation of heating to provide gradual cool-down.
16. When air temperature is above 85 degrees, provide mist, shading, windscreens and other protection as required for 12 hours after placing.
17. Concrete being placed shall be protected from rain. If rain falls on concrete before it has set, or within 3 hours of placement in any event, contractor shall bear cost of testing to prove concrete is unaffected, and shall remove and replace affected concrete to the satisfaction of the engineer.
23. Wet cure (poly and burlap or proprietary blankets kept moist daily) for a minimum of 7 days; sides of footings may be buried after 24 hours. Add one day of cure for flyash in excess of 15 percent or GGBFS in excess of 10 percent of cementitious. Contractor is responsible for staining caused by burlap in visible areas. Spray-on curing compounds shall not be used as a substitute for wet curing without written permission of the SER except as follows. Liquid-containing structures must use a wet cure on all surfaces. Spray-on curing compounds may be substituted for wet curing in areas of non-liquid-holding structures that are not visible in the final condition and in liquid holding structures in winter conditions where water curing may be hazardous or difficult. When spray-on curing compounds are used, they should be applied in two layers perpendicular to each other and according to manufacturer's instructions.
24. Cementitious grout shall be non-shrink and non-metallic grout. Place according to manufacturer's recommendations and trim neatly where visible.
25. Coordinate with other trades for sleeves, conduit, electrical grounding wires, inserts, underground utilities, and other items to be embedded into concrete and verify that they are properly installed and supported before casting concrete. Holes through slab or wall shall leave minimum 1 inch clear to reinforcing; shift reinforcing as required. Placement of such items shall be coordinated with reinforcing placement where they would otherwise displace each other. For instance, in areas with a single mat of reinforcing, east-west conduit should be placed with east-west reinforcing and north-south conduit is placed with north-south reinforcing.
26. Embedments shall not significantly impair the strength of the structure and shall not reduce fire protection. In no case shall embedments violate the required concrete cover. Conduit and pipes, with their fittings, embedded in concrete shall not be larger in outside dimension than 1/3 the overall thickness of slab, wall, or beam in which they are embedded and shall not be spaced closer than three diameters on center. Conduit and pipes placed within 2 feet below bottom of slabs and footings shall not be spaced closer than three diameters on center and shall be encased in CLSM or concrete vibrated to flow around conduit.
27. No uncoated aluminum items shall be embedded in any concrete. All aluminum surfaces in direct contact with concrete shall receive one coat of 8-12 mil dry film thickness bitumastic.
28. Unless shown on drawings, concrete shall be placed without construction joints except where specifically shown on shop drawings approved by the engineer. The contractor shall submit shop drawings showing additional or alternate construction joint locations to the engineer for approval.
29. Bevel all exposed corners of concrete 3/4"x3/4".
30. Verify size and location of all equipment bases and housekeeping pads.
31. All cast-in-place concrete floors on grade shall be provided with a min. 1/8" per FT slope to floor drains unless noted otherwise. All interior slabs on grade shall be placed over 10 MIL vapor retarder meeting ASTM E1745 class A, with joints welded or lapped and sealed according to manufacturer's recommendations. Vapor retarder shall permit less than 0.01 perm after conditioning. All damage and penetrations shall be sealed according to manufacturer's recommendations.
32. All concrete to be trowel finished shall be tested for air content, whether or not it is purposely air entrained. If concrete contains more than 2 percent entrained air, delay start of finishing to preclude weakened air-rich plane just below surface.
33. Where placing new concrete against previously existing concrete, bush-hammer existing to leave a profile of 1/8 inch and blow clean with oil-free compressed air or water blast. To the extent possible, leave a smooth zone under hydrophilic waterstop; see next section. This roughening does not apply to recently placed concrete at a keyed construction joint.
34. All slabs and stairs not shown otherwise shall be 5" thick with #4 bars at 16" on center each way. All exterior stoops not otherwise detailed may be constructed in any standard manner, solid or hollow, but must be reinforced with epoxy coated #4 bars at 12" on center each way minimum. Porches and stoops shall be doweled to adjacent walls or grade beams with #4 bars at 16" on center, hooked or embedded 40 diameters into both members. Slope stoops minimum 1/8" per foot for drainage unless noted otherwise.
35. Unless specifically noted otherwise, building sections may not illustrate all dowels, keyways, or waterstops required by design. All base slab or footing to wall joints shall have vertical dowels crossing the joint. All elevated slabs (including base slabs above the lowest base slab elevation) to tank or foundation walls shall have horizontal dowels crossing the joint. Slabs on grade may either be independent (with expansion joint) or doweled in; provide dowels where slabs on grade are shown to bear on walls in sections. Refer to typical details in the drawings for design intent.

JOINTS IN CONCRETE STRUCTURES
1. Because of the effects of concrete consolidation, workmanship, detailing, cure, temperature, aggregate size, and other factors; Contractor is responsible for cracking in base slabs and walls of liquid-holding structures, and shall repair any leaking cracks by sealing, injecting, or otherwise filling them. Where sealing is judged necessary by either Contractor or Engineer, Contractor shall submit material and description of sealing to be used for review by Engineer. Note that crystalline waterproofing will heal tight cracks (less than approximately 1/64") over time in warm temperatures, but wide cracks or leak tests attempted in cold temperatures will require additional measures. Any wall which is or may be subject to external groundwater is considered liquid holding.
2. Contractor is encouraged to use well-graded aggregate larger than ¾"; fiber reinforcing; shrinkage reducing admixtures; crystalline waterproofing; extended moist cure; and other means to reduce shrinkage. If used, crystalline waterproofing shall be used at the manufacturer's recommended dosage.
3. Concrete walls in liquid-holding structures:
   a. Concrete walls in liquid-holding structures shall have waterstopped construction joints at a maximum spacing of 20 feet for concrete proportioned according to these Notes and the specification. Full horizontal reinforcing shall extend through these joints and be developed each side of joint. At least 36 hours shall pass between adjacent wall pours in liquid-holding structures. Joint spacing in walls shall be measured at the inside surface between corners in a straight line or along a curve, but not around corners. For example, an 18' square box is not required to have wall joints, but a 22' square box is required to have one in each wall. For this purpose, a T-intersection counts as a corner at the intersecting wall but not at the continuing wall.
   b. Alternatively, a low-shrinkage mix may be proposed, and shrinkage measured for the specific concrete mix to be used in the walls, and the maximum construction joint spacing determined by the equation: Spacing = 2.0 / (sh + 0.03), where "sh" is the shrinkage in percent from the 35-day shrinkage test described below; and the spacing is limited to 50 feet. Concrete placed in the walls shall have the same or lesser water content as that used in the test. If a Shrinkage Reducing Admixture or Shrinkage Compensating Admixture is used, it shall be used at the manufacturer's recommended dosage. Measurement of shrinkage shall be according to ASTM C157, except that the specimens should be cured in a lime saturated bath for 7 days rather than 28 days. Shrinkage shall be reported based on measurements at the end of the 7-day moist cure, and at 28 days after cessation of curing. If Shrinkage Compensating Admixture is used, initial measurement shall be 12 hours after placing rather than 7 days; full 7-day lime bath cure and 28-day drying shall still be followed.
4. Concrete base slabs in liquid-holding structures:
   a. Concrete base slabs in liquid-holding structures shall have waterstopped construction joints at a maximum spacing of 40 feet in each direction, with full reinforcing through the joint and developed each side of each joint. At least 36 hours shall pass between adjacent slab pours in liquid-holding structures.
   b. Alternatively, shrinkage may be measured as specified above for the specific concrete mix to be used in the base slab, and the maximum spacing determined by the equation: Spacing = 4.0 / (sh + 0.03), where "sh" is the shrinkage in percent from the 35-day shrinkage test described above and the spacing is limited to 100 feet. Concrete placed in the base slab shall have the same or lesser water content as that used in the test. If a Shrinkage Reducing Admixture is used, it shall be used at the manufacturer's recommended dosage.
5. Concrete slabs on grade in non-liquid-holding structures:
   a. Contraction joint spacing in non-liquid-holding steel-reinforced slabs on grade (building floors) shall be spaced at a maximum of 24 x Thickness, but not more than 15 feet, in each direction. Contraction joint spacing in fiber-reinforced slabs on grade shall be spaced at a maximum of 30 x Thickness, but not more than 18 feet, in each direction. A slab of dimension 20 feet or less does not need to be divided by a contraction joint in that direction except as required by aspect ratio. The aspect ratio of any panel shall not exceed 1.50. Unless noted on drawings, Contractor shall submit proposed contraction joint spacing for review. Joints shall intersect columns. Where slab is reinforced with bars #4 or greater, cut or interrupt every other bar at each contraction joint. Joint depth shall be slab thickness / 4, with a minimum of 1". If sawcut, joints shall be cut as soon as it is possible to do so without raveling the concrete, but no later than 12 hours after placement.
   b. Contraction joint spacing in steel-reinforced slabs on grade (building floors) with two mats of reinforcing shall have a 1 ½" chamfer strip at bottom of slab and a sawcut or formed joint 1 ½" deep at same location, top of slab. Cut or interrupt every other bar of each mat at each contraction joint.
   c. Construction joints in building floor slabs on grade shall provide for shear transfer across the joint, using plate dowels such as Diamond dowels. Round or square dowel rods shall not be used. Reinforcing bars may be used where shown on drawings, e.g. at stoop or apron joints. Plate dowels shall be sized per manufacturer's recommendations and spaced at manufacturer's recommended spacing (18 inches max for wheeled traffic on slab, 24 inches max otherwise). If subject to de-icing salt, plate dowels shall be galvanized or epoxy coated.
6. Concrete in non-liquid-holding structures other than slabs on grade:
   a. Concrete walls in non-liquid-holding structures shall have construction or contraction joints at a maximum spacing of 60 feet.
   b. Footings carrying such walls shall have construction or contraction joints at a maximum spacing of 120 feet.
   c. Half the longitudinal reinforcing shall be interrupted at these joints unless noted otherwise.
   d. Space control joints at maximum 10'-0" on center each way for topping slabs on precast plank.

WATERSTOPS
1. Waterstops in new construction shall be 6-inch PVC, center bulb, ribbed, unless specifically noted otherwise.
2. At splices, miter all intersecting connections at 45 degrees and use a manufacturer approved heating iron to make full contact butt joints. At areas under more than 10 feet of hydrostatic head, all welded field splices shall receive a bead of flowable hydrophilic waterstop such as Adeka P-201 on each side of waterstop at weld.
3. For construction joints at hardened concrete, hydrophilic waterstops may be proposed by the contractor in lieu of adhered split-T PVC waterstop. Such material shall be selected considering water head to be resisted, concrete cover in all directions, reinforcing present through the joint, and whether waterstop is continually immersed. Contractor's proposal shall include waterstop information and contact information for a technical representative of the waterstop supplier along with the representative's written recommendation of the type of waterstop to be used. Hydrophilic waterstop shall not be used unless this process is followed.

PRECAST CONCRETE
1. Prior to installation, the precast concrete manufacturer shall submit structural calculations and plans to the architect/engineer for review. The structural calculations shall contain an original Professional Engineer's seal and signature by the design engineer licensed in the state where the project is located. Where precast is used as a structural shear diaphragm, calculations shall include shear capacity data for the members in question, topped or untopped.
2. Precast concrete units shall be designed for all potential loading conditions including initial handling and erection stresses, all superimposed dead, live, and lateral loads shown on the contract drawings, and all concentrated loads from mechanical equipment and lifting points. General contractor shall verify mechanical loads with the mechanical contractor and provide to precast designer and SER before design.
3. The precast concrete manufacturer shall be responsible for the design and installation of all precast connection hardware including hangers, embed plates, anchors, clip angles, headers at openings, etc. that are cast into or form a part of the precast units. Precast manufacturer shall provide 1/8 inch thick continuous bearing strips beneath hollowcore slabs and masonry or concrete supports.
4. All roof and wall opening dimensions and locations shown on the plans shall be verified by the contractor and roof manufacturer. Wall openings not contained within a panel width shall be protected by posts or other means during transit and erection.
5. Precast wall panels shall be fully grouted at base.
6. Joints between plank shall be pulled flush and grouted. Maximum distance between edges of planks is 4 inches at any joint. Where partial width planks are required, edge of ripped plank shall be smooth and straight.

1. Where topping is called for, plank shall receive a transverse broom finish at plant and shall have keys grouted minimum 4 days before topping is placed. Immediately before placing topping, pressure-wash surface of plank and blow clean with oil-free compressed air, then rub with cement slurry as a bonding agent, working just ahead of concrete placement. Surface to be free of standing water but slurry must be wet when topping is placed. Wet cure topping (burlap/poly) for a minimum of 7 days. Topping slabs shall be reinforced with 6x6 - W2.9 x W2.9 welded wire fabric (flat sheets only) macrosynthetic fibrous reinforcement integral to the mix.
2. All horizontal joints and reveals in wall panels shall align within 1/2 inch or 1/2 of joint dimension, whichever is less, at all joints between panels.
3. All exposed connection components shall be stainless steel type 316 / painted steel / steel with three coat paint system: moisture-cured zinc-rich urethane primer, epoxy, urethane. (pick one)

REINFORCING STEEL
1. All concrete is reinforced concrete unless specifically called out as unreinforced. Reinforce all concrete not otherwise shown with same steel as in similar sections or areas. Any details not shown shall be detailed per ACI 315 and meet requirements of ACI 318, current editions.
2. All reinforcing steel shall conform to the requirements of ASTM A615 grade 60 steel. Reinforcing steel shall not be welded without authorization of the SER, and if welded shall be A706 grade 60 steel. Reinforcing to be welded shall only be welded to structural steel, not other reinforcing, unless specifically noted on the drawings. Welded plain wire fabric shall be supplied in sheets, not rolls, and conform to the requirements of ASTM A185.
3. Clear minimum cover of concrete over reinforcing steel shall be as follows unless specifically noted otherwise:
   - 3" Concrete placed against earth
   - 2" Top mat of base slabs to receive waterstops at wall joint
   - 2" All other concrete
4. All reinforcing shall be tied to crossing reinforcing on at least every other bar (every bar at perimeter), and sufficiently to resist displacement from workers and placement of concrete.
5. All footing dowels shall be accurately positioned and wired in place before casting footing concrete. Where not noted, provide and install hooked dowels of same size and spacing as vertical reinforcement in all columns and walls. Position all anchor bolts with templates.
6. Bar lap table can be found on the first general sheet of the structural drawings.
7. Bar lap lengths in concrete and 90 degree end hooks shall be in accordance with the bar lap table unless noted otherwise. This table lists class 'B' laps. For epoxy coated reinforcing steel, increase lap length by 50% with c-c bar spacing < 6db and cover to center of bar <3db, otherwise increase by 20%. For masonry reinforcing, use fc' = 3000 psi values.
8. Bars marked continuous, corner bars, and all vertical steel shall be lapped in accordance with table above at splices and embedments, unless shown otherwise. Splice top bars near midspan and splice bottom bars over supports, unless noted otherwise.
9. Bar support accessories shall be as specified in latest edition of the ACI detailing handbook and the concrete reinforcing steel institute design handbook. Maximum accessory spacing shall be 4'-0" on center, and all accessories on exposed surfaces shall have plastic coated ends. Chairs shall be supported on sand plates as required to keep from sinking into subgrade. WWF shall be supported by continuous bolsters or bars on chairs sufficiently close to prevent sheets from sagging appreciably during concrete placement. Support rebar used at contractor's option shall be extra bars supplied by contractor, not taken from design reinforcing.
10. Where potentially exposed to de-icing salts; stoop, apron, sidewalk and floor reinforcing shall be epoxy coated.

CONCRETE REPAIR
1. Locate and remove areas of loose, delaminated, or damaged concrete. Saw cut outside perimeter of damaged areas to a minimum depth of approximately 3/4 inch; do not cut reinforcing. Tally areas removed for payment. Sandblast area to be patched and blow clean. Protect surroundings and workers from dust and hazards associated with this work.
2. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide minimum 3/4 inch clearance behind bar. Clean and coat exposed surface of bar with bonding agent (Sika Armatec 110, Sonoprep, or Euclid Corr-Bond).
3. Dampen patch area and apply mortar scrub coat, keeping moist until patch is applied.
4. Patch with polymer-modified cementitious patching mortar (Dayton Superior HD-50, Euclid Verti-coat, Master Builders Emaco R320, Sikatop 121, or Sonopatch 100). Cure according to manufacturer's recommendations.

CONCRETE BLOCK MASONRY
1. Concrete block used in exterior walls or load bearing walls shall meet the following minimum requirements:
   - Masonry assembly — f'm = 2,000 PSI
   - Concrete masonry units: — 2,000 PSI
   - Mortar, ASTM C-270-10 — Type S UNO
   - Grout, ASTM C-476-10 — fg = 3,000 PSI, Slump: 8-11 inches
2. The contractor shall provide adequate temporary bracing for all masonry walls during construction.
3. Concrete block shall be laid in running bond pattern typical unless noted otherwise. No vertical (head) joint shall be continuous for more than one block height. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities which are to be reinforced or to be filled with concrete or grout.
4. Pilasters and columns shall be laid up in running bond in each direction to provide a monolithic unit.
5. All joints shall be concave tooled joints above and below grade.
6. Masonry walls shall be reinforced with hot dipped galvanized truss horizontal reinforcing (per ASTM A153) with 9 gage side and cross rods. Reinforcing shall be continuous in horizontal joints every other block course (16 inches OC) in walls, every course (8 inches OC) in parapets, with prefabricated corner and tee sections.
7. Unless noted otherwise, concrete block shall be reinforced as follows in 6", 8", 10", and 12" walls:
   - Vertical reinforcing shall be a minimum of (1) #5 bar in 6" and 8" walls and (2) #4 bars in 10" and 12" walls at 4'-0" on center.
   - Provide bar or bars of same size as wall reinforcing at each corner, at each door, window, and opening jamb, each side of control joints and in the end void of each length of wall.
   - Lap splices for masonry vertical reinforcing shall be according to the table above, for "wall top bar."
   - Stack bond CMU shall have continuous horizontal bond beams at 48" OC, reinforced with (2) #4 continuous.
   - Continuous horizontal bars shall be included per section or detail in bond beam or optional running bond beam where noted. Where not detailed, use (2) #5 continuous. Where bond beams are continuous at corners of walls, supply corner bars matching size of horizontal bars. All bond beam reinforcing shall have standard laps or hooked development reinforcing bars at wall corners and intersections.
8. Grouting and reinforcing: all masonry, grouting, and reinforcing work shall be performed by mason craft workers who have successfully completed the International Masonry Institute (1-800-IMI-0988) training course for grouting and reinforced masonry construction, or equal
9. When grouting is stopped for more than one hour, stop grout approximately 1 ½ inches below top of CMU to provide key.
10. Masonry block cells with vertical reinforcing and bond beams with horizontal reinforcing shall be grouted solid. Mortar is not an acceptable corefill. Provide a cleanout hole at the base of all grouted cells where grout lift exceeds 5'-4". Account for fly ash in grout during winter construction by protecting and heating as required to assure set and strength gain.
11. Non-load bearing concrete block walls shall be isolated from adjacent structural elements with vertical 1/2 inch control joints and at the top of the wall with minimum 1/2 inch air space or compressible material and support per details on the drawings.
12. Unless otherwise covered on architectural plans or specifications, vertical control joints in masonry construction shall be 3/8" wide, full height of wall. Joints shall be spaced at a maximum of 18'-0" on center and coordinated with the architect/engineer. Install control joints in locations as required and as directed by engineer/architect.
13. All horizontal joint reinforcing shall be discontinuous at control joints in masonry. All bond beam horizontal reinforcing shall be continuous through control joints.
14. Lintels over all openings in walls not otherwise noted, of 4'-0" span or less, shall be one L6 x 3-1/2 x 5/16 angle for each 4" of masonry (2 angles for 12" CMU); or an 8 inch deep bond beam with 2 - #5. All exterior steel lintels to be hot-dip galvanized. Bear minimum 8 inches on jambs grouted and reinforced full height.
15. Walls shall be anchored at bottom by hooked dowels matching wall vertical reinforcing (unless noted otherwise) set on footing bottom mat. Where walls rest on cast-in-place concrete foundation walls, dowels may be straight and lapped with concrete wall reinforcing below. Non-bearing walls shall be anchored at top by bracing angles per details on drawings.
16. Bond beam lintels shall be standard horse collar type (U shaped) block. Continuity bond beams may be, and upper courses of multi-course bond beams shall be, flow through block.

SEH

ORIGINAL

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	NRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

GENERAL STRUCTURAL NOTES

GS002

POST INSTALLED ANCHOR RODS AND DOWELS

1. Unless noted otherwise, anchors and reinforcing dowels installed in concrete or concrete masonry shall be as noted below. Post-installed anchors shall only be used where shown on the construction documents. Anchors not shown or noted on the drawings, those required by the contractor solely for his means and methods, or those required by mechanical/electrical and carrying less than 100 pounds of non-safety-related items, do not require special inspection.
2. Approved manufacturers are: Hilti, ITW / Redhead, Simpson, Dewalt / Powers, and Rawl.
   a. Post installed anchors shall have current ICC approval in accordance with ACI 355 and ICC ES corresponding to anchor base material.
   b. Submit product data and current ICC ES report or IAPMO report showing product is compliant with project code requirements for review.
   c. Contractor shall arrange for manufacturer's rep to train all installers on the complete installation process. A letter of procedure stating method of drilling, the product for use, the complete installation procedure, manufacturer training date and a list of the personnel trained on anchor installation shall be submitted to the engineer.
   d. Substitution requests of alternate products must be approved in writing by structural engineer of record prior to use by providing technical data that the substituted product is capable of meeting performance requirements of specified products including but not limited to the following basis of design parameters ACI 355.2 or ACI 355.4 qualifications.
3. Permanent anchors exposed to earth, weather, or corrosive environments, including all anchors in wet areas of WWTP and water treatment plant work, and anchors engaging stainless steel or aluminum members, shall be stainless steel type AISI 304 or 316, anchors in contact with sewage or chloride deicer runoff shall be type 316. Otherwise, anchors shall be zinc plated, minimum ASTM A36 material unless ASTM A193 grade B7 is noted in the drawings, and shall be according to ASTM F1554. Reinforcing dowels shall be of the same size (U.N.O.), material and coating (if any) as the continuing reinforcing.
4. Where expansion anchors are called for, contractor may substitute screw type anchors with self-tapping threads or adhesive anchors of the same size and embedment, subject to review of capacity by the engineer for the product substituted. Where adhesive anchors are called for, other types shall not be substituted. Screw type anchors shall not be re-used on permanent work.
5. Adhesive shall have a current ICC ES report. Use high viscosity adhesive and placement devices in consultation with the manufacturer for overhead work. Adhesive anchors in overhead or horizontal installation shall be subject to continuous special inspection during installation and shall only be performed by installers certified per ACI/CRSI Adhesive Anchor Certification Program Section 17.8.2 or Engineer approved equivalent. Use low temperature formulations for cold weather work. Do not apply load to anchors until their capacity has been assured.
6. Anchors installed in concrete masonry and precast hollow core concrete shall be installed in cores grouted solid. Minimum grout strength f'_g = 3,000 PSI. Minimum 12 inches of grout each way along horizontal cores from anchor. Vertical cores shall be grouted full height. Anchors installed in masonry shall not be installed within 1 1/2 inches of any head joint unless block are square end and mortared across full width of head joint, or filled bond beam.
7. Holes shall be drilled dry, cleaned, and maintained until installation in accordance with manufacturer's recommendations and ICC-ES report using standard rotary-impact bits and oil-free compressed air. Diamond core bits shall not be used unless specifically approved by the manufacturer.
8. The general contractor shall engage a testing company to locate existing reinforcing bars, PT tendons, and embedded items, by non-destructive means (GPR, X-ray, or other approved means) prior to drilling for installation of anchors. Notify EOR of any conflicts with existing embedded items. Do not cut or damage existing reinforcing or embedded items unless approved by the EOR.
9. Maintain critical spacing and and edge/corner distances as recommended by manufacturer unless specifically noted otherwise in the drawings.
10. Unless noted otherwise, anchors shall be installed to the following minimum embedments:

	Diameter	CIP Concrete	Grouted CMU
Expansion:	3/8 inch	3 inches	
	1/2 inch	3 1/4 inches	4 1/2 inches
	5/8 inch	4 inches	5 inches
	3/4 inch	4 3/4 inches	8 1/4 inches
Screw:	3/8 inch	3 inches	
	1/2 inch	4 1/2 inches	
	5/8 inch	4 3/4 inches	
	3/4 inch	6 1/4 inches	
Adhesive*:	3/8 inch	3 3/8 inches	
	1/2 inch	4 1/2 inches	5 1/2 inches
	5/8 inch	5 5/8 inches	5 5/8 inches
	3/4 inch	6 3/4 inches	6 3/4 inches

*For adhesive at reinforcing bars, increase embedment above by 33%.

11. Except as noted, all anchors shall have intermittent special structural inspection by one of the following. Load tests shall be to 150 percent of service capacity or 75 percent of ultimate strength, with no appreciable slip, permanent deformation, or concrete damage. Anchors which fail this test shall be replaced at no cost to the project. Two failures in a given installation shall result in mandatory load testing at double the rate noted below.
    a. Expansion and screw anchors:
       - Witness installation with torque wrench according to manufacturer's recommendations and requirements of ICC report;
       - Test all anchors with torque wrench after installation (including load test of 5 percent of installed anchors); or
       - Load test of 10 percent of installed anchors by supplier or third party inspector
    b. Adhesive anchor rods and dowels:
       - Witness installation according to manufacturer's recommendations and requirements of ICC report; or
       - Load test of 10 percent of installed anchors by supplier or third party inspector

STRUCTURAL METALS/FRP

1. All structural steel shall be as follows:
   - Wide flange beams and columns shall be ASTM A992, grade 50 steel.
   - All miscellaneous steel (angles, channels, plate) shall be ASTM A992, A529, or A36 steel (min. Fy = 36 KSI).
   - Rectangular steel tubes (HSS) shall be ASTM A500, grade C steel (fy = 50 KSI).
   - Pipe shall be ASTM A53 (fy = 35 KSI) unless A500 grade C (46 KSI) is noted.
   - Other shapes shall be ASTM A36 (36 KSI).
2. Splicing or modification of members in the field is prohibited without prior written approval of the SER.
3. All primary member bolted connections shall be two bolt minimum.
4. Fabrication and erection shall be in accordance with the latest edition of the AISC Manual of Steel Construction, Code of Standard Practice for Steel Buildings and Bridges, except as follows:
   - To paragraph 3.1, add "The project architectural drawings are a part of the structural steel design drawings by reference and must be used concurrently with the structural steel design drawings for any information not shown on the structural steel design drawings".
   - Delete paragraph 3.2 and insert the following: "architectural, process, electrical and mechanical plans shall be used as a supplement to the structural steel design drawings to define detail configurations and construction information".
   - Paragraph 3.3 modify the last sentence to read, "In case of discrepancies between the structural steel plans and plans of other disciplines or existing conditions, such discrepancies shall be called to the architect / engineer's attention for resolution".
5. All aluminum shapes shall be ASTM B209, B308, alloy 6061-T6, except handrail may be 6063-T5 or -T6. All welding shall be performed by a certified welder using compatible electrodes in accordance with the requirements of AWS D1.2 and visually inspected. Where designed by the fabricator, aluminum alloy and temper shall be stated on shop drawings.
6. All steel shall receive a primer coat unless galvanized, refer to specification manual.
7. Unless galvanized, all steel shall receive a three coat paint system: moisture-cured zinc-rich urethane primer, epoxy, urethane. Existing steel in area to be re-decked / All steel shall be cleaned to SSPC SP-10 (near white blast clean) and maintained in this state until painted. Refer to specification manual.
8. All exposed steel shall be galvanized. Damaged galvanizing shall be repaired by application of cold galvanizing compound such as ZRC (minimum 3 coats). Paint finish per architectural.
9. All steel welding shall be performed by a certified welder using E70 electrodes in accordance with the requirements of AWS D1.1 "Structural Welding Code" and visually inspected. Full-pen welds shall also be inspected by NDT methods such as ultrasonic, mag particle, or dye pen.
10. All field welded connections shall be chipped, ground where required, wire brush cleaned and painted to match the paint system.
11. All bolts not otherwise specified shall be 3/4" diameter high strength (ASTM A325-N). All bolts shall be fully pretensioned. Any non-bolt of bolts shall have 10 percent checked with a torque wrench by the special inspector. All beam connections shall be designed per the AISC Manual of Steel Construction "Framed Beam Connections" for the indicated reactions but at least 0.60 x beam total shear capacity shown in the allowable uniform load tables, whichever is greater.
12. All copes shall be made with a 1 inch minimum radius.
13. All anchor rods shall be minimum 3/4" diameter ASTM F1554 grade 36 / ASTM A276 Stainless Steel type 304 OR 306 unless noted otherwise. Where headed rods are noted or specified, bent rods shall not be furnished; rods may be headed or nutted, with the nut lack welded at the bottom end of the anchor or double nutted.
14. Metal/FRP stairways, platforms and grates shall be provided and constructed with adequate design characteristics (100 PSF live load capacity UNO) and structural configurations in accordance with the fabricator's shop drawings as approved by the engineer. All stairways, platforms and grates shall satisfy all requirements of the project documents. All stair runs longer than 10 feet between laterally rigid supports, and all two-post bents, shall have diagonal bracing fastened to the bottom flanges of the stringers and center of posts UNO.
15. All cut or raw surfaces of FRP shall be coated with compatible epoxy meeting NSF 61.

METAL DECK

1. Metal deck shall span a minimum of two continuous spans UNO. Deck design is based on products of Vulcraft Corporation, and any substitutions shall meet that standard. Where not explicitly noted, roof deck is wide rib.
2. Openings through deck which cut one flute need not be reinforced. Openings which cut two flutes shall be reinforced with a hot rolled equal-leg angle the size of the deck depth, minimum 1/4 inch thick, extending 12 inches past the opening, on each side of the opening, fastened with minimum 2 - #10 screws each side of opening. Openings which cut more than two flutes shall be framed to surrounding supports with frames as detailed in the drawings.
3. Manufacturer shall be a member of the Steel Deck Institute (SDI). Detail, manufacture, and install deck and accessories in accordance with SDI and OSHA.
4. Welding and welder qualifications shall be in accordance with AWS D1.3.
5. Deck shall be fastened to underlying framing with 5/8 inch diameter puddle welds at spacing as indicated on the drawings, unless headed studs are to be applied. Contractor may submit shot pins (PAF) for approval as a substitute for puddle welds. Side lap edges shall be joined with minimum of one #10 screw in each deck span, unless more screws are indicated in the drawings.
6. Where spray-on fireproofing is required, the general contractor shall verify that the deck finish is compatible with fireproofing. Coordinate with architect.
7. All roof opening dimensions and locations shown on the plans shall be verified by the contractor and roof manufacturer.

SHOP DRAWING REVIEW

1. Short Elliott Hendrickson Inc. (SEH) will review the general contractor's (GC) shop drawings and related submittals (as indicated below) with respect to the ability of the detailed work, when complete, to be a properly functioning integral element of the overall structural system designed by SEH. In general, submittals will not be reviewed for correct quantities or construction considerations. SEH shall review shop drawings and related materials with comments provided that each submission has met the requirements herein. SEH shall return without comment unrequired material or submissions without GC approval stamp
2. Any items requiring submittal of calculation packages shall have calculations submitted prior to or as part of the shop drawing submittal they accompany. Shop drawings submitted prior to submittal of request calculations will be rejected. All calculations shall be sealed and signed by an engineer licensed in the state of the project. The supplier's engineer must provide calculations for all systems and connections that differ from the drawings. Design shall comply with the requirements in these notes, the drawings and the specifications.
3. Prior to submittal of a shop drawing or any related material to SEH, the GC shall:
   - Review each submission for conformance with the means, methods, techniques, sequences and operations of construction and safety precautions and programs incidental thereto, all of which are the sole responsibility of the GC.
   - Review and approve each submission.
   - Stamp each submission as approved.
4. SEH shall assume that no submission comprises a variation from the contract documents unless the GC advises SEH with written documentation. Should SEH require more than ten (10) working days to perform the review, SEH shall so notify the GC. Submittals shall include drawings and related material (if any) as indicated below.
   - Concrete mix designs and material certificates including admixtures, compounds applied to the concrete after placement, and associated product data. See specifications.
   - Aggregate tests and concrete test history for each mix design, with the submission of concrete mix designs.
   - Reinforcing steel shop drawings including erection drawings and bending details. Bar list will not be reviewed for correct quantities. Include elevations of all reinforced concrete masonry walls and all concrete walls with footing steps or other elevation changes, at a scale no smaller than 1/8" = 1'-0" showing all required reinforcing.
   - Grout mix designs (for CMU) and CMU block certification.
   - Structural steel and metal fabrication shop drawings including erection drawings and piece details.
   - Stairs and railing. Details on the drawings for the following items have been designed by the SER: railing systems, connection of railings and stringers to the primary structure. All other items shall be designed by the supplier's engineer to match intent of the construction drawings.
   - Metal deck shop drawings.
   - Precast shop drawings including reinforcing, bearing details, and design calculations.

REQUIRED INSPECTION

1. Required inspection and testing is required according to the table on the first general sheet of the structural drawings. Refer to specification section 01 45 10 for responsibilities. Contractor shall coordinate with SER, testing agency and geotechnical engineer throughout the project.
   - Required inspections shall be performed in accordance with IBC Chapter 17.
   - Required inspection of reinforcing steel and anchor rod placement shall be performed prior to concrete placement or during anchor rod installation for adhesive anchors.
   - Continuous inspection during concrete placement is required.
   - Conduct concrete slump tests in accordance with ASTM C143.
   - Obtain set of a four (4) concrete test cylinders each time concrete is placed. Make test cylinders in accordance with ASTM C39.
   - See these Notes for testing of Post-Installed anchors and rebar where installation is not witnessed.
   - It is assumed that shop welding will be performed on the premises of a fabricator registered and approved to perform such work without Required Inspection. GC shall submit fabricator documents, standards, and procedures in accordance with IBC 1705.2.
   - It is assumed that precast concrete will be cast on the premises of a fabricator registered and approved to perform such work without Required Inspection. GC shall submit fabricator documents, standards, and procedures in accordance with IBC 1705.2.
   - Reports of Required Inspections shall be provided, at the frequency noted above, to the Owner, Contractor, and Engineer of Record by the firm contracted to perform Required Inspections.
   - Special inspection criteria presented above and in specification shall apply to all footings and foundation walls, but does not apply to non-structural slab on grade and site work concrete.

ORIGINAL

SEH

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187618
Checked By	NRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

GENERAL STRUCTURAL NOTES

GS003

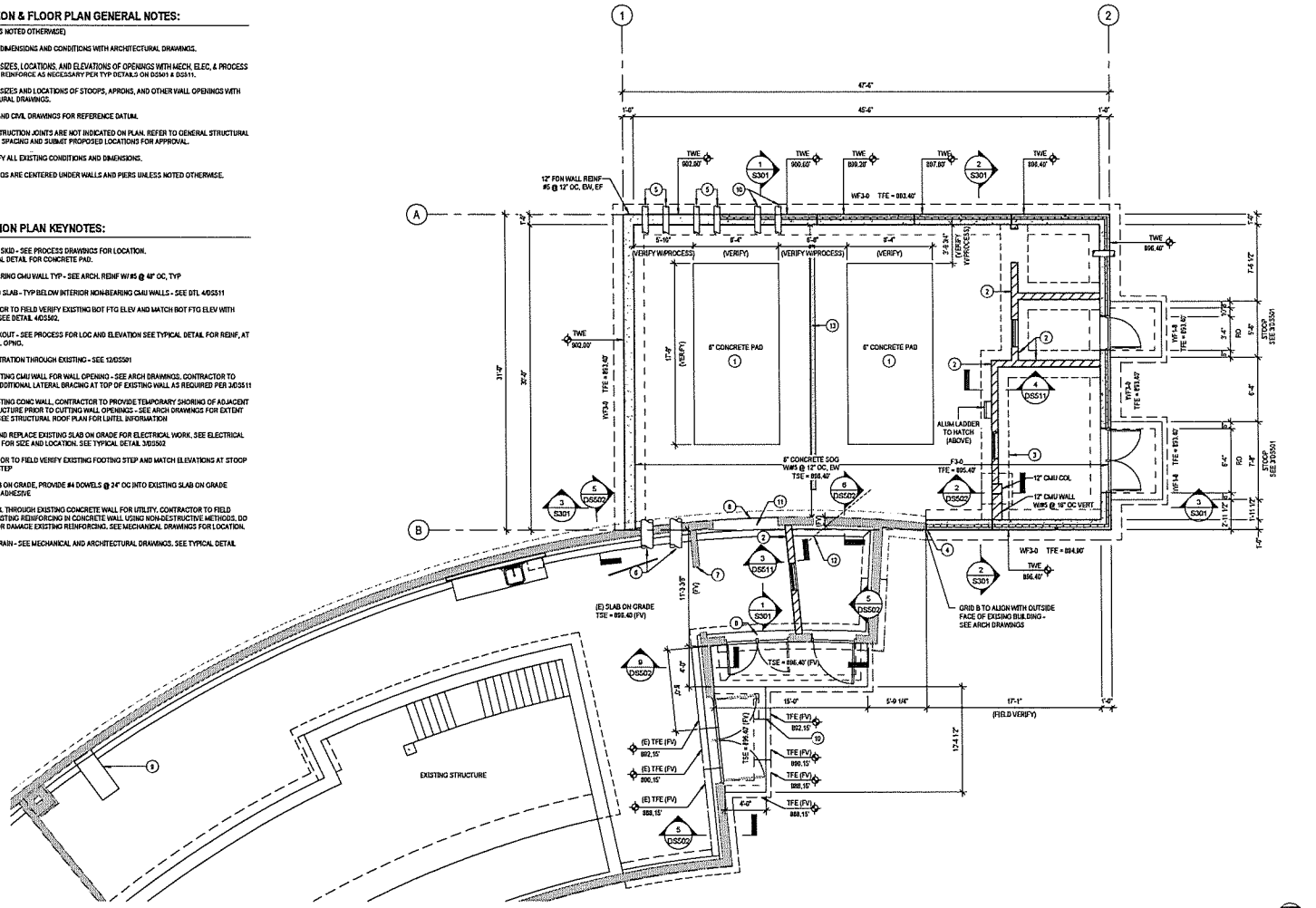
FOUNDATION & FLOOR PLAN GENERAL NOTES:

(TYPICAL UNLESS NOTED OTHERWISE)

1. VERIFY ALL DIMENSIONS AND CONDITIONS WITH ARCHITECTURAL DRAWINGS.
2. VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS WITH MECH, ELEC, & PROCESS DRAWINGS. REINFORCE AS NECESSARY PER TYP DETAILS ON D3501 & D3511.
3. VERIFY ALL SIZES AND LOCATIONS OF STOOPS, APRONS, AND OTHER WALL OPENINGS WITH ARCHITECTURAL DRAWINGS.
4. SEE ARCH AND CIVIL DRAWINGS FOR REFERENCE DATUM.
5. SLAB CONSTRUCTION JOINTS ARE NOT INDICATED ON PLAN. REFER TO GENERAL STRUCTURAL NOTES FOR SPACING AND SUBMIT PROPOSED LOCATIONS FOR APPROVAL.
6. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS.
7. ALL FOOTINGS ARE CENTERED UNDER WALLS AND PIERS UNLESS NOTED OTHERWISE.

FOUNDATION PLAN KEYNOTES:

1. MIX FILTER SKID - SEE PROCESS DRAWINGS FOR LOCATION. SEE TYPICAL DETAIL FOR CONCRETE PAD.
2. 8" NON-BEARING CMU WALL TYP - SEE ARCH. REINF W/ #5 @ 48" OC, TYP
3. THICKENED SLAB - TYP BELOW INTERIOR NON-BEARING CMU WALLS - SEE DTL 4/D5511
4. CONTRACTOR TO FIELD VERIFY EXISTING BOT FTG ELEV AND MATCH BOT FTG ELEV WITH EXISTING. SEE DETAIL 4/D5502.
5. PIPE BLOCKOUT - SEE PROCESS FOR LOC AND ELEVATION SEE TYPICAL DETAIL FOR REINF, AT CONC WALL OPNG.
6. PIPE PENETRATION THROUGH EXISTING - SEE 12/D5501
7. DEMO EXISTING CMU WALL FOR WALL OPENING - SEE ARCH DRAWINGS. CONTRACTOR TO PROVIDE ADDITIONAL LATERAL BRACING AT TOP OF EXISTING WALL AS REQUIRED PER 3/D5511
8. DEMO EXISTING CONC WALL. CONTRACTOR TO PROVIDE TEMPORARY SHORING OF ADJACENT ROOF STRUCTURE PRIOR TO CUTTING WALL OPENINGS - SEE ARCH DRAWINGS FOR EXTENT AND LOC, SEE STRUCTURAL ROOF PLAN FOR LINTEL INFORMATION
9. REMOVE AND REPLACE EXISTING SLAB ON GRADE FOR ELECTRICAL WORK. SEE ELECTRICAL DRAWINGS FOR SIZE AND LOCATION. SEE TYPICAL DETAIL 3/D5502
10. CONTRACTOR TO FIELD VERIFY EXISTING FOOTING STEP AND MATCH ELEVATIONS AT STOOP FOOTING STEP
11. AT (E) SLAB ON GRADE, PROVIDE #4 DOWELS @ 24" OC INTO EXISTING SLAB ON GRADE W/STRUCT ADHESIVE
12. CORE DRILL THROUGH EXISTING CONCRETE WALL FOR UTILITY. CONTRACTOR TO FIELD VERIFY EXISTING REINFORCING IN CONCRETE WALL USING NON-DESTRUCTIVE METHODS. DO NOT CUT OR DAMAGE EXISTING REINFORCING. SEE MECHANICAL DRAWINGS FOR LOCATION.
13. TRENCH DRAIN - SEE MECHANICAL AND ARCHITECTURAL DRAWINGS. SEE TYPICAL DETAIL 12/D5502.



1 S101 FOUNDATION & FLOOR PLAN
3/16" = 1'-0"

PROJECT NORTH

FOOTING SCHEDULE		
MARK	SIZE	REINFORCING
	<varies>	<varies>
F3-0	3'-0" x 3'-0" x 1'-0"	(3) #5 EA WAY, BOTTOM
WF1-8	1'-8" WIDE x 1'-0" DEEP x CONTINUOUS	(2) #5 REBAR CONTINUOUS, BOTTOM
WF3-0	3'-0" WIDE x 1'-0" DEEP x CONTINUOUS	(2) #5 REBAR CONTINUOUS, BOTTOM

SEH

Original

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2626 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167810
Checked By	NRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2022

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

FOUNDATION & FLOOR PLAN

01
S101

ROOF PLAN GENERAL NOTES:

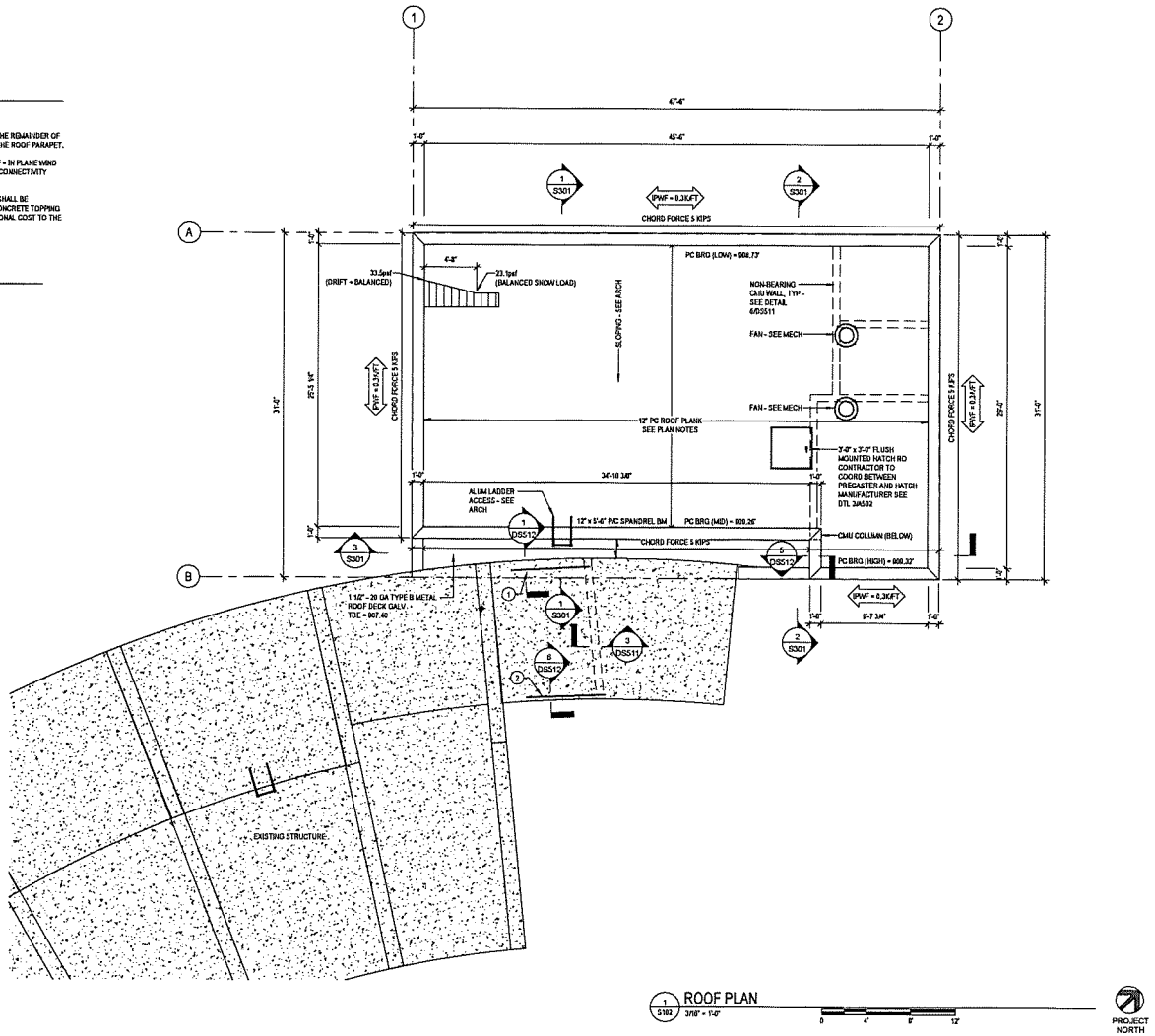
(TYPICAL UNLESS NOTED OTHERWISE)

LOADS THUS: ▭▭▭

1. ARE SNOW DRIFT LOADS AND BALANCED OR FLAT ROOF SNOW LOAD FOR THE REMAINDER OF THE ROOF. THEY ARE TYPICAL AROUND THE PERIMETER OF THE ROOF AT THE ROOF PARAPET.
2. PRECAST DESIGN LOADS: - OUT OF PLANE WIND: 27 PSF (STRENGTH), IPWF = IN PLANE WIND FORCE PER ASCE 7-10 (STRENGTH LEVEL). MINIMUM PRECAST DIAPHRAGM CONNECTIVITY T_U = 0.3 K/FT AND V_U = 0.3 K/FT
3. HORIZONTAL PRECAST ROOF TO RECEIVE ADHERED MEMBRANE ROOFING SHALL BE WARRANTABLE BY CONTRACTOR'S ROOF OR SHALL RECEIVE MINIMUM 2" CONCRETE TOPPING SUFFICIENT TO MEET ROOFER'S WARRANTY REQUIREMENTS, AT NO ADDITIONAL COST TO THE OWNER.

ROOF PLAN KEYNOTES:

1. W8x24 GALV LINTEL CURVED TO MATCH (E) CONC WALL.
2. (7) HSS 14x4x3/8 GALV LINTEL CURVED TO MATCH (E) CONC WALL



1 S102 ROOF PLAN 3/16" = 1'-0"

SEH

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2505 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

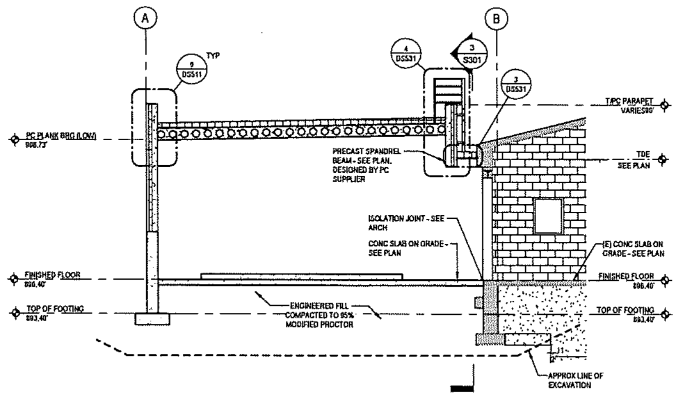
SEH Project	MADWU 187818
Checked By	NRD, SAU
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

ROOF PLAN

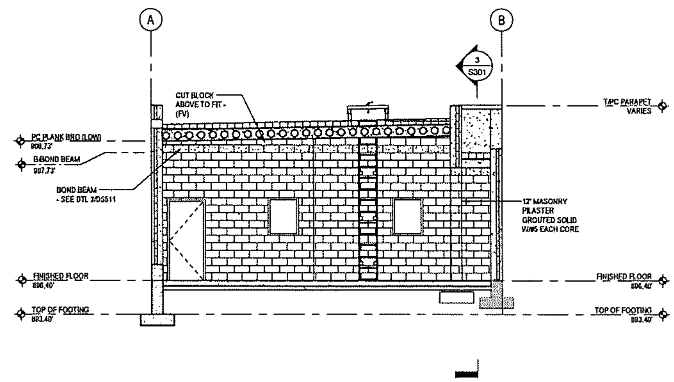
01
S102



1 S301 BUILDING SECTION
3/16" = 1'-0"

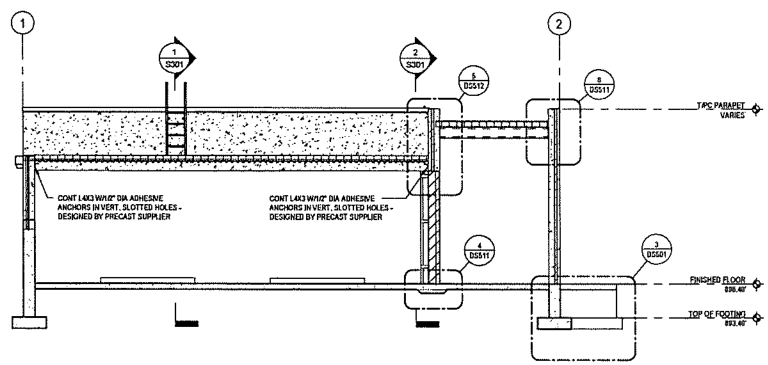
0 4' 8' 12'

NOTES:
1. DO NOT BACKFILL PORTION OF FOUNDATION WALL ABOVE FFE UNTIL SOG IS POURED.
2. SOIL CORRECTION AND EXCAVATION INFO SHOWN IN THIS SECTION IS REPRESENTATIVE OF THE ENTIRE BUILDING. THIS INFORMATION IS NOT SHOWN IN OTHER SECTIONS VIEWS, BUT SHOULD BE ACCOUNTED THERE ALSO. GEOTECHNICAL ENGINEER TO CONFIRM LIMITS OF EXCAVATION.



2 S301 BUILDING SECTION
3/16" = 1'-0"

0 4' 8' 12'



3 S301 BUILDING SECTION
3/16" = 1'-0"

0 4' 8' 12'

SEH

ORIGINAL

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
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UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	HRD, SMJ
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REVISION SCHEDULE

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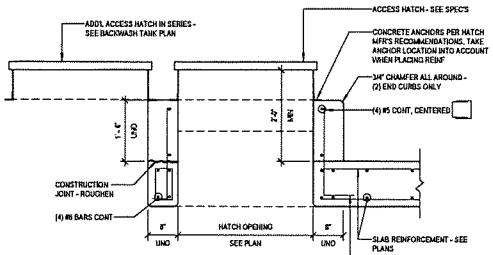
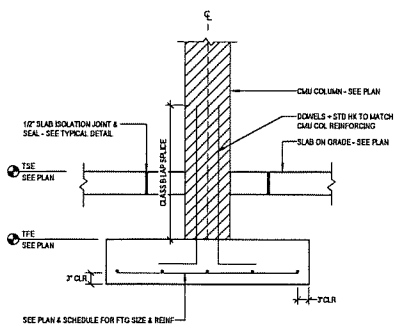
BUILDING SECTIONS

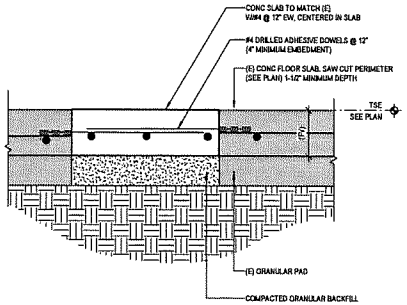
01
S301



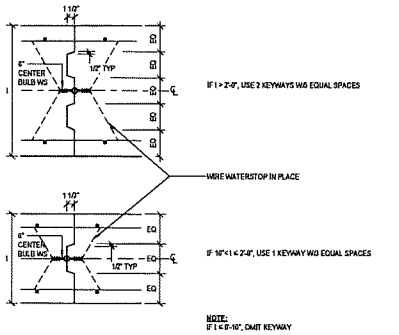
1 DS502 ACCESS HATCH CURB DETAIL
NOT TO SCALE



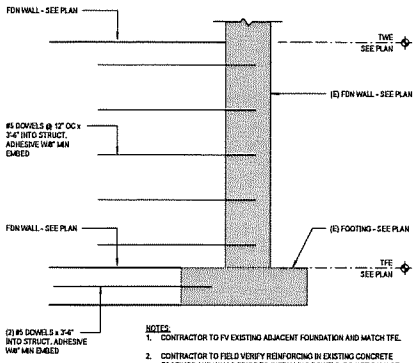
2 DS502 INTERIOR COLUMN FOOTING DETAIL
NOT TO SCALE



3 DS502 DETAIL AT EXISTING SLAB ON GRADE
NOT TO SCALE



4 DS502 WALL CONSTRUCTION JOINT DETAIL
NOT TO SCALE



5 DS502 SECTION
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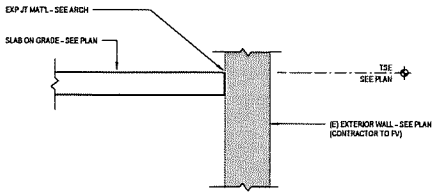

6 DS502 SECTION
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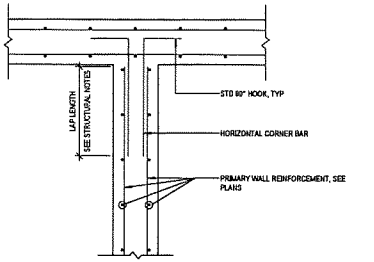
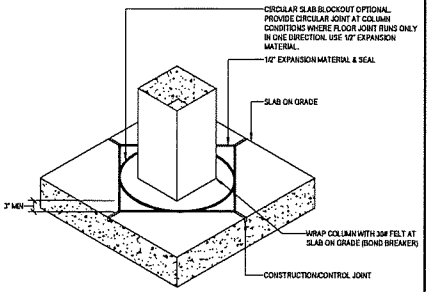
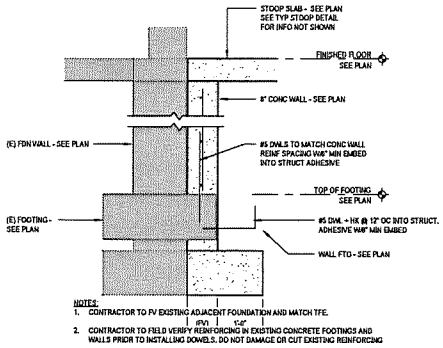


7 DS502 WALL INTERSECTION REINFORCEMENT DETAIL
NOT TO SCALE



8 DS502 ISOLATION JOINT DETAIL AT CONCRETE COLUMN
NOT TO SCALE



9 DS503 SECTION
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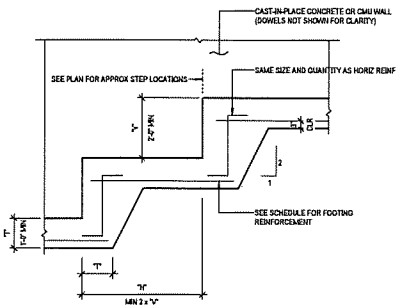
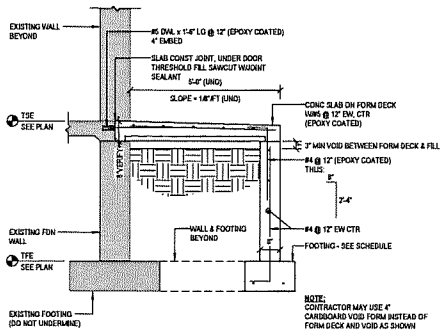
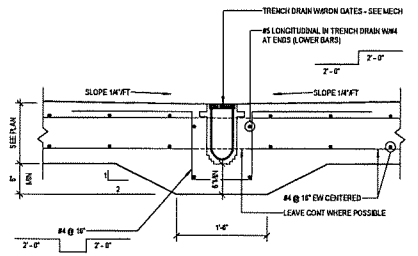


10 DS503 FOOTING STEP DETAIL
NOT TO SCALE



11 DS502 CONCRETE STOOP AT EXISTING BUILDING
NOT TO SCALE



12 DS502 TRENCH DRAIN DETAIL 12"+ SLABS
NOT TO SCALE

SEH

ORIGINAL

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE KENOSHA DRIVE
MADISON, WISCONSIN

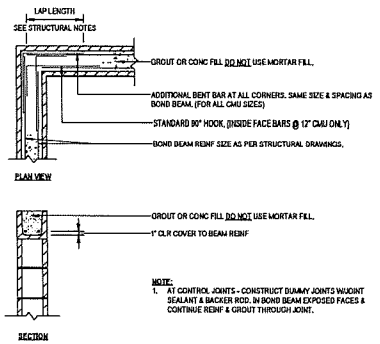
SEH Project	MADWU 167618
Checked By	MRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

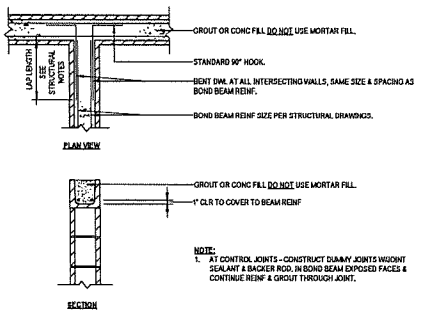
REV. #	DESCRIPTION	DATE

FOUNDATION DETAILS

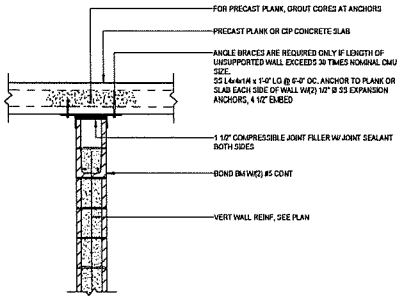
DS502



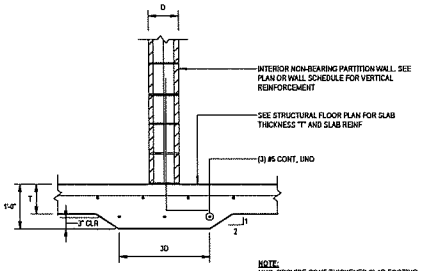
1 DS511 BOND BEAM CORNER REINF DETAIL
NOT TO SCALE



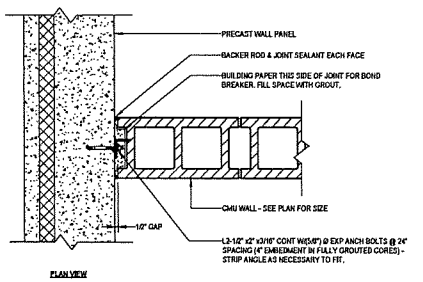
2 DS511 BOND BEAM INTERSECTION REINF. DETAIL
NOT TO SCALE



3 DS511 CMU PARTITION WALL TOP DETAIL
NOT TO SCALE



4 DS511 THICKENED SLAB AT NON-BEARING CMU WALL
NOT TO SCALE



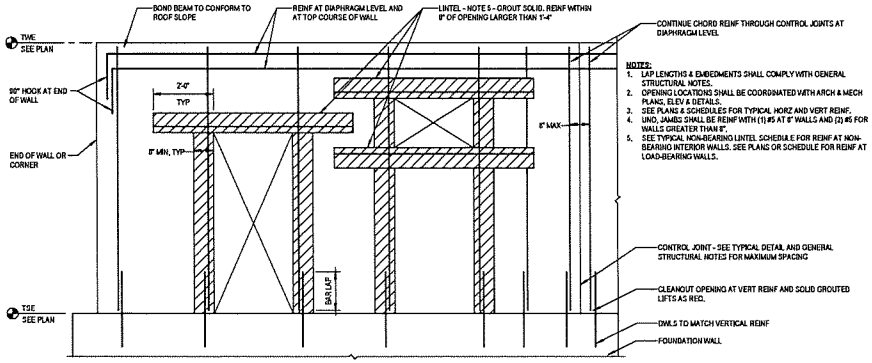
5 DS511 CMU TO PRECAST WALL CONNECTION DETAIL
NOT TO SCALE

NON-BEARING MASONRY LINTEL SCHEDULE

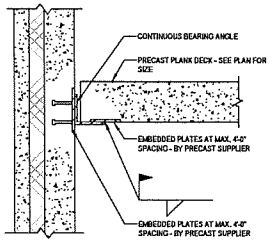
	6" CMU WALL	8" CMU WALL	12" CMU WALL	16" CMU WALL
ROUGH OPENING WIDTH (LINTEL SPAN)	L1	L2	L3	L4
0'-0" - 3'-4"	(1) #4	(2) #4	(2) #4	(2) #4
3'-5" - 5'-4"		(2) #4	(2) #4	(2) #4
5'-5" - 8'-4"		(2) #5	(2) #5	(2) #5

MASONRY LINTEL NOTES:
1. LINTEL BLOCKS SHALL BE GROUTED SOLID, DO NOT USE MORTAR. f'g' = 3000 PSI MIN
2. 8" MIN BEARING EACH END FOR BLOCK LINTELS. CORES BENEATH LINTEL BEARING SHALL BE GROUTED SOLID. PROVIDE (2) VERTICAL WALL BARS (#5 MIN) BELOW EACH BEARING END UNO.

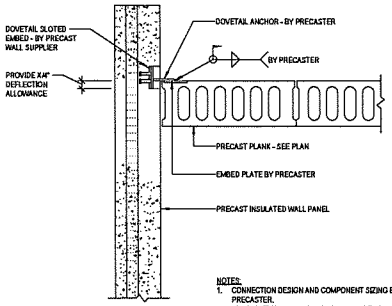
6 DS511 NON-BEARING MASONRY LINTEL SCHEDULE
NOT TO SCALE



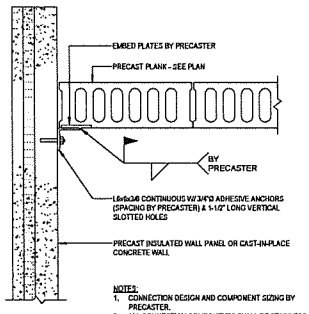
7 DS511 CMU WALL REINFORCING SCHEMATIC
NOT TO SCALE



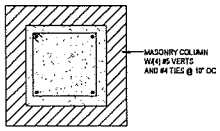
8 DS511 PLANK TO WALL PANEL BEARING CONNECTION
NOT TO SCALE



9 DS511 WALL PANEL TO ROOF PLANK CONNECTION
NOT TO SCALE



10 DS511 WALL PANEL TO ROOF PLANK CONNECTION
NOT TO SCALE



11 DS511 MASONRY COLUMN DETAIL
NOT TO SCALE

SEH

03/21/2025

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2626 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

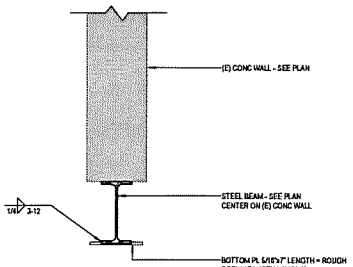
SEH Project	MADWU 167810
Checked By	MRD, SMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2025

REVISION SCHEDULE

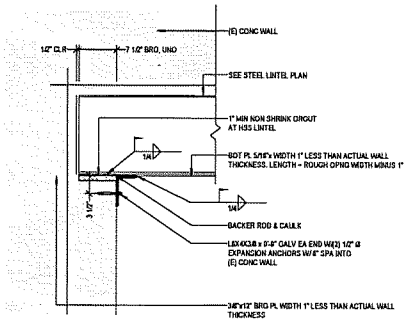
REV. #	DESCRIPTION	DATE

FRAMING DETAILS

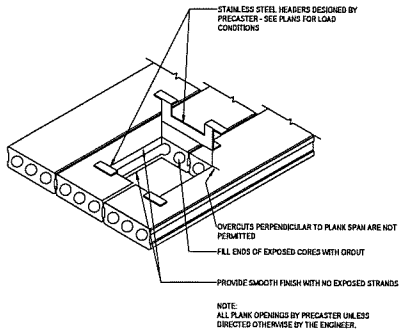
DS511



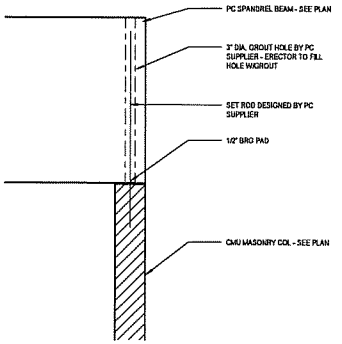
1 DS512 STEEL LINTEL SECTION
NOT TO SCALE



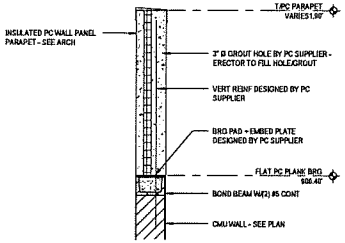
2 DS512 STEEL LINTEL ELEVATION
NOT TO SCALE



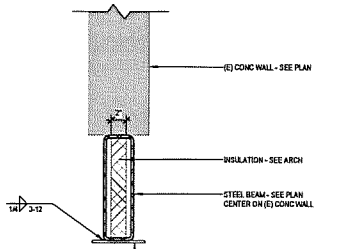
3 DS512 TYPICAL PLANK OPENING WITH HEADERS
NOT TO SCALE



4 DS512 PC SPANDREL TO CMU COL
NOT TO SCALE



5 DS512 PC SPANDREL TO CMU WALL
NOT TO SCALE



NOTES
1. SEE DETAIL 2/DS12 FOR INFO NOT SHOWN

6 DS517 STEEL LINTEL SECTION
NOT TO SCALE

SEH

DRAFT

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	MRD, SAM
Drawn By	ALM

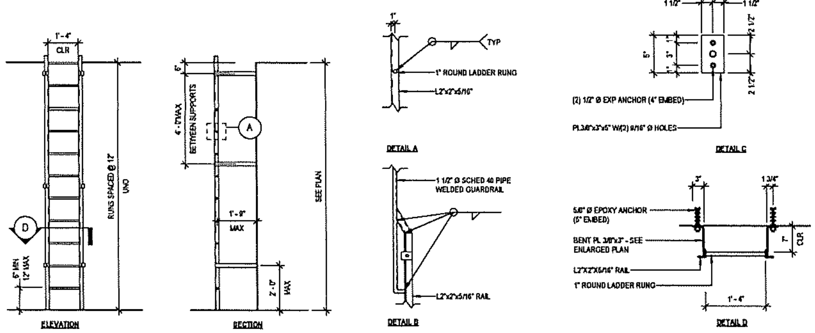
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

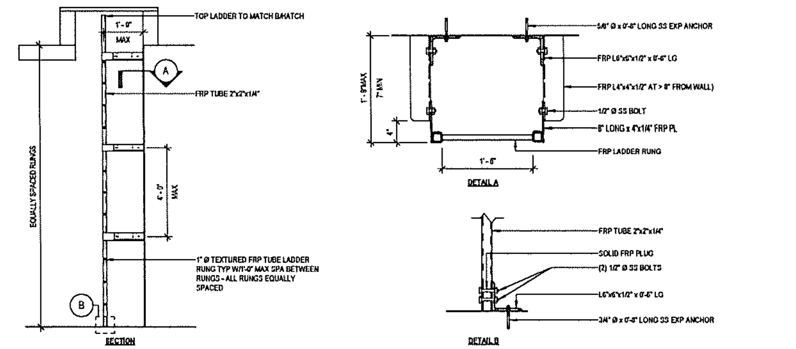
REV. #	DESCRIPTION	DATE

FRAMING DETAILS

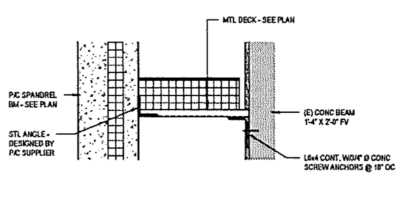
DS512



1 DS531 ALUMINUM LADDER DETAIL
NOT TO SCALE

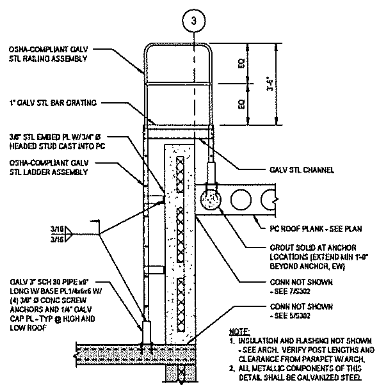


2 DS531 FRP LADDER DETAIL
NOT TO SCALE



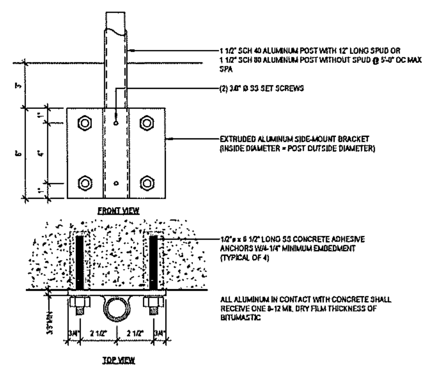
NOTES:
1. LOCATE EXISTING REINFORCEMENT AND OTHER EMBEDED ITEMS PRIOR TO INSTALLATION OF ANCHORS. DO NOT DAMAGE EXISTING REINFORCING OR OTHER EMBEDDED ITEMS.
2. FIELD DRILL HOLES INTO STEEL FRAMING.
3. CONTRACTOR'S OPTION TO SEGMENT CONT. ANGLE AT CURVED EXISTING CONC. BEAM

3 DS531 SECTION
NOT TO SCALE

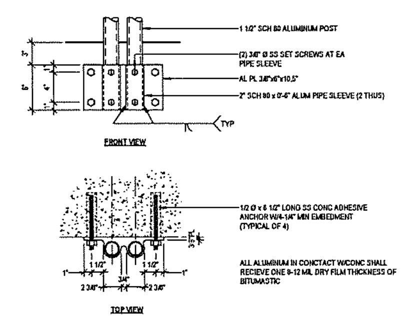


NOTE:
1. INSULATION AND FLASHING NOT SHOWN - SEE ARCH. VERIFY POST LENGTHS AND CLEARANCE FROM PARAPET W/ ARCH.
2. ALL METALLIC COMPONENTS OF THIS DETAIL SHALL BE GALVANIZED STEEL

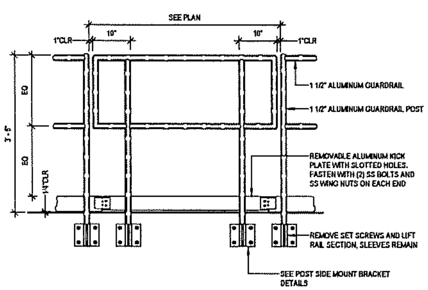
4 DS531 LADDER CONNECTION DETAIL
NOT TO SCALE



5 DS531 ALUM POST SIDE-MOUNT BRACKET
NOT TO SCALE



6 DS531 ALUM POST SIDE-MOUNT BRACKET AT REMOVABLE SECTION
NOT TO SCALE



7 DS531 ALUMINUM REMOVABLE GUARDRAIL SECTION (2 RAILS)
NOT TO SCALE

ORIGINAL

SEH

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: NRD, SMJ
Drawn By: ALM

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE
REV. # | DESCRIPTION | DATE

STEEL DETAILS

DS531

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: MS
Drawn By: LAP

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

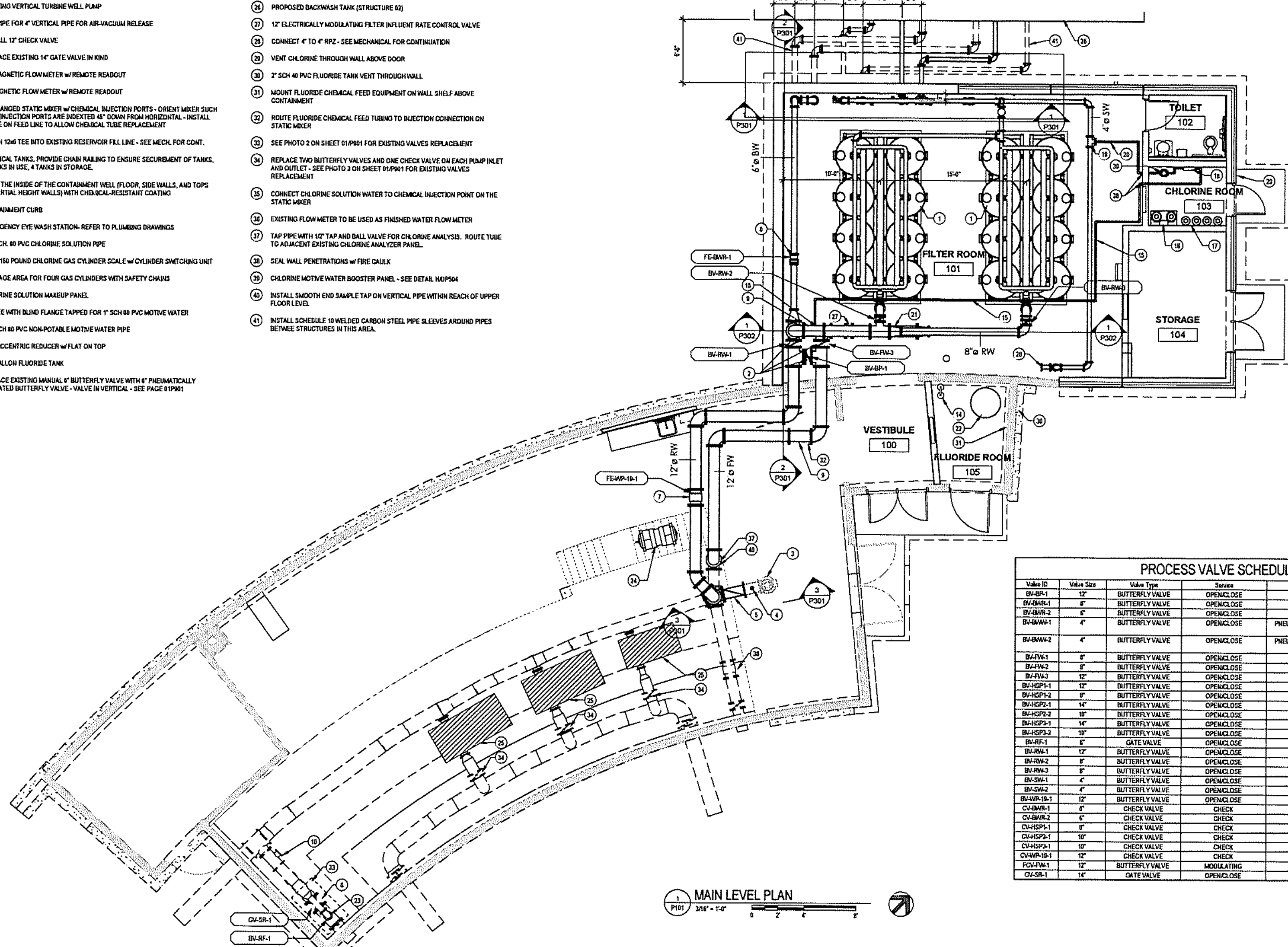
REV. #	DESCRIPTION	DATE

PROCESS PLAN

01
P101

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 8" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXTED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS, PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS, 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. COAT THE INSIDE OF THE CONTAINMENT WELL (FLOOR, SIDE WALLS, AND TOPS OF PARTIAL HEIGHT WALLS) WITH CHEMICAL-RESISTANT COATING
13. CONTAINMENT CURB
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH. 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x8 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 160 GALLON FLUORIDE TANK
23. REPLACE EXISTING MANUAL 6" BUTTERFLY VALVE WITH 6" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01P901
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01P901
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL H/0P504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEE STRUCTURES IN THIS AREA.



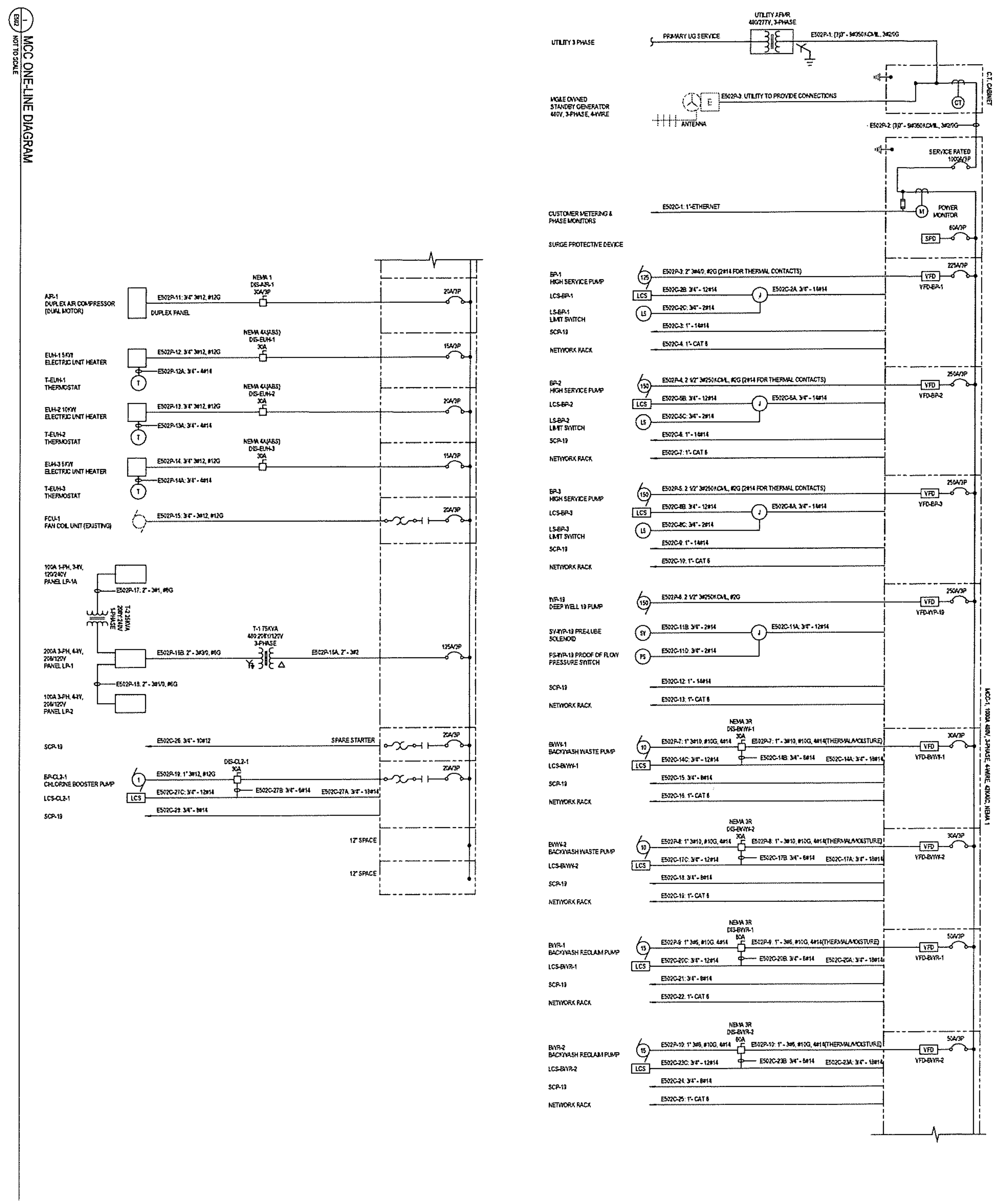
1 MAIN LEVEL PLAN
P101 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BP-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-RF-1	6"	GATE VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WP-19-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP2-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-WP-19-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

10/12/2023 3:25:26 PM

12/11/2023 11:46:50 AM



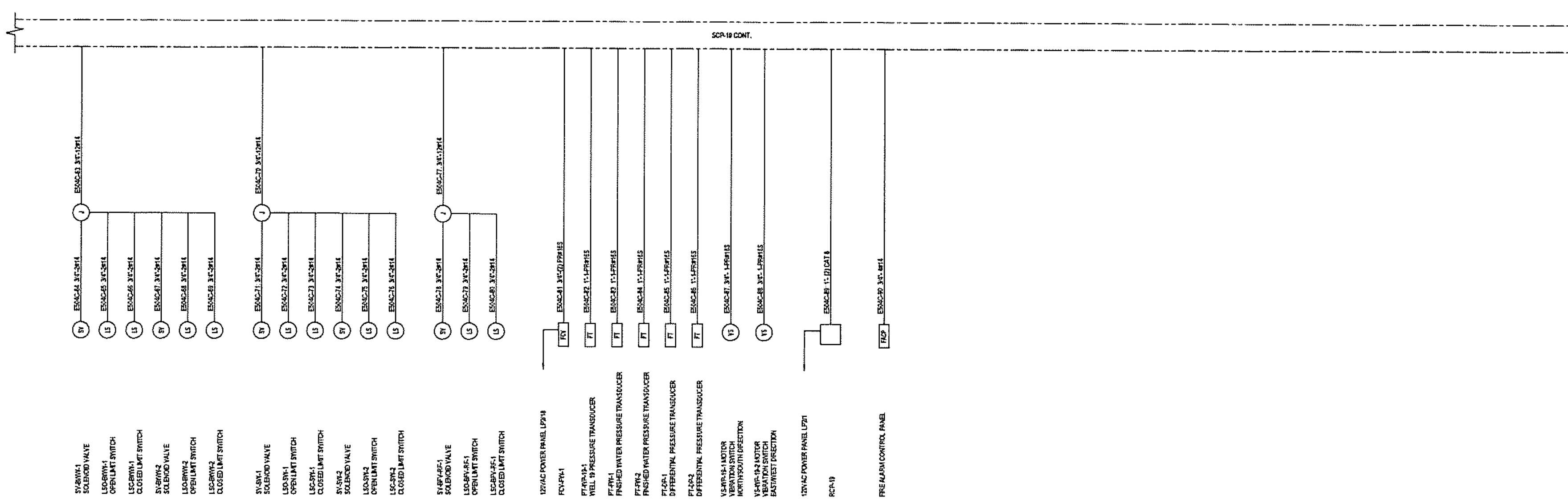
CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

ONE-LINE DIAGRAM

01
E502

SEH

ORIGINAL



1 E504 SCP-19 ONE-LINE DIAGRAM CONTINUED

NOT TO SCALE

10/11/2023 11:45:50 AM

SEH

Project Owner

CITY OF MADISON WATER UTILITY

UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167818
Checked By CEW
Drawn By DDH

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

ONE-LINE DIAGRAM

01

E504

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

November 27, 2023

NOTICE OF ADDENDUM
ADDENDUM 4

CONTRACT NO. 9289
PROJECT NO. 10448
UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

REPLACE Sheet A-1 in the "9289 Contract" document. Notable changes to the document are as follows:

1. **Due dates for bids have been changed as follows (all times CST):**

   a. Bid Submission Deadline – December 14, 2023 at 2:00 P.M.

   b. Bid Opening – December 14, 2023 at 2:30 P.M.

   c. Contractor Prequalification Application Deadline – December 7, 2023 at 2:00 P.M.

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.

11/27/2023

Pete Holmgren, PE
Chief Engineer – Madison Water Utility

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:	UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO.:	9289
SBE GOAL	8%
BID BOND	5%
CONSTRUCTION PRE BID MEETING (2:00 P.M.)	11/13/2023; See Info Below (OPTIONAL)
SBE PRE BID MEETING	See SBE Pre Bid Meeting Info Below
PREQUALIFICATION APPLICATION DUE (2:00 P.M.)	12/7/2023
BID SUBMISSION (2:00 P.M.)	12/14/2023
BID OPEN (2:30 P.M.)	12/14/2023
PUBLISHED IN WSJ (2023)	10/26, 11/2, 11/9, 11/16, 11/23, 11/30 & 12/7

CONSTRUCTION PRE BID MEETING: Madison Water Utility will be hosting an **OPTIONAL** pre-bid construction meeting to review the site and project details with prospective contractors, as well as answer questions. **This meeting will be held virtually through Zoom on November 13, 2023 at 2:00 P.M. (CST):**

Zoom Meeting ID: 899 6430 5207 **Zoom Passcode:** 859818

SBE PRE BID MEETING: Small Business Enterprise Pre-Bid Meetings are being held virtually. Advance registration is required. Visit the SBE Meeting web page on Engineering's web site:

https://www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-bid-public-works-contracts/small-business.

Questions regarding SBE Program requirements may be directed to the Affirmative Action Division:

- Tracy Lomax
  (608) 266-6510
  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.

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

November 29, 2023

NOTICE OF ADDENDUM
ADDENDUM 5

CONTRACT NO. 9289
PROJECT NO. 10448
UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

1. **Changes to SPECIFICATIONS:**

   a. Section 00 01 10 Table of Contents, REPLACE in its entirety.
   b. Section 08 45 13 Translucent Window System, REPLACE in its entirety.
   c. Section 11 53 13 Laboratory Fume Hoods, ADD in its entirety.
   d. Section 22 15 13 General Service Compressed Air Piping, ADD in its entirety.
   e. Section 22 15 19 Packaged Compressed Air System, ADD in its entirety.
   f. Section 33 31 00 Sanitary Sewer Systems, REPLACE in its entirety.
   g. Section 40 23 20 Process Piping Valves and Operators, REPLACE in its entirety.
   h. Section 40 23 30 Process Piping Specialties, REPLACE in its entirety.
   i. Section 40 92 40 Process Valve Actuators, REPLACE in its entirety.
   j. Section 43 21 13 Horizontal Split Case Centrifugal Pumps, REPLACE in its entirety.
   k. Section 43 21 30 Non-Clog Submersible Pumps, REPLACE in its entirety.
   l. Section 44 44 39 Fluoride Feed Equipment, REPLACE in its entirety.

2. **REPLACE the following DRAWINGS in their entirety:**

   a. C100-Site Plan
   b. C103-Utility Plan
   c. C104-Plan & Profile
   d. 01 A101-Floor and Roof Plan
   e. 01 A401-Enlarged Plan, Schedules and Details
   f. 01 S101-Foundation Floor Plan
   g. 01 P101-Process Plan
   h. 01 P301-Process Sections
   i. 01 P901-Process Isometric 3D Views for Reference Only
   j. 01 M201-First Level Domestic Water and Gas Plan
   k. 01 M202-First Level Sanitary Waste and Vent Plan
   l. 01 M301-Riser Diagrams
   m. 01 E301-Power Plan
   n. DP 502-Process Piping Details
   o. DP 504-Miscellaneous Process Details

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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.

11/29/2023

Pete Holmgren, PE
Chief Engineer – Madison Water Utility

DOCUMENT 00 01 10

TABLE OF CONTENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

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DIVISION 32 - EXTERIOR IMPROVEMENTS

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DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT

DIVISION 44 - POLLUTION CONTROL EQUIPMENT

SECTION 08 45 13

TRANSLUCENT WINDOW SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for translucent window system as shown and specified herein.

1.02 WORK INCLUDED

A. Design, engineer, manufacture, and installation of translucent window system.

B. All anchors, brackets, and hardware attachments necessary to complete the specified structural assembly, weatherability, and water-tightness performance requirements. All flashing up to but not penetrating adjoining work are also required as part of the system and shall be included.

C. Trained and factory authorized labor and supervision to complete the entire panel installation.

1.03 RELATED WORK ELSEWHERE

A. Sheet Metal and Flashing

B. Sealant

1.04 QUALITY ASSURANCE

A. The glazing panels must be evaluated and listed by recognized building code evaluation organization: International Council Evaluation Service Inc (ICC-ES).

B. Materials and products shall be manufactured by a company continuously and regularly employed in the manufacturing, engineering, and designing, stocking and building of unitized translucent window/walls for a period of at least ten (10) years.

C. Erection shall be by an installer who has been in the business of erecting similar material for at least five (5) consecutive years and can show evidence of satisfactory completion of projects of similar size, scope, and type.

D. The manufacturer shall be responsible for the configuration and fabrication of the complete panel system, in accordance with the requirements of this specification.

1.05 SUBMITTALS

A. Submit Shop drawings and color samples.

B. Manufacturer shall submit written guarantee accompanied by substantiating data, stating that the products to be furnished are in accordance with or exceed these specifications.

C. Manufacturer shall submit full warranty and sales terms and conditions for verification of compliance with the requirements of this specification.

D. Submittal: For glazing assemblies to comply with performance requirements and design criteria,

1.06 MAINTENANCE DATA

A. The manufacturer shall provide recommended maintenance procedures, schedule of maintenance and materials required or recommended for maintenance.

B. Submit installer certificate signed by installer, certifying compliance with project qualification requirements.

1.07 WARRANTY

A. Provide a single source translucent window systems manufacturer warranty against defective materials and fabrication. Submit manufacturer's written warranty agreeing to repair failures in materials within one (1) year from date of delivery.

B. Provide the following single source translucent window manufacturer glazing warranties. Third party warranties shall not be acceptable. All warranties shall be maintained without any system maintenance requirements of the owner's responsibility. The expected humidity of the enclosed space shall not affect warranty length.
   1. Provide a lifetime warranty for both interior and exterior glazing covering:
      a. Delamination of the glazing from the internal structure.
      b. Fiberbloom; development of a rough exterior surface.
   2. Provide a ten (10) warranty on the interior glazing covering:
      a. Change in light transmission of no more than 6 percent per ASTM D1003.
      b. Color stability: interior glazing shall not change color more than 6 CIE Units DELTA E by ASTM D2244.
   3. Provide a ten (10) year warranty on the exterior glazing covering:
      a. Change in light transmission of no more than 6 percent per ASTM D1003.
      b. Color stability: exterior glazing shall not change color more than 6 CIE Units DELTA E by ASTM D2244.
   4. Blue light spectrum (400-470nm) measured in accordance with ASTM E1175 shall not decrease by no more than 6 percent after ten years in comparison with the original value.

C. In addition, submit installer's written warranty agreeing to repair installation workmanship, defects and leaks within one year from date of delivery.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of design
   1. The design and performance criteria of this job are based on the UniQuad Translucent Window–prefabricated, pre-assembled glazing, system as manufactured by Kingspan Light + Air | Architectural Daylighting
   2. Phone: (800) 759-6965 Website: www.kingspanlightandair.us
   3. WindowTherm by SIP as an approved product; Contract Bruce Gold, Solutions in Polycarbonate, LLC. Phone: 330.572.2860.

B. Approved Manufacturers
   1. Other manufacturers may bid this project provided they comply with all requirements of the specification and submit evidence of compliance with all performance criteria specified herein. This evidence must include proof of conformance and test reports per Section 1.5. Any exceptions taken from this specification must be noted on the approval request. If no exceptions are noted and approval is given, product performance will be as specified.
   2. Listing manufacturers names in this specification does not constitute approval of their products or relieve them of compliance with all the performance and design requirements contained herein.

2.02 TRANSLUCENT WINDOW PERFORMANCE AND APPEARANCE

A. Glazing construction for longevity and resistance to buckling and pressure.
   1. Translucent glazing must be constructed of tight cell sizes not exceeding 0.18 inch. Wide cells of size greater than 0.18 inch shall not be acceptable.

B. Translucent glazing assemblies – Unitized Double Glazed
   1. Design, engineer, manufacture, and installation of unitized double-glazed translucent window system. An assembly of two independent insulated glazing panes in one integrated assembly, incorporated into a complete aluminum frame system that has been tested and warranted by the manufacturer as a single source system. Design shall provide for the replacement of the exterior glazing, independently of the interior glazing without exposing the building's interior or

compromising the weather tightness of interfering with the normal working functions of the building. Single pane glazing systems are not acceptable.
2. Overall glazing assembly thickness shall be a minimum 2.75 inches, with two glazing panes and concealed interlocking connector. Thickness of the exterior and interior glazing shall be minimum 8mm thick each.

C. Thermal and Solar Performance
1. To ensure Energy Code compliance, product U-Values must be listed in the NFRC Product Directory and have a Certified Product Directory (CPD) number.
   a. Basis of Design CPD Number: UQTW
2. Center of glazing U-Value per NFRC 100: Maximum .25.
3. System U-Value per NFRC 100 and 700: Maximum .30.
4. Haze measurement minimum of 90 percent per ASTM D1003.
5. Standard exterior glazing color: Clear Matte
6. Standard interior glazing color: Clear Matte

D. Translucent Glazing Joint System
1. Water penetration: no water penetration of the glazing joint connection length at test pressure of 6.24 PSF per ASTM E331.
2. Air Infiltration: pass requirements of NFRC 400 at 1.57 PSF and 6.24 PSF.
3. Air Exfiltration: pass requirements of NFRC 400 at 1.57 PSF and 6.24 PSF.
4. Free movement of the glazing shall be allowed to occur without damage to the weather tightness of the completed system.
5. The glazing joint shall comply with the deflection limitation of IBC Table 1604.3 for exterior walls with flexible finishes – L/120 per IBC.

E. Flammability
1. Exterior Glazing
   a. Class A interior flame spread per ASTM E84
   b. Flame spread no greater than zero (0) and smoke density no greater than 110 per ASTM E84.
   c. Minimum self-ignition temperature of 1120° per ASTM 1929.
2. Interior Glazing
   a. Class A interior flame spread per ASTM E84.
   b. Flame spread no greater than zero (0) and smoke density no greater than 110 per ASTM E84.
   c. Minimum self-ignition temperature of 1120° per ASTM 1929.

F. Impact Resistance
1. Minimum Impact loading of 500 ft. lbs. per ASTM E695.

G. Weatherability
1. The light transmission shall not decrease more than 6 percent as measured by ASTM D1003 over 10 years, or after exposure to temperature of 300° for 25 minutes (thermal aging performance standard).
2. The weathering performance should be justified by successful testing of the glazing's performance after exposure to actual Florida weather conditions for approximately 10 years in comparison to a new glazing assembly. This performance must be demonstrated by providing independent lab test reports for the exposed and a new panel assembly for the following tests; test results must show that there is no deterioration in performance for the 10 year's exposed panels versus new:
   a. Uniform static air pressure per ASTM E330 at negative load of -105 PSF and positive load of 130 PSF.
   b. Impact loading of 500 feet pounds per ASTM E695.
   c. Cyclic static air pressure at 65 PSF and impact lever D per ASTM 1886 and ASTM E1996.
3. Glazing must be manufactured with a permanent, co-extruded ultra-violet protective layer. Post-applied coatings or films of dissimilar materials that need to be maintained are unacceptable.
4. Glazing shall not become readily detached when exposed to temperatures of 300°F and 0°F for 25 minutes.

5. Thermal aging – the interior and exterior glazing shall not change color in excess of 0.75 Delta E per ASTM D2244 and shall not darken more than 0.3 units Delta L per ASTM D2244 and shall allow no cracking or crazing when exposed to 300°F for 25 minutes.
6. Glazing shall be factory sealed to restrict dirt ingress.

2.03 METAL FRAME STRUCTURE

A. The wall light framing is designed to be self-supporting between the support constructions. The deflection of the system framing members in a direction normal to the plane of the glazing, when subjected to a uniform load deflection, shall not exceed L/120 for the unsupported span per IBC Table 1604.3. All adjacent and support construction must support the transfer of all loads included horizontal and vertical, exerted by the system. Design or structural engineering services for the supporting structure or building components in not included in the translucent window scope of this section.

B. All window system aluminum framing exposed to the exterior shall be thermally broken.

C. Water penetration: the translucent window system shall allow no water penetration at a minimum differential static pressure of 6.24 PSF per AAMA 501 pressure difference recommendations and as demonstrated by prior testing of typical framing sample per ASTM E331

D. Water test of meal frame structure shall be conducted according to procedures in AAMA 501.2.

2.04 METAL MATERIALS

A. Extruded aluminum shall be ANSI/ASTM B221; 6063-T6 or 6005-T5.

B. Flashing:
   1. 5005 H34 Aluminum .040-inch thick
   2. Sheet metal sill flashings are to be furnished shop formed to profile - when lengths exceed 10 feet, provide in nominal 10ft lengths. Field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap at least 6 inches to 8 inches, set in a full bed of sealant and riveted if required.

C. All fasteners for aluminum framing to be stainless steel or cadmium plated steel, excluding the final fasteners to the building.

D. All exposed ALUMINUM FINISH shall be from manufacturer standard color range:
   1. Options as follows:
      a. PREMIUM polymer resin powder coat per AAMA 2604 with 10-year warranty.

PART 3 EXECUTION

3.01 EXAMINATION

A. General contractor to verify when structural support is ready to receive all work in the section and to convene a pre-installation conference at least one week prior to commencing work of this section. Attendance required of the general contractor, translucent window installer and all parties affecting and effected by the work of this section.

B. All submitted opening sizes, dimensions and tolerances are to be field verified by the general contractor unless otherwise stipulated.

C. Installer shall examine area of installation to verify readiness of site conditions. Notify the general contractor about any defects requiring correction. Do not work until conditions are satisfactory.

3.02 INSTALLATION

A. Install components in strict accordance with manufacturer's instructions an approved shop drawings. Use proper fasteners, caulking and hardware for material attachments as specified.

B. Use methods of attachment to structure allowing sufficient adjustment to accommodate tolerances.

C. Remove all protective coverings on panels immediately after installation.

3.03 CLEANING

A. Follow manufacturer's instructions when washing down exposed panel surfaces using a solution of mild detergent in warm water that is applied with soft, cleaning wiping cloths. Always test a small area before applying to an entire area.

B. Follow strict panel manufacturer guidelines when removing foreign substances from panel surfaces requiring mineral spirits or any solvents that are acceptable for use. Always test a small sample to validate compliance before applying to the entire glazing surface.

C. Installer shall leave glazing system clean at completion of installation. Final cleaning is by others upon completion of project, following manufacturer's cleaning instructions.

END OF SECTION

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SECTION 11 53 13

LABORATORY FUME HOODS

PART 1 GENERAL

1.01 SUMMARY

A. Provide:
   1. Laboratory Ductless Benchtop Fume hood.

B. Related Sections:
   1. 12 30 00 Manufactured Casework - Metal and Resin

1.02 SUBMITTALS

A. Refer to Section 01 33 00.

B. Product Data: Submit manufacturer's current Product Data including specifications, handling, storage and installation instructions, and maintenance and cleaning recommendations.

C. Maintenance Manual: Provide to Owner, maintenance and warranty data in "Maintenance Manual" compliant with Section 01 77 00 at Maintenance Demonstration at Substantial Completion.

1.03 QUALITY ASSURANCE

A. Single Source Responsibility: Provide materials made of components, with uniform texture and color or blend, furnished by 1 manufacturer for each different product required.

B. Qualifications:
   1. Contractor: 3 years experience in the installation of laboratory equipment.
   2. Personnel: For actual installation of laboratory equipment, use personnel skilled in work required, completely familiar with manufacturer's recommended methods of installation, thoroughly familiar with requirements of work.

1.04 PROJECT CONDITIONS

A. Existing Conditions: Drawings do not purport to show actual dimensions but are intended only to establish location and scope of Work. Field-verify dimensions and assume full responsibility for their accuracy.

1.05 MAINTENANCE

A. Extra Materials: Provide for maintenance purposes, 2 additional HEPA filters. Deliver and store as directed by Owner.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Standard of Quality: Design is based on products of Labconco Corporation, Kansas City, MO www.labconco.com

B. Other Acceptable Manufacturers: Subject to compliance with specified requirements, acceptable manufacturers and products are:
   1. Manufacturer of comparable products submitted in compliance with Section 01 25 13.

2.02 COMPONENTS

A. Filtered Benchtop Fume Hood:
   1. Dimensions: 48-inch wide by 37.7-inch deep by 66.2-inch high.
   2. Electrical: 115V, 50/60 Hz, 10A.
   3. Airflow Type: Bypass.
   4. Air foil Type: Eco-Foil.
   5. Integral Blower.
   6. Conformance: AFNOR NF-X, ANSI Z9.5, ASTM E84, CAN/CSA C22.2, Modified ASHRAE 110, SEFA 9, UL 61010.
   7. LED Lighting.
   8. 11.75-foot power cord with plug.
   9. Sash Type: Cable and pulley.
   10. Style: Benchtop with 48-inch wide base cabinet.
   11. Dished epoxy top and left rear cup sink.
   12. Neutrodine Unisorb filter, HEPA filter, replacement ammonium pre-filter.

A. Accessories:
   1. Other Materials: Materials not specifically described but required for complete, proper installation of equipment, subject to acceptance of Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Clean surfaces thoroughly prior to installation.

B. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction. Secure work surfaces to casework securely. Test for proper operation and adjust until proper operation is achieved.

3.02 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion

END OF SECTION

SECTION 22 15 13

GENERAL-SERVICE COMPRESSED-AIR PIPING

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes piping and related specialties for general-service compressed-air systems operating at 150 psig (1035 kPa) or less.

1.02 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Pressure regulators. Include rated capacities and operating characteristics.
   2. Automatic drain valves.
   3. Filters. Include rated capacities and operating characteristics.
   4. Lubricators. Include rated capacities and operating characteristics.

1.03 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.04 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.05 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

1.06 RELATED SECTIONS

A. Section 22 01 20 - Plumbing General Provisions

B. Section 40 23 02 - Steel Process Pipe

PART 2 PRODUCTS

2.01 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, black with ends threaded according to ASME B1.20.1.
   1. Steel Nipples: ASTM A733, made of ASTM A53/A53M or ASTM A106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
   2. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded.
   3. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded.
   4. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel, threaded.
   5. Wrought-Steel Butt-Welding Fittings: ASME B16.9, Schedule 40.
   6. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel.

B. Copper Tube: ASTM B88, Type K or L (ASTM B 88M, Type A or B) seamless, drawn-temper, water tube.
   1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.

2. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150 or 300.
3. Copper Unions: ASME B16.22 or MSS SP-123.
   a. Transition Couplings for Metal Piping: Metal coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.02 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for compressed-air piping system contents.
   1. ASME B16.21, nonmetallic, flat, full-face, asbestos free, 1/8-inch (3.2-mm) maximum thickness.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

E. Solvent Cements for Joining PVC Piping: ASTM D2564. Include primer complying with ASTM F656.

2.03 VALVES

A. Metal Ball, Butterfly, Check, and Gate Valves: Provide all required gate, ball, check valves and outlet connections on air compressor units. Size for maximum flow rating on the compressor unit.

B. Gate Valves: MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.

C. Ball Valves: MSS SP-110, Class 150, 400 psi CWP, bronze two-piece body, chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blowout proof stem, lever handle with balancing stops, solder ends with union.

D. Swing Check Valves: MSS SP-80, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.

2.04 DIELECTRIC FITTINGS

A. General Requirements for Dielectric Fittings: Combination fitting of copper alloy and ferrous materials with insulating material; suitable for system fluid, pressure, and temperature. Include threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory-fabricated union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

2.05 FLEXIBLE PIPE CONNECTORS

A. Bronze-Hose Flexible Pipe Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
   1. Working-Pressure Rating: 200 psig (1380 kPa) minimum.
   2. End Connections, NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.
   3. End Connections, NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.

B. Stainless-Steel-Hose Flexible Pipe Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
   1. Working-Pressure Rating: 200 psig (1380 kPa) minimum.
   2. End Connections, NPS 2 (DN 50) and Smaller: Threaded steel pipe nipple.
   3. End Connections, NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.

2.06 SPECIALTIES

A. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet-type safety valve for compressed-air service.
   1. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.

B. Air-Main Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 250-psig (1725-kPa) inlet pressure, unless otherwise indicated.

C. Air-Line Pressure Regulators: Diaphragm or pilot operated, bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200-psig (1380-kPa) minimum inlet pressure, unless otherwise indicated.

D. Automatic Drain Valves: Stainless-steel body and internal parts, rated for 200-psig (1380-kPa) minimum working pressure, capable of automatic discharge of collected condensate.

E. Coalescing Filters: Coalescing type with activated carbon capable of removing water and oil aerosols; with color-change dye to indicate when carbon is saturated and warning light to indicate when selected maximum pressure drop has been exceeded. Include mounting bracket if wall mounting is indicated.

F. Mechanical Filters: Two-stage, mechanical-separation-type, air-line filters. Equip with deflector plates, resin-impregnated-ribbon-type filters with edge filtration, and drain cock. Include mounting bracket if wall mounting is indicated.

2.07 QUICK COUPLINGS

A. General Requirements for Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.

B. Through brass body with O-ring or gasket seal and stainless-steel or nickel-plated-steel operating parts.

PART 3 EXECUTION

3.01 PIPING APPLICATIONS

A. Low-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials as indicated on drawings for each size range:
   1. NPS 2 (DN 50) and Smaller: Type K or L (Type A or B), copper tube; wrought-copper fittings; and brazed joints.

B. Drain Piping: Use one of the following piping materials:
   1. NPS 2 (DN 50) and Smaller: Type M (Type C) copper tube; wrought-copper fittings; and brazed or soldered joints.
   2. NPS 2 (DN 50) and Smaller: PVC pipe and fittings; and solvent-cemented joints.

3.02 VALVE APPLICATIONS

A. Equipment Isolation Valves: Safety-exhaust, copper-alloy ball valve with exhaust vent and pressure rating at least as great as piping system operating pressure.

3.03 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss,

expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping concealed from view and protected from physical contact by building occupants, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and to coordinate with other services occupying that space.

E. Install piping adjacent to equipment and machines to allow service and maintenance.

F. Install air and drain piping with 1 percent slope downward in direction of flow.

G. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.

H. Equipment and Specialty Flanged Connections:
   1. Use steel companion flange with gasket for connection to steel pipe.
   2. Use cast-copper-alloy companion flange with gasket and brazed joint for connection to copper tube. Do not use soldered joints for connection to air compressors or to equipment or machines producing shock or vibration.

I. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

J. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver.

K. Install piping to permit valve servicing.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and branch connections.

N. Install unions, adjacent to each valve and at final connection to each piece of equipment and machine.

O. Install sleeves for piping penetrations of walls, ceilings, and floors.

P. Install sleeve seals for piping penetrations of concrete walls and slabs.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

R. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

S. Remove scale, slag, dirt, and debris from pipe and fittings before assembly.

T. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Apply appropriate tape or thread compound to external pipe threads.

U. Brazed Joints for Copper Tubing: Join according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

V. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B828 or CDA's "Copper Tube Handbook."

W. Flanged Joints: Use asbestos-free, nonmetallic gasket suitable for compressed air. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.

X. Solvent-Cemented Joints for PVC Piping: Clean and dry joining surfaces. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D2672.

Y. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

3.04 VALVE INSTALLATION

A. Install shutoff valves and unions or flanged joints at compressed-air piping to air compressors.

B. Install shutoff valve at inlet to each automatic drain valve, filter, lubricator, and pressure regulator.

C. Install check valves to maintain correct direction of compressed-air flow to and from compressed-air piping specialties and equipment.

3.05 DIELECTRIC FITTING INSTALLATION

A. Install dielectric unions in piping at connections of dissimilar metal piping and tubing.

3.06 FLEXIBLE PIPE CONNECTOR INSTALLATION

A. Install flexible pipe connectors in discharge piping of each air compressor.

B. Install bronze-hose flexible pipe connectors in copper compressed-air tubing.

C. Install stainless-steel-hose flexible pipe connectors in steel compressed-air piping.

3.07 SPECIALTY INSTALLATION

A. Install safety valves on receivers in quantity and size to relieve at least the capacity of connected air compressors.

B. Install air-main pressure regulators in compressed-air piping at or near air compressors.

C. Install air-line pressure regulators in branch piping to equipment.

D. Install automatic drain valves on aftercoolers, receivers, and dryers. Discharge condensate onto nearest floor drain.

E. Install coalescing filters in compressed-air piping at or near air compressors and upstream from mechanical filters.

F. Install mechanical filters in compressed-air piping at or near air compressors and downstream from coalescing filters.

G. Install quick couplings at piping terminals for hose connections.

H. Install hose assemblies at hose connections.

3.08 HANGER AND SUPPORT INSTALLATION

A. Vertical Piping: MSS Type 8 or 42, clamps.

B. Individual, Straight, Horizontal Piping Runs:
   1. 100 Feet (30 m) or Less: MSS Type 1, adjustable, steel clevis hangers.
   2. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.

C. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

D. Base of Vertical Piping: MSS Type 52, spring hangers.

E. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

F. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

G. Install hangers for Schedule 40, steel piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4 to NPS 1/2 (DN 8 to DN 15): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
   2. NPS 3/4 to NPS 1-1/4 (DN 20 to DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
   3. NPS 1-1/2 (DN 40): 12 feet (3.7 m) with 3/8-inch (10-mm) rod.
   4. NPS 2 (DN 50): 13 feet (4 m) with 3/8-inch (10-mm) rod.

H. Install supports for vertical, Schedule 40, steel piping every 15 feet (4.6 m).

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1/4 (DN 8): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
   2. NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
   3. NPS 3/4 (DN 20): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
   4. NPS 1 (DN 25): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
   5. NPS 1-1/4 (DN 32): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
   6. NPS 1-1/2 (DN 40): 10 feet (3 m) with 3/8-inch (10-mm) rod.
   7. NPS 2 (DN 50): 11 feet (3.4 m) with 3/8-inch (10-mm) rod.

J. Install supports for vertical copper tubing every 10 feet (3 m).

3.09 FIELD QUALITY CONTROL

A. Perform field tests and inspections.

B. Tests and Inspections:
   1. Piping Leak Tests: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig (345 kPa) above system operating pressure, but not less than 150 psig (1035 kPa). Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
   2. Repair leaks and retest until no leaks exist.
   3. Inspect filters lubricators and pressure regulators for proper operation.

END OF SECTION

SECTION 22 15 19

PACKAGED COMPRESSED AIR SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install one (1) dual reciprocating air compressor assembly.

B. Furnish and install carrier piping systems as specified in Section 22 15 13 between the compressed air equipment specified herein and/or shown on the Drawings and the serviced equipment and devices.

C. The compressor package shall be supplied by an equipment vendor who is authorized to sell and service the compressor supplied. The vendor shall maintain a service center within a 100-mile radius from the Project site.

D. Each compressor assembly shall be pre-tested and pre-wired, including an alternator control panel, air dryer, and all other related accessories.

E. Materials or features not specified herein shall be manufacturer's standard for equipment and shall be included to comprise a complete and reliable system suitable for specified operating conditions.

1.02 SYSTEM DESCRIPTION

A. Function: Air from the air compressors shall be utilized by all the pneumatic operators of various valves throughout the facility, including but not limited to the screen air valves.

B. Controls: Start-up control shall be provided to turn the compressors on and off automatically. The air dryer will cycle off and on with the compressor. A pressure switch shall start the unit when the receiving tank pressure drops to a cut-in level and shall shut off power to the motor when a pre-determined cut-off pressure is reached.

C. Alternator Control: Lead and lag status for the dual compressors shall automatically change with each operating cycle when the unit is supplying air from only 1 of the compressors. Additionally, the alternator shall start up the second compressor in the event the air requirement exceeds the capacity of the 1 compressor operating alone in the automatic mode.

1.03 SUBMITTALS

A. Submit shop drawings, and preliminary operation and maintenance manuals for all equipment furnished.

B. Submit final operation and maintenance instructions before requesting payment for this section of work.

1.04 WARRANTY

A. The manufacturer shall warranty the units against defects in workmanship and materials for a period of 2 years from the date of substantial completion (when unit is placed into normal use, operation and service). The warranty shall be in published form and apply to all similar units. A warranty offered by a representative will not be acceptable in lieu of the manufacturer's warranty. Refer to Section 01 78 37.

PART 2 PRODUCTS

2.01 COMPRESSOR ASSEMBLIES

A. Provide one complete air compressor assembly.

B. Manufacturers:
   1. Quincy QR-25 model FF210.
   2. Equivalent by Ingersoll-Rand, or
   3. Prior approved equal.

C. Construction and Features:
   1. Style: duplex, tank mounted.
   2. Tank orientation: Horizontal.
   3. Construction:
      a. 1 piece cast iron with totally enclosed crankcase.
      b. Removable, heat-treated, precision-finished disc valves.
      c. Tapered roller main bearings.
   4. Displacement per Compressor: 6.7 cfm at 80 psi FAD and 886 rpm.
   5. Cooling: Deep finned, air-cooled cylinders.
   6. Lubrication: Pressure lubrication with a positive displacement pump driven by the main crankshaft.
   7. Air Control Valve: Valve integrated with oil pressure system to keep each compressor unloaded at start-up until normal operating speed and oil pressure is reached.
   8. Low Oil Protection: Compressor shall be unloaded in the event of loss of oil pressure or level.
   9. Safety Valve: Excessive pressure in the cylinder shall be vented by a valve. Operation shall be automatic, not requiring resetting upon return to normal pressure.
   10. Separator: In-line air/oil separators shall be installed between each of the compressors and the receiving tank.
   11. Thermal Protection: Each compressor shall be protected by thermal overload.

D. Motors
   1. Open, drip-proof.
   2. V-Belt Assembly:
      a. Balanced fan flywheels.
      b. Enclosed belt guards.
      c. Belt take-ups.
   3. Electric power: 2 HP, 460 volt, 3 phase, 60 Hz.
   4. Starters equipped with circuit breakers.

E. Alternator Control Panel:
   1. Provide one (1) panel for the Well 8 air compressor installations.
   2. Completely wired.
   3. Two (2) motor starters
   4. Provide a circuit breaker disconnect. This disconnect may be supplied integral to the Alternator Panel, or as a separate, enclosed circuit breaker disconnect mounted directly adjacent to the alternator panel.
   5. Fused control panel disconnect.
   6. Motor contactors.
   7. 3 phase overload relays.
   8. Auxiliary contacts.
   9. 6-digit run time meter for each compressor
   10. NEMA 1 enclosure.
   11. Lead/Lag switches that also allow the plant operator to manually select either compressor to repeatedly cycle while the other compressor remains off-line.

F. Receiving Tank:
   1. Size of receiver (gallons): 60-gallon capacity.
   2. ASME coded for 200 psig.

3. Automatic drain.
4. Safety valve.
5. Shut-off valve.
6. Pressure regulating valve.
7. Pressure gauge.
8. Low Pressure Alarm Contact.
   a. Factory set to 30 psi.
   b. Provide one 120Volt rated, SPDT, dry alarm contact for remote annunciation to SCADA for the compressor low pressure.
9. High Pressure Alarm Contact:
   a. Factory set to 130 psi.
   b. Provide one 120Volt rated, SPDT, dry alarm contact for remote annunciation to SCADA for the compressor high pressure.
10. Cut-In Pressure: 80 psig, adjustable w/gauge.
11. Cut-Out Pressure: 100 psig, adjustable w/gauge.
12. Regulator provided on tank. Regulated To: 60 psig, adjustable 40 to 110 psi.
13. Supported off floor by four legs welded to underside.

2.02 AIR FILTERS:

A. Approved Manufacturers:
   1. Domnick Hunter
   2. Prior approved equal.

B. Pre-Filter
   1. Model A0-0058G, High Efficiency filtration, in-line with auto-drain.
      a. Particulate removal to 1.0 micron at design air flow.
      b. Integral pressure gauge to measure pressure drop across filter.

C. After Filter
   1. Model AA-0058G, High Efficiency oil filtration, in line with auto drain:
      a. Particulate removal to 0.01 micron at design air flow.
      b. Integral pressure gauge to measure pressure drop across filter.

2.03 DRYERS

A. Provide one dryer assembly.

B. Model Zeks HeatSink™ 10 HSE, 115/1/60. cycling dryer, or approved equal.

C. Refrigerated, cycling air dryer with separate compressed air and refrigerant circuits.

D. Capacity: 10 cfm at 100 degrees F inlet air, producing air with a pressure dewpoint of 33 degrees F to 38 degrees F.

E. Automatic, completely wired, 115-volt, 60 Hz, 1 phase.

F. Automatic drain.

G. Wall mounted. Provide angle iron wall mounting bracket.

H. Provide cycling controls.

I. 1/2-inch FPT pipe connections.

J. 6-foot power cord.

2.04 QUICK CONNECTS

A. Provide 1/4-inch NPT quick connects at the end of stainless steel air lines where shown on the Drawings and/or specified herein and in Section 23 15 13.

B. Coordinate with Owner Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. The compressor assembly shall be installed as shown on the Drawings and in accordance with the manufacturer's recommendations.

B. All erection and lubrication procedures shall be accomplished according to the manufacturer's recommendation.

C. Installation of piping and electrical shall conform to the methods and materials specified throughout the Contract Documents.

3.02 PIPING, MOUNTING AND DRAINS

A. All piping shall be provided with sufficient expansion joints, guides, and anchors and be supported so as to preclude the possibility of exerting undue forces and moments on the equipment flanges.

B. Suitable flexible connectors shall be furnished to isolate the equipment from the piping system.

C. Contractor shall provide all air piping, hangers, and supports.

D. Drip funnels and drain piping shall be installed to convey discharge from all automatic drain valves and the air dryer to the nearest floor drain.

E. Drain piping shall be copper piping sized in accordance with manufacturer's recommendation and installed plumb and parallel to the lines of the building and shall not project into the work path.

F. Install the filter between the receiving tank and dryer. Refrigerated dryer shall be wall mounted. Provide brackets and support base and anchor as required.

3.03 ANCHORS

A. Contractor shall place all anchors in accordance with certified prints supplied by the equipment supplier.

B. Anchor bolts shall be 304 stainless steel, adhesive type.

3.04 POWER AND WIRING

A. 460 volt, 3 phase, 60 Hz. power shall be brought to the mounting locations.

B. 115 volt, 1 phase, 60 Hz. power shall be brought to the mounting locations.

C. Alternator control panel and disconnect shall be wall mounted adjacent to the compressor units.

D. Make all final electrical and mechanical connections to complete the air compressor assembly.

3.05 INSPECTION AND START-UP

A. After the Contractor has installed the equipment and the unit is capable of being operated, the equipment manufacturer shall furnish a qualified representative to inspect the equipment and supervise field testing and start-up.

B. After the equipment has been placed into operation, the manufacturer's representative shall make all final adjustments for proper operation.

3.06 OPERATOR TRAINING

A. Manufacturer's representative shall provide start-up training as specified in Section 01 77 00 to instruct the Owner in operation and maintenance procedures and to certify to the Engineer that the equipment is installed and operated correctly.

B. Provide minimum of 4 hours of operator training at Owner's convenience after system is operational.

END OF SECTION

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SECTION 33 31 00

SANITARY SEWER SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Gravity sanitary sewer pipe.
   2. Sanitary manholes and appurtenances.
   3. Service connections.
   4. Service pipe.
   5. Riser pipe.

B. Related Sections:
   1. Section 31 23 34 - Trenching, Backfilling and Compaction
   2. Section 33 01 10 - Tracer Wire

C. Method of Measurement:
   1. Sewer Pipe:
      a. Measure by distance in linear feet.
      b. Measure along longitudinal axis from manhole centers with no deduction for fittings.
      c. Measure each pipe size, class, and depth zone separately.
   2. Manholes:
      a. Measure each size and type individually as a unit.
      b. Unit includes granular foundation, base, precast barrel and cone sections, steps, rings, frame, and cover to a depth of 10 feet.
      c. Measure depth from lowest invert to top of frame.
   3. Excess Manhole Depth:
      a. Measure by distance in linear feet.
      b. Measure total distance from lowest invert to top of frame less 10 feet.
   4. Manhole Drop Section:
      a. Measure by distance in linear.
      b. Measure from upper to lower pipe invert.
      c. Unit includes base extension, fittings, drop pipe, collar, and differential cost of special lateral pipe material.
   5. Manhole Connections:
      a. Measure connections to an existing manhole as a unit.
      b. Unit includes cutting and patching of manhole wall and base, and construction of a new invert.
   6. Service Connections: Measure fittings of each size and type as a unit.
   7. Service Pipe:
      a. Measure by distance in linear feet of each size.
      b. Measure horizontally from end of riser fitting to end of pipe.
   8. Riser Pipe:
      a. Measure by distance in linear feet for each size.
      b. Measure vertically from end of service wye connection fitting to end of riser fitting.

D. Basis of Payment:
   1. Payment for acceptable quantities of sanitary sewer items shall be at the Contract Unit Price as listed on the Bid Form.
   2. All associated Work items shall be considered incidental.
   3. Maintaining sanitary sewer service during construction shall be considered incidental.

1.02 REFERENCES

A. ANSI:
1. A21.4 - Standard for Cement - Mortar Lining for Ductile Iron Pipe and Fittings
2. A21.11 - Standard for Rubber - Gasket Joints for Ductile Iron Pressure Pipe and Fittings
3. A21.51 - Standard for Ductile Iron Pipe Centrifugally Cast
4. A21.53 - Standard for Ductile Iron Compact Fittings, 3-inch through 16-inch

B. ASTM:
1. A48 - Specification for Gray Iron Castings
2. A74 - Specification for Cast Iron Soil Pipe and Fittings
3. C76 - Specification for Reinforced Concrete Pipe
4. C361 - Specification for Reinforced Concrete Low Head Pressure Pipe
5. C425 - Specification for Compression Joints for VCP and Fittings
6. C478 - Specification for Precast Reinforced Concrete Manhole
7. C564 - Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
8. D2321 - Recommended Practice for Installation of Flexible Thermo-plastic Sewer Pipe
9. D3034 - Specification for PVC Sewer Pipe and Fittings
10. F477 - Elastomeric Seals for Joining Plastic Pipe
11. F714 - Specification for PE Sewer Pipe and Fittings

1.03 SUBMITTALS

A. Submit Shop Drawings for each manhole.

B. Quality Assurance/Control Submittals:
1. Submit Certificates of Compliance from manufacturers certifying that materials meet reference specifications listed in Article 1.02.
2. Submit record of service connections weekly to Engineer.

1.04 HANDLING AND DELIVERY OF MATERIALS

A. Inspect pipe and materials during unloading process and notify Engineer of cracked, flawed or otherwise defective material.

1.05 STAKING

A. Engineer shall provide necessary staking for all Work under this Section.

1.06 MAINTAINING SEWER SYSTEM

A. Maintain flow in sanitary sewers on continuous basis while construction is underway.

B. Plug sewers with inflatable plug. Provide pumps, portable generators, hoses, and related items appurtenant to the Work.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Provide the following:

Material	Class	Joint
PVC **(within 200' of Well 19 and as shown on drawings)**	**SDR 18 C-900** ~~SDR 35~~ ASTM D3034 ASTM F477	**Elastomeric Gasket** ~~Elastomeric Gasket~~ Water Stop Gasket
Cement Lined Ductile Iron	Class 52 ANSI A21.4 ANSI A21.11 ANSI A21.51 ANSI A21.53	Push-On (Pipe) Mechanical (Fittings)
HDPE	SDR 17	Butt-Fusion

B. Provide pipe and fittings of each material type from same manufacturer.

2.02 MANHOLES

A. Precast Sections:
1. ASTM C478.
2. Cone: Eccentric.
3. Pipe Joints: Gasketed, watertight.

B. Covers and Frames:
1. ASTM A48:
   a. Type A: Neenah R1661, self-sealing lid with solid gasket, concealed pick-hole, not non-rocking.
   b. Adjustment Rings: Concrete, polypropylene, or approved equal, meeting AASHTO M-306, H-25, and HS-25 support requirements

C. Steps:
1. ASTM C497
2. Steel, plastic coated
3. 16inch center on center

D. Manhole Boots:
1. ASTM C923

E. Chimney Seals: Internal/External Seals - Adaptor Inc. or approved equal.

F. **Coat exterior or interior with chemical resistant coating to seal the entire manhole, from the factory or field applied. Submit materials proposed during submittal process.**

PART 3 EXECUTION

3.01 PREPARATION

A. Line and Grade: Provide means for accurately transferring line and grade from ground surface stakes to working point in trench.

B. Water Stops: Provide in manholes as required to prevent infiltration into system.

3.02 CONSTRUCTION REQUIREMENTS

A. Pipe Installation:
   1. Comply with ASTM D2321 for PVC installation.
   2. Inspect pipe for defects and cracks while suspended before lowering into trench.
   3. Place pipe bell at upstream end of pipe length.
   4. Install pipe from lower to higher invert elevation at a uniform slope between manholes.
   5. Place plug in end of incomplete piping at end of day and when Work stops.
   6. Provide watertight plugs at future connection plugs.
   7. When water is present in trench, seals are to remain in-place while trench is pumped completely dry.
   8. See Section 31 23 33 for pipe foundation and backfill.
   9. Maximum Allowable Deviation From Staked Grade:
      a. Alignment: 0.30 feet.
      b. Elevation: 0.02 percent.

B. Manhole Installation:
   1. Place precast manhole base on compacted granular subgrade.
   2. Locate steps within 1 inch of vertical alignment and within 1 inch of required vertical spacing.
   3. Provide monolithic base for drop manholes.
   4. Maximum Allowable Deviation From Staked Grade:
      a. Alignment: 0.30 feet.
      b. Elevation: 0.03 feet.

3.03 FIELD QUALITY CONTROL

A. Remove all dirt and foreign material from pipe interior prior to testing.

B. Gravity Sewer Pipe:
   1. Pipe Diameter 27 Inches and Smaller: Air test.
   2. Pipe Diameter Larger Than 27 Inches: Infiltration test.

C. Perform the following tests upon completion of sewer construction and prior to any external plumbing connections:
   1. Infiltration Test:
      a. Manholes shall be watertight, with no leakage permitted.
      b. Place 90-degree V-notch weirs in locations directed by Engineer to measure leakage in sewer lines.
      c. Allowable leakage rate shall be 100 gallons/day/inch diameter/mile of sewer between any adjacent manholes.
      d. Provide corrective measures for lines exceeding the allowable leakage rate.
   2. Air Test:
      a. Place inflatable sewer stoppers in manhole at each end of reach to be tested.
      b. Connect 1 end of an air hose to plug used for air inlet.
      c. Connect other end of hose to portable air control equipment.
      d. This equipment consists of valves and pressure gages used to control the rate air flows to the test section and to monitor air pressure inside the pipe.
      e. Connect an air hose between compressor (or other source of compressed air) and control equipment.
      f. Add air to pipe section. Monitor air pressure so pressure inside pipe does not exceed 5.0 psig.
      g. When pressure reaches 4.0 psig, stop air supply so internal pressure is maintained for 2 minutes.
      h. These 2 minutes allow time for air temperature to come to equilibrium with the pipe walls.
      i. During this time check plugs with soap solution to detect any plug leakage. If plugs are found to leak, bleed off air, tighten plugs, and begin again by supplying air.
      j. After temperature has been allowed to stabilize for 2 minutes, disconnect air supply and allow pressure to decrease to 3.5 psig.
      k. At 3.5 psig, start stopwatch to determine time required for pressure to drop to 2.5 psig.

l. Provide corrective measures for any line not meeting requirements.
m. Test results are usually better if sewer pipe walls are damp at time of testing.
n. Time shall be equal to or greater than the allowable time shown in table at end of this Section.

3. Deflection Test:
   a. Perform on PVC pipe at least 30 days after trench backfill has been placed.
   b. Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
   c. Mandrel diameter: Minimum 95 percent of the base inside diameter of the pipe as follows:

Nominal Size (in.)	Base I.D.	5% Deflection Mandrel
4	3.874	3.68
6	5.742	5.46
8	7.665	7.28
10	9.563	9.08
12	11.360	10.79
15	13.897	13.20
18	16.975	16.13
21	20.004	19.01
24	22.481	21.36
27	25.326	24.06
30	28.639	27.21
33	32.224	30.61
36	35.808	34.02
42	40.401	38.38
48	46.094	43.79

   d. The line will be considered acceptable if mandrel can progress through line without binding.
   e. Provide corrective measures for lines not meeting these requirements.

Time Required for a 0.5 PSIG Pressure Drop for Size and Length of Pipe Indicated

1 Pipe Diameter (inches)	2 Minimum Time (minutes:seconds)	3 Length for Minimum Time (feet)	4 Time for Longer Length (seconds)	Specified Minimum for Length (L) Shown (minutes:seconds)							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:74	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:67	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09

END OF SECTION

SECTION 40 23 20

PROCESS PIPING VALVES AND OPERATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Process piping valves.
   2. Process piping valve accessories.
   3. Process piping valve installation.

B. Related Sections:
   1. Section 40 23 00 - Process Piping General Provisions
   2. Section 40 23 10 - Process Water and Waste Piping
   3. Section 40 92 40 - Process Valve Actuators

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittal Procedures the following items:
   1. Product data
   2. Dimensions
   3. Manufacturer recommendations for installation

PART 2 PRODUCTS

2.01 MATERIAL

A. Size, joint type, and body material of process valves shall correspond to the size, joint type, and material of adjacent piping, unless otherwise stated on Contract Drawings and specifications.

2.02 EQUIPMENT

A. Gate Valves (3-inch or larger):
   1. Valves shall be resilient seated gate valves conforming to the latest revision of AWWA standard C-509.
   2. Valves shall be non-rising stem, opening by turning stem left and provided with a handwheel, unless otherwise shown or specified, and the word "open" and an arrow cast in the metal to indicate direction to open.
   3. The wedge shall be cast iron completely encapsulated, except for guide and stem nut areas, with polyurethane rubber.
   4. The polyurethane sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber to metal bond ASTM D429.
   5. Stem shall be cast bronze with integral collars in full compliance with AWWA standards. The stem stuffing box shall be the O-ring seal type with two O-rings located above the thrust collar. The two O-rings shall be replaceable with valve fully open and subjected to full rated working pressure.
   6. Provide two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of wedge and shall be made of solid bronze.
   7. There shall be a smooth unobstructed waterway free of all pockets, cavities and depressions in the seat area.
   8. The body and bonnet shall be coated on the interior and exterior with fusion bonded epoxy.
   9. Each valve shall have manufacturer's name, size, pressure rating, and year in which manufactured cast on the body.
   10. Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure.
   11. Approved Manufacturers: Clow, American, Mueller, M&H, or approved equal.

B. Butterfly Valves:
   1. Butterfly valves 3-inch through 30-inch shall have flanged ends and meet or exceed the requirements of AWWA C504 Class 150B and MSS SP-67.
   2. Valve body shall be ASTM A126 Class B cast iron.
   3. Disc:
      a. 3-inch to 20-inch valves: The disc shall be a lens-shaped design to afford minimal pressure drop and line turbulence. Materials of construction shall be:
         1) 3-inch to 6-inch: ASTM A351 gr. CF8N stainless steel disc
         2) 8-inch to 20-inch: ASTM A126, Class B cast iron disc with a stainless steel Type 316 edge
      b. 24-inch and larger valves: All valve discs shall be constructed of ductile iron ASTM A536 with a stainless steel seating edge. The disc shall not have any hollow chambers that can entrap water. All surfaces shall be visually inspected and measurable to assure all structural members are at full disc strength. Disc and shaft connection shall be made with stainless steel pins.
   4. Valve stem shall be 304 stainless steel and shall be supported on upper and lower nylon bearings.
   5. Seat and stem seals shall be acrylonitrile-butadiene.
   6. The seat shall be compression molded in the body and shall conform to ASTM D429 test standards.
   7. All process butterfly valves throughout the treatment facility shall be by the same manufacturer. Contractor shall coordinate with fabricated gravity filter supplier.
   8. Operators
      a. Hand levers shall be provided for all 4-inch and smaller butterfly valves. Hand levers shall be directly connected to the shaft, parallel to the disc, and shall rotate 90° from full open to tight close. Unless otherwise noted, levers shall include a locking device to assure positive disc position in the open, closed and at least 8 intermediate positions around the quadrant of rotation.
      b. Handwheel operators shall be provided for all 6-inch and larger butterfly valves. Valves with centerlines more than 6 feet above the floor shall be equipped with chain wheels and chains. Handwheel operators (geared actuators) shall be furnished with a 2-inch AWWA nut, cast iron handwheel. Handwheels shall have a maximum diameter of 12 inches. The operator shall be capable of throttling the valve in any position and holding this position under all operating conditions. The unit shall be of the worm screw or traveling nut type, totally enclosed, operating in a lubricant. Exterior position indication shall be provided. Maximum handwheel or chainwheel pull shall be 80 pounds at the rim.
      c. Handwheel floorstand operators and torque tubes shall be provided for valves as shown on the drawings. The floorstand operators shall include position indicators and geared actuators. Henry Pratt Diviner Handwheel Floorstand or equivalent by Dezurik.
      d. All butterfly valves shall be provided with position indicators.
      e. Provide electric or pneumatic actuators where shown on the drawings in accordance with the Pneumatic Actuators article of this section or Section 40 92 40.
      f. Provide torque tubes, extension bonnets, u-joints, steady bearings, wall brackets, and extension shafts as shown on the drawings and required for a complete functioning system. Items shall be manufactured by Henry Pratt Company or equivalent by Dezurik.
      g. Provide extended necks with wall brackets where shown on the Drawings. The extended neck shall be made of an interior 6-inch diameter schedule 80 steel pipe, with the exterior being made of 8-inch schedule 40 pipe. Extended neck braces shall consist of drill-in type anchor bolts with galvanized or stainless steel pipe supports.
   9. All process butterfly valves throughout the treatment facility shall be by the same manufacturer.
      a. In-plant butterfly valves shall be Pratt 2FII by Plant and Flanged, Pratt Triton XR-70 by Plant and Flanged, or DeZurik BAW. No substitutes.
      b. Buried butterfly valves shall be Pratt Groundhog or DeZurik BAW.
      c. Buried valves shall have an AWWA nut and valve box.

C. Swing Check Valves (Air Cushioned)
   1. The swing check valve shall be constructed with heavy cast iron or cast steel body with a bronze or stainless steel seat ring, a non-corrosive shaft for attachment of weight and lever, and

complete non-corrosive trim cushion chamber. Body shall have minimum 175 psi pressure rating and shall be provided with ANSI standard 125-pound flanges.

2. Valve shall absolutely prevent the return of water, soil, or gas back through the valve when the inlet pressure decreases below the deliver pressure. The valve must be tight seating, and must be cushioned in operation. The seat ring must be renewable.
3. The cushion chamber shall be of bronze construction and the shock absorption by air. The cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushion chamber shall be arranged that the closing will be adjustable to meet the service requirements.
4. The valve disc shall be convex and of cast iron or cast steel and shall be suspended from a non-corrosive shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve.
5. All material and workmanship shall be first class throughout and the purchaser reserves the right to inspect this valve before shipment.
6. Air cushioned swing check valves shall be Golden Anderson Figure No. 250-D, or APCO Series 250.

D. Plastic Ball Valves:
   1. Furnish true union manually operated ball valves in PVC construction.
   2. Valves shall have lever operators unless otherwise noted.
   3. Ball valves as manufactured by Chemtrol, or equal, and which meet these specifications will be accepted.

E. Plug Valves:
   1. In-Plant Plug Valves - General:
      a. Valves on sludge, sewage and water shall be non-lubricated eccentric type with resilient-faced plugs. Valves shall be operated by nuts, or cast iron handwheels or chainwheels as indicated on the Drawings. Operators whose center line is 6'-6" or higher above the operating floor, shall be equipped with galvanized shrouded pocket handwheels and sherardized chains. Bolt-on chainwheels for mounting on standard handwheels will not be acceptable. Handwheels and chainwheels shall have a maximum diameter of 12 inches. Maximum handwheel or chainwheel pull shall be 80 pounds at the rim.
      b. All valves, except those indicated on the Drawings, shall be equipped with gear actuators. All bearing surfaces shall be enclosed, suitable for running in oil or grease with seals provided on all shafts to prevent entry of dirt and water into the actuator. Actuator shall clearly indicate valve position and an adjustable stop shall be provided to set closing. Valve packing adjustment on non-submerged valves having adjustable packing shall be accessible without removing the actuator from the valve. Construction of actuator housing shall be cast iron or semi-steel. All exposed nuts, bolts, and washers shall be zinc plated.
      c. Provide pneumatic actuators where shown on the Drawings in accordance with Section 40 92 40.
      d. Certified copies of proof-of-design test reports shall be furnished in accordance with AWWA C504, Section 5.2.

F. Air Release and Air Release/Vacuum Breaker Valves
   1. General:
      a. Air release valves, air/vacuum release valves and combination air valves shall conform to AWWA C512 and be manufactured by APCO Valve Corporation; Val-Matic; Crispin; or equal.
      b. Body, cover and baffle shall be cast or ductile iron. Fasteners, internal linkage, internal parts, floats, and float guide shall be stainless steel. Elastomers shall be Buna-N.
      c. All valves shall be furnished with an inlet shut-off ball valve. Discharge lines shall extend down to 18 inches above the floor.
      d. Valves on sewage lines shall be equipped with backflushing attachments consisting of a 1-inch blow-off valve, shut-off valve, and quick disconnect coupling and a minimum of 6 feet of back-flushing hose.
      e. Add a pipe saddle if valve and pipe tap size required for flow condition are too large to allow adequate thread depth.

f. Venting rate and size for all valves shall be within the manufacturer's recommendations.

2. Air Release Valves
   a. Air release valves shall allow entrained air in pipelines to escape through an air release orifice. After entrained air escapes, the valve orifice shall close by a needle mounted upon a compound lever mechanism actuated by a float. Air release shall remain closed until more air accumulates and the opening cycle is repeated.
   b. Water valves shall be APCO Series 200, Val-Matic (Model 38, 45, or 50), or equal.
   c. Sewage air release valves shall be APCO Series 400 or equal.
3. Air Release/Vacuum Breaker Valves:
   a. Design valve to exhaust air from well pump column piping upon pump startup, and allow air to re-enter column piping when pump shuts down.
   b. Water valves shall be APCO Series 140, Val-Matic (Model 100, 101, or 102).
   c. Equip with adjustable throttling device to regulate flow of air escaping during pump startup.
4. Combination Air Valves:
   a. Combination air valves shall be a single housing style that combines the operating features of an air release/vacuum breaker valve, as well as an air release valve when the system is under pressure.
   b. Water valve shall be APCO Model 143C, 145C, 147C, 149C, 150C, or 151C, Val-Matic Series 200, or equal.
5. Valve Sizes:

Type	Location	Size	Comments
Air/vacuum release	Filter room See Keynote 12 on Section 1P301 in Plan Set	1"	Installed in pipe tap in blind flange on run of 4x4x4 tee
Air/vacuum release	After well discharge See Keynote 4 on 01-P101 in Plan Set	4"	Tap 12" pipe for 4" air/vac valve
Air release	High Service Pumps (3 locations)	¾"	Three high service pumps, see Section 43 21 13

G. Sample Taps - Water Only:
1. Sample cocks shall be mounted where shown on Drawings.
2. Sample taps for water shall be constructed of brass. They shall be suitable for bacteriological testing and have no internal threads, screens, aerators, external threads at the discharge, or other small areas that would encourage bacterial growth.
3. The main body shall be a one-piece, angle pattern globe valve with an integral MPT pipe connection, a hex nut, and a smooth-nose discharge. The seat seal shall be rubber. The operating knob shall be round, at least 1.25-inch diameter, replaceable, and constructed of plastic or metal.
   a. For pressures <80 psi, provide 1/2-inch chrome-plated smooth-end sampling cock, Zurn Z-80401, or equal.
   b. For pressures >80 psi, provide 1/2-inch satin brass smooth-end sample cock, Conbraco 26-314, or equal.

H. Valve Tags & Equipment Tags:
1. Valve Tags: All new valves and major process equipment shall be tagged. CONTRACTOR shall furnish and install on valves, engraved 2 1/2-inch by 2 1/2-inch plastic laminated tags, Seton "Setonply Series M4550-H," or equal.
2. Nomenclature for tagging (letters and numbers) will be provided by ENGINEER.
3. Colors will be selected by OWNER.
4. CONTRACTOR shall affix tags to valves with Brady 3809, or equal, stainless steel wire and Brady 38090, or equal, zinc wire clamps.

5. Tags shall be engraved plastic. Plastic shall be three colored layers. Engraving shall reveal the inner, contrasting color. Lettering shall be 1/2-inch-high minimum. Unless otherwise noted, use black tags with white lettering.

I. Pipe Labels
1. Manufacturers: Marking Systems, Inc., Seton Name Plate Company, W.H. Brady Company, or equal.
2. Pipe markers shall conform to ANSI A13.1. Arrow markers must have same ANSI background colors as their companion pipe markers or be incorporated into the pipe identification marker.
3. Plastic Pipe Markers: Factory-fabricated, flexible, semirigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
4. Pipe markers and arrow markers also shall be provided for all piping systems.
5. Use Seton Setmark type SNA or Brady Snap-on type identification for all piping systems, up through 6 inches.
6. For piping systems larger than 6 inches, use Seton or Brady strap-on markers, or similar, by Marking Services, Inc. Self-adhesive labels are not acceptable. Provide lettering in accordance with information below:

Outside Pipe Dia. (Including Covering)	Minimum Length of Label Field (Inch)	Minimum Height of Letters (Inch)
3/4 inch to 1-1/4 inch	8	1/2
1-1/2 inch to 2 inch	8	3/4
2-1/2 inch to 6 inch	12	1-1/4
8 inch to 10 inch	24	2-1/2
Over 12 inches	32	3-1/2

J. Rubber Flapper Swing Check Valves:
1. Manufacturer: APCO Series 100.
2. Provide on discharge of sludge and recycle pumps as shown on Drawings. Provide two 4-inch valves and two 6-inch valves.
3. Materials and Construction:
   a. Cast Iron Body.
   b. Tight Sealing.
   c. O-ring Seating.
   d. Buna-N Coated Steel Disc.
   e. Manual Back Flushing Hold-Open Device.

K. Surge Relief Valves:
1. Manufacturer: Cla-Val Model 50-01
2. Replace Golden Anderson 12-inch by 14-inch surge relief valve with a Cla-Val 10-inch surge relief valve.
3. Cla-Val 10-inch valve shall be provided with a pipe train adapter on the outlet side to increase to a 14-inch pipe size. Furnish any and all necessary adaptors or pipe fitting materials to connect to the existing facility piping.
4. Function:
   a. The valve shall maintain a constant upstream pressure by bypassing or relieving excess pressure and shall maintain close pressure limits without causing surges. If upstream pressure decreases below the spring setting, the valve shall close.
5. Main Valve:
   a. The valve shall be hydraulically operated, single diaphragm-actuated, globe or angle pattern. The valve shall consist of three major components: the body with seat installed, the cover with bearings installed, and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall forma sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls.
6. Main Valve Body:
   a. No separate chambers shall be allowed between the main valve cover and body. Valve body and cover shall be of cast material. Ductile Iron is standard and other materials shall be

available. No fabrication or welding shall be used in the manufacturing process. Total shipping weight, in all respects, shall be equal to or greater than the Hytrol 100-01/100-20 body.

b. The valve shall contain a resilient, synthetic rubber disc with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. No O-ring type discs (circular, square, or quad type) shall be permitted as the seating surface. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the disc firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. It must have straight edge sides and a radius at the top edge to prevent excessive diaphragm wear as the diaphragm flexes across this surface. No hourglass-shaped disc retainers shall be permitted, and no V-type or slotted type disc guides shall be used.

c. The diaphragm assembly containing a non-magnetic 303 stainless steel stem of sufficient diameter to withstand high hydraulic pressures shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. The seat shall be a solid, one-piece design and shall have a minimum of a five-degree taper on the seating surface for a positive, drip-tight shut off. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve separating operating pressure from line pressure.

d. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The center hole for the main valve stem must be sealed by the vulcanized process or a rubber grommet sealing the center stem hole from the operating pressure. The diaphragm must withstand a Mullins Burst Test of a minimum of 600 psi per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall not be used as the seating surface. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully open or fully closed position.

e. The main valve seat and the stem bearing in the valve cover shall be removable. The cover bearing and seat in 6 inches and smaller size valves shall be threaded into the cover and body. Valve seat in 8 inches and larger size valves shall be retained by flat head machine screws for ease of maintenance. The lower bearing of the valve stem shall be contained concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. To ensure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No "pinned" covers to the valve body shall be permitted. Cover bearing, disc retainer, and seat shall be made of the same material. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline. Packing glands and/or stuffing boxes shall not be permitted and components including cast material shall be of North American manufacture.

f. The valve manufacturer shall warrant the valve to be free of defects in material and workmanship for a period of three years from date of shipment provided the valve is installed and used in accordance with all applicable instructions. Electrical components shall have a one-year warranty.

g. The valve manufacturer shall be able to supply a complete line of equipment from 1 1/4-inch through 24-inch sizes and a complete selection of complementary equipment. The valve manufacturer shall also provide a computerized cavitation chart which show flow rate, differential pressure, percentage of valve opening, Cv factor, system velocity, and if there will be cavitation damage.

7. Material Specification:
   a. Valve Size:10-inch.
   b. Main Valve Body and Cover: Ductile Iron.
   c. Main Valve Trim: stainless steel.
   d. End Detail: 150# flanged, globe pattern.
   e. Temperature Range: normal.
   f. Rubber Material: Buna-n.
   g. Coating: fusion bonded epoxy inside.
   h. Desired Options: X105LCW close limit switch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect all material and equipment as it is received to determine damage and/or missing parts. Repair or replace damaged items in accordance with the manufacturer's instructions.

3.02 INSTALLATION AND TESTING

A. Each item or system shall be furnished complete and installed as shown on the drawings and in accordance with the manufacturer's recommendations, instructions and directions. The complete installation shall function properly and reflect a high work quality.

B. Refer to related sections of this specification for additional installation and testing requirements and information. Tests shall be conducted after all valves are installed.

3.03 PAINTING

A. The exterior of all valves, operators, and accessories, unless otherwise described, shall be painted as specified under Section 09 91 00. Valves shall be painted to match the color of the adjacent piping.

3.04 OPERATOR TRAINING

A. Provide minimum of 2 hours of operator training, for each type of actuator function (electric or pneumatic) included in the Project. Schedule training at Owner's convenience, after system is operational.

3.05 VALVE SCHEDULE

A. Reference Sheet ~~01-P901-~~**01 P101** in the Drawings for the Project Valve Schedule.

B. The Valve Schedule has been included for the purposes of conveying information regarding operator requirements for some of the process valves to be installed as part of this project. The Valve Table/Schedule does not include the valves and actuators provided with the Filters Equipment skids, those are to be provided by the Filter Equipment manufacturer and are not listed on the Valve Schedule. Other minor valves are not listed, and the Valve Schedule is NOT intended to list every valve on the project.

END OF SECTION

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SECTION 40 23 30

PROCESS PIPING SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Miscellaneous process piping items.

B. Related Sections:
   1. Section 40 23 00 - Process Piping General Provisions
   2. Section 40 23 10 - Process Water and Waste Piping

1.02 REFERENCES

A. ASTM:
   1. C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
   2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005
   3. E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2000

B. NFPA:
   1. 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; 2006

C. UL:
   1. 723 - Standard for Test for Surface Burning Characteristics of Building Materials, 2003

1.03 SUBMITTALS

A. Submit Product Data which includes the following for each item furnished:
   1. Manufacturer and model.
   2. Component materials.
   3. Dimensions.

B. Seal Installation Through Fire-rated Wall, Roof, or Floor:
   1. Provide Engineer and Code Official with 2 copies each of proposed firestop system for each pipe penetration.
   2. System information shall include:
      a. UL system numbers.
      b. F and T ratings.
      c. Detailed drawing.
      d. Manufacturer name.
      e. Installation procedure.
      f. List of components.

PART 2 PRODUCTS

2.01 EXPANSION JOINTS

A. EPDM or Teflon single-filled arch spool type.

B. Full face steel flanges.

C. Temperature Range: 40 to 100 degrees F.

D. Design for UV exposure.

E. Maximum Working Pressure: 125 psi.

F. Furnish tie rods, limiter sleeves, and retaining brackets where indicated on Drawings.

G. Acceptable Manufacturers:
   1. Proco Products, Inc.
   2. Red Valve Co., Inc.
   3. Approved equals.

2.02 PRESSURE GAGES AND COCKS

A. Pressure Gage:
   1. Size: 4-1/2 inch dial.
   2. Range: ~~0-160 psi, unless shown on Drawings.~~ Will be specified during the shop drawing submittals, and will vary by location of the gage on the piping.
   3. Graduation: ~~2 psi.~~ will be specified during the shop drawing submittals, graduation will vary by gage.
   4. Accuracy: 1/2 percent.
   5. Movement: Heavy-duty stainless steel.
   6. Case: Fiberglass Reinforced Polypropylene.
   7. Mounting: Direct (stem).
   8. Connection: 1/4-inch NPT, bottom.
   9. Glycerin - filled.
   10. Manufacturer: Weksler AY04 or approved equal.

B. Isolation Cock:
   1. Ball valve.
   2. Suitable to 200 psi.
   3. 1/4-inch NPT male and female connections.

2.03 PIPE COUPLINGS

A. Sleeve type.

B. Furnish to match pipe being coupled.
   1. Size.
   2. Material.
   3. Pressure.
   4. Service of pipe.

C. Acceptable Manufacturers/Models:
   1. Dresser, Style 38.
   2. Smith Blair, Type 411.
   3. Approved equal.

2.04 FLANGED ADAPTERS

A. Furnish to match the pipe being connected:
   1. Size.
   2. Material.
   3. Pressure.
   4. Service of pipe.

B. Acceptable Manufacturers/Models:
   1. EBBA Iron Series 2100 Megaflange.
   2. Dresser, Style 127.
   3. Smith Blair, Type 911.
   4. Approved equal.

2.05 PIPE SLEEVES

A. Material: Steel Pipe.
   1. Furnish zinc-coated steel pipe in the following installations:
      a. Masonry walls and floor.
      b. Fire-rated gypboard partitions.
      c. Masonry or steel deck roofs.
   2. Furnish zinc-coated sheet steel in the following installation:
      a. Non fire-rated gypboard partitions.

B. Size:
   1. Minimum: 2 nominal pipe sizes larger than respective pipe.

C. Acceptable Manufacturers/Models:
   1. American Cast Iron Pipe, Model A-01770.
   2. Approved equal.

2.06 SEALS

A. Furnish positive hydrostatic pipe link seal.
   1. Sealing Element: Synthetic rubber material expanded by tightening of zinc galvanized plate carbon bolts.

B. Acceptable Manufacturers:
   1. Thunderline Corp.
   2. Approved equal.

2.07 WALL PIPES

A. Material: Ductile iron.

B. Size and End Connections: Match adjacent pipe.

C. Furnish with welded or integrally-cast waterstop collar.

D. Acceptable Manufacturers:
   1. Clow Pipe.
   2. American Cast Iron Pipe.
   3. Approved equal.

2.08 FLOATING SUCTION STRAINERS AND HOSES

A. Contractor shall furnish and install a floating suction strainer in each backwash reclaim tank.
   1. Dimensions of tank are shown in contract drawings.

B. Approved Manufacturer:
   1. Megator Corporation Dolphin Floating Suction Strainer.
   2. Pureflow Filtration Division Floating Decanter System.

C. Provide two 4-inch suction strainer with a minimum capacity of 300 gallons per minute for installation in the rehabilitated lagoon.

D. Materials and construction:
   1. Stainless steel construction.
   2. Floating chamber of polyurethane foam.
   3. Freely turning tube to prevent hose from twisting.
   4. Eye for providing mooring or for attaching weight.
   5. Anti-vortex plates.

E. Non-floating hose:
   1. Approved Manufacturer: Dayco U-10 non-floating hose or Engineer approved equal.
   2. Floating suction strainer manufacturer shall provide 20-feet of hose.
   3. Cut hose to fit during installation.
   4. Hose shall connect to 4-inch DIP flange.

F. Contractor shall fabricate a cable system to keep floating suction from drifting and to allow vertical movement of flexible hose.

2.09 SPRAY NOZZLES

A. Approved Manufacturers:
   1. Spraying Systems Company, Wheaton Illinois.
   2. Or Engineer approved equal.

B. Materials and Construction.

C. Uni-Let Model 1/4 TT4060 brass nozzles:
   1. Qty: As called for in the Drawings.

D. Uni-Let Model 1/4 TT1560 brass nozzles:
   1. Qty: As called for in the Drawings.

E. Provide the following nozzles assembly for each nozzle listed above:
   1. Nozzle body.
   2. Spray tip.
   3. Tip retainer.
   4. No. 5540 swivel assembly.

F. In general, installation of the spray wash nozzles is as described:
   1. The head end of the tanks, are the shallow ends and the hopper end is the deep end of the tanks.
   2. Along the head ends of the tanks, four (4) 1560 type nozzles are to be installed in the center of the tanks along the springline (equator) of the spray wash pipe.
   3. Four (4) 1560 type are to be installed on the bottom of the head end pipe, two near the pipe center pointing in toward the center of the head end of the tank, and two installed near the corner 90's oriented in the same manner.
   4. Along the long sides of the tanks, 1560 type nozzles are to be installed along the bottom of the spray wash pipes at 6 feet - 0 inch spacing starting 6 inches away from the head end 90's.
   5. Along the spring-lines of the long side pipes, 4060 type nozzles are to be installed where spacing is greater than 6 inches on center.
   6. Use 1560 type nozzles at the head of the tanks where nozzles are spaced at 6 inches on center.
   7. The spring-line nozzle spacing notes are identified per one side of the tank and apply equally to all long sides.

2.10 STATIC MIXER

A. Furnish and install two (2) static mixers for blending chemical with the water.
   1. Number of units: 2.
   2. Location: See sheet GP 002 and 01-P101 Keynote 9 and 32.
      a. One (1) in the raw water pipe.
      b. One (1) in the filtered water pipe.
   3. Pipeline Diameter: 12-inch.

4. Flow Rate: 2,300 gpm.
5. Chemical Feed Taps on each mixer:
   a. Qty: 3.
   b. Sizes on raw water:
      1) one (1) 1.5-inch for chlorine feed.
      2) one (1) 0.75-inch spare.
      3) one (1) 0.75-inch spare.
   c. Sizes on finished water:
      1) one (1) 0.75-inch for fluoride feed.
      2) one (1) 0.75-inch spare.
      3) one (1) 0.75-inch spare.
6. Elements: One set of six (6) vane style elements designed to suit the mixer with a length to diameter ratio of 1D (Element length = 1 nominal mixer diameter).
7. Maximum Pressure Drop: 0.4 psi.
8. Overall Length of Unit: 12-inch.
9. Construction: 316SS.
10. Manufacturer
    a. Statiflo DSM Series (1D Version).
    b. Or equal pre-approved by Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
   1. Install all items in accordance with manufacturer's recommendations.
   2. Install items only where indicated on the Drawings.
   3. Installation at other location only with prior approved by the Engineer.

B. Pipe Sleeves:
   1. Sleeve each pipe individually.
   2. Floor Installation: Extend sleeve 2 inches above finished floor.
   3. Roof Installation:
      a. Extend sleeve from 4 inches below to 12 inches above roof deck.
      b. Furnish with welded attachment brackets.
      c. Furnish with weather skirt for each sleeve.
   4. Provide continuously welded waterstop collar on sleeves set in masonry or concrete.

C. Seals:
   1. Installation through fire-rated wall, floor, or roof.
   2. Seal annular space between piping and sleeve with approved brand fire barrier caulk or putty.

END OF SECTION

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SECTION 40 92 40

PROCESS VALVE ACTUATORS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Pneumatic power-actuating devices for process valves.

B. Related Sections:
   1. Section 09 91 50 - Shop Painting
   2. Section 40 23 04 - Process Piping Valves and Operators

1.02 REFERENCES

A. AWWA:
   1. C540 - Power-Actuating Devices for Valves and Sluice Gates
   2. C541-08 - Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates

B. Materials:
   1. Alloy cast iron: ASTM A436.
   2. Aluminum: ASTM B179, Alloy 356.1.
   3. Aluminum: ASTM B85.
   4. Brass or Bronze: ASTM B154, less than 7 percent zinc.
   5. Cast iron: ASTM A126.
   6. Cast steel: ASTM A216.
   7. Carbon steel: ASTM A108.
   8. Ductile iron: ASTM A536.
   9. Electroless-nickel plate: ASTM B733.
   10. Fabricated steel: ASTM A36, ASTM A516.
   11. Nickel-copper alloy: ASTM B127, ASTM B164.
   12. Stainless steel: ASTM Z276, type 304 or better.
   13. Zinc alloy: ASTM B-240.

1.03 DESIGN REQUIREMENTS

A. Features:
   1. The following shall be completed without removal of the actuator covers:
      a. Setting of the torque levels and position limits.
      b. Configuration of the indication contacts.

B. Sizing:
   1. Size actuator to ensure valve closure at the differential pressure at each location.
   2. Verify differential pressures at each location prior to ordering.
   3. Coordinate with valve manufacturer to ensure proper sizing for each valve model and size.

C. Commissioning Tools:
   1. Provide with each actuator.
   2. Shall not form an integral part of the actuator.
   3. Shall meet enclosure protection and certification levels of the actuator.
   4. Shall be removable for secure storage/authorized release.
   5. Ensure protection of configured actuator settings by a means independent of access to the commissioning tool.

1.04 PERFORMANCE REQUIREMENTS

A. Environmental:
   1. Suitable for indoor and outdoor use.
   2. Capable of functioning in an ambient temperature range of 32 degrees F to 100 degrees F.
   3. Capable of functioning in relative humidity up to 100 percent.

B. Operating Speed:
   1. Provide valve opening and close at 12 inches per minute.
   2. Capable of adjustment.

C. The safety margin of motor power available for seating and unseating the valve shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10 percent below normal.

1.05 SUBMITTALS

A. Product Data: Submit Product Data for each type of actuator provided.

B. Shop Drawings: Submit scaled Shop Drawings for each size and type of actuator provided.

C. Quality Assurance:
   1. A list of actuators to be provided for each application which includes:
      a. Torque capabilities.
      b. Operating torques.
         1) Seating.
         2) Unseating.
   2. Certificates of performance testing.

D. Close-out:
   1. System start-up reports.
   2. Operation and maintenance manuals.

PART 2 PRODUCTS

2.01 CYLINDER-TYPE PNEUMATIC ACTUATORS

A. Supply cylinder-type pneumatic actuators capable of open/close operation and/or modulating operation where specified or indicated in the Drawings. Provide actuators for valves as indicated on the Valve Schedule in the Drawings. ~~on Sheet GP4.~~

B. Where specified or indicated in the Drawings, valves are to be supplied with enclosed pneumatic cylinder operators and shall have a disc maximum stop limit and position indicator.

C. Shaft seals and seats shall be suitable for continuous operation up to 180 degrees F.

D. Cylinder shall be double-acting with stop nuts provided to position cylinder. The air compressor for operation of the pneumatic system shall be provided as specified in Section 22 15 ~~00~~ 13.

E. Pneumatic cylinder operators shall be rigid-mounted without swivel movement during valve operation. A manual operator shall also be provided, which is able to function in the event of loss of air pressure in the pneumatic operators.

F. Conform to the requirements of AWWA C540 and C541.

G. Materials
   1. Cylinder Head and End Caps: Ductile iron.
   2. Piston Rod: chrome plated stainless steel.

3. Epoxy coat interior surfaces.

H. Valve supplier shall determine torque requirement of butterfly valve for selection of actuator based on a flow rate ~~of 400 gpm~~ in each pipe where a valve is located.

I. Air Supply:
   1. Normal operation: 80 psi air supply.
   2. Pressure rating: 150 psi.

J. Solenoid Valves:
   1. 4-way solenoid valves for 120V, 60 Hz, single-phase, AC power supply shall be furnished for each operator.
   2. Solenoid valves shall be NEMA 4X and shall be mounted on the operator or in a solenoid cabinet.
   3. Rate of opening and closing adjustment shall be provided for all solenoid valves.

K. Limit Switches:
   1. All pneumatic actuators shall be furnished with limit switches as follows:
      a. Mechanical function, quick set cam actuated limit switches.
      b. Two (2) SPDT contacts rated 10A continuous at 120VAC.
      c. NEMA 4X enclosure, epoxy coated, cast aluminum, explosion proof, watertight, corrosion proof enclosure.
      d. One 3/4-inch and one 1/2-inch conduit entries.
      e. Indicator Lights
         1) Red: valve closed.
         2) Green: valve open.
      f. Limit switches shall be by the same manufacturer as the actuators.

L. Fail Positions:
   1. Valves shall fail to either a fully open or fully closed position in the case of air pressure loss.
   2. Loss of power shall cause valve to return to normal open/close fail position.
   3. See Valve Schedule for the fail position of each valve.

2.02 MANUFACTURERS

A. The pneumatic actuators shall match the valve manufacturers and be of the following:
   1. Henry Pratt Company: Pratt MDT actuator and Dura-Cyl® cylinder.
   2. DeZurik approved equal.

2.03 ACCESSORIES

A. Supply each actuator with a start-up kit.
   1. Content:
      a. Installation manual.
      b. Electrical wiring diagram.
      c. Cover seals to make good any site losses during the commissioning period.
      d. Supply sufficient tools to enable set up and adjustment during valve/ actuator installation, testing, and commissioning.

B. Furnish and install an air line moisture, dirt and oil extractor unit at process air supply source (Coordinate with Section 22 15 00)

2.04 FABRICATION

A. Cylinder actuators for valves 3-inch through 8-inch shall be of the scotch yoke type. Valve sizes 10-inch and larger shall be supplied with a compound link and lever arrangement designed to minimize water hammer by providing characterized opening and closing. The concept of characterized closure is to reduce the flow area quickly to 20 percent open in the first half of the actuator stroke, and then slow down the disc travel to close off the last 20 percent of the flow area.

B. All wetted parts of the cylinder shall be nonmetallic, except the cylinder rod which shall be chromium plated stainless steel. The rod seals shall be of the nonadjustable, wear compensating type. A rod wiper for removing deposits inside the cylinder shall be provided in addition to an external dirt wiper. Cylinder actuator can be supplied with an optional manual override.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment and accessories in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

A. The manufacturer or duly appointed representative shall provide the following services:
   1. After installation and prior to start-up:
      a. Inspect all installations.
      b. Perform necessary adjustments and modifications.
   2. During start-up operations: Supervise initial start-up.
   3. Post start-up:
      a. Make all final adjustments.
      b. Provide minimum of 8 hours of operation and maintenance training for Owner's personnel.

END OF SECTION

SECTION 43 21 13

HORIZONTAL CENTRIFUGAL SPLIT CASE PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the furnishing and installation of horizontal split case centrifugal pumps, motor, mounting bases, anchor bolts, and appurtenances necessary for satisfactory operation.

B. Pump shall be installed in lay length provided location of the existing booster pumps.

C. Related Sections:
   1. Section 09 91 50 - Shop Painting
   2. Section 26 29 24 - Variable Frequency Drives

1.02 PERFORMANCE REQUIREMENTS

A. Liquid Temperature Range: 40-70 degrees F.

B. Meet or exceed the operating condition requirements listed at the end of this section.

C. NSF 61/372 compliant.

D. Performance Requirements.
   1. Design basis Small Booster Pump (QTY1):
      a. Fairbanks Morse 1824 single-stage, split-case, horizontal centrifugal pump.
      b. Impeller: 444A329.
      c. Suction: 6-inch.
      d. Discharge: 5-inch.
      e. Speed: 1800 rpm.
   2. Design Condition:
      a. Full speed (1775 rpm).
      b. Provide 1,400 gpm against a total dynamic head of 175 feet.
      c. Minimum efficiency at this speed = 77 percent.
      d. Minimum shut-off head: 210 feet.
      e. Runout flow: 1,950 gpm at 120 feet.
   3. Design Basis Large Booster Pumps (Qty 2)
      a. Fairbanks Nijhuis 1823 single-stage, split case, horizontal centrifugal pump.
      b. Impeller: 444R330.
      c. Suction: 8-inch.
      d. Discharge: 6-inch.
      e. Speed: 1800 rpm.
   4. Design Condition:
      a. Full speed on (1775 rpm).
      b. Provide 2,100 gpm against a total dynamic head of 175 feet.
      c. Minimum efficiency at this speed = 81 percent.
      d. Minimum shut-off head: 215 feet.
      e. Runout flow: 2900 gpm at 105 feet.

1.03 SUBMITTALS

A. Product Data:
   1. Preliminary characteristic performance curves.
   2. List of pump components and materials.

B. Shop Drawings:
   1. Pump schematic.
   2. Component sizes and dimensions.
   3. Field measurements of existing piping conditions including available space between pipe flanges to remain.

C. Test Reports: Certified factory H.I. performance test results for pumps to be provided prior to shipping.

D. Manufacturer's Operation and Maintenance Instructions.

E. Close-out:
   1. Performance test results from installed units.
   2. Provide within 7 days of field testing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fairbanks Morse, Kansas City, KS

B. Approved equal.

2.02 EQUIPMENT

A. High Service Pump Schedule
   1. High Service Pump No. 1: HSP-1.
   2. High Service Pump No. 2: HSP-2.
   3. High Service Pump No. 3: HSP-3.

B. General Requirements:
   1. Split case centrifugal pump with shaft in the horizontal orientation.
   2. Quantity: three (3).
   3. NSF 61 and NSF 372 Listed to comply with the Reduction of Lead in Drinking Water Act.
   4. Maximum Speed: 1800 rpm.
   5. Rated Motor Horsepower: (QTY 1) Small Booster:100 HP; (QTY 2) Large Boosters: 125 HP.
   6. Power Supply: 480V, 3-phase, 60 Hz.
   7. Acceptable Pumps:
      a. Fairbanks Morse Pump
         1) Size: 5-inch 1824 (QTY 1); and 6-inch 1823 (QTY 2).
         2) Maximum pressure: 250 psig.
      b. Other pumps are acceptable only if they meet all the requirements of this specification and with prior approval by Engineer.

C. Materials
   1. Casing: Cast iron (ASTM A48.)
   2. Impeller (for use with chlorinated water above 2 PPM): Alpha Nickel Aluminum Bronze or 316 Stainless Steel.
   3. Shaft Sleeve: 316 stainless steel.
   4. Shaft: Steel AISI C1045.
   5. Casing Wear Ring: 416 stainless steel.
   6. Impeller Wear Ring: 316 stainless steel.
   7. Base Plate: Structural steel or cast iron.

D. All pumps furnished under this section shall be provided by the same manufacturer.

2.03 COMPONENTS

A. Casing:
   1. Horizontal split cast design.
   2. Flange Connections: ANSI 125 pound rated.
   3. Tapped and plugged holes for priming and draining. Furnish and install a 0.75-inch air release valve installed in a provided tap in the top of the volute of each casing, to facilitate air removal from the water column. See Section 40 23 20 for Air Release Valve requirements. Install with isolation ball valve. Route discharge per the air release detail and provide stainless steel screen.
   4. Provide for removal of the rotating element without disconnecting the suction or discharge piping.
   5. Furnish lower half of casting with cored passageways from the high-pressure area of the volute to each seal box for positive lubrication without the use of external flushing lines.
   6. Integrally cast bearing arms with lower half of casing to ensure positive bearing alignment.
   7. Bolt-on bearing arms are not acceptable.

B. Impeller:
   1. Enclosed type, vacuum cast in one piece.
   2. Dynamically balanced.
   3. Key to shaft.
   4. Exterior Finish: Turned.
   5. Interior Finish: Finished smooth, free of burrs, trimmings, and irregularities.

C. Shaft Sleeves:
   1. Seal sleeve to impeller hub by means of an O-ring.
   2. Positively drive sleeve to the keyway.
   3. Fasten the sleeve to the shaft by means that the manufacturer recommends.

D. Shaft Seal: Mechanical, Type 21.

E. Shaft:
   1. One piece, finished and polished on all sections.
   2. Length: Shortest practicable distance between bearings to minimize deflection and vibration.
   3. Maximum Allowable Deflection: 0.002 inches at any point on the pump operating curve.

F. Casing Wearing Ring:
   1. Radial type.
   2. Press fit into casing.

G. Bearings:
   1. Regreasable lubrication ball type.
   2. Average Life: 100,000 hours.
   3. Radial Loads: Provide single row inboard bearings.
   4. Thrust Loads: Provide double row outboard bearings.
   5. Mount bearings in moisture and dust proof machined housing.
   6. Housing:
      a. Registered fits to ensure alignment.
      b. Pinned, to prevent rotation.
      c. Bolt to bearing arms.
   7. Supply each housing with grease fitting and plugged relief port.

H. Coupling:
   1. Provide flexible coupling to connect pump and motor shaft.
   2. All metal type with flexible rubber insert.
   3. Enclose entire rotating coupling element by means of a coupling guard.

I. Base Plate:
   1. Mount pump and motor on:
      a. Groutable steel base plate.
      b. Steel drip rim base plate.

2. Incorporate integral drip channels on each side.
3. Provide NPT connection and plug for each channel.
4. Capable of supporting pump and motor without the use of additional supports or members.

J. Nameplate:
1. Mount permanent nameplate in a prominent location on the pump.
2. Include the following information:
   a. Manufacturer's name.
   b. Serial number.
   c. Pump design characteristics.

K. Motors:
1. NEMA configuration.
2. Premium efficiency.
3. Totally enclosed, fan-cooled.
4. Design for normal starting torque and low starting current.
5. Size: Sufficient to operate pump from shutoff head to open discharge without operating in the motor service factor.
6. Horsepower Rating: Sufficient to operate pump at any point on the head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor.
7. Class F thermostat, one per phase.
8. Motor shall be inverter duty, 10:1 turndown (6-60 Hz), and meeting NEMA MG1 Part 31.
9. Manufacturers:
   a. US Motors.
   b. Marathon.
   c. WEG.
   d. Baldor.

L. Shop Coatings: Coat pump and base in accordance with Section 09 91 50.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pump in accordance with manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

A. Field Testing:
1. Conduct test of the pumping equipment in the presence of the Engineer.
2. Testing Period: One hour minimum, or longer as may be required to determine compliance with the specifications.
3. Provide all power, gages, measurement devices, and other apparatus required for the testing.
4. Remove all testing equipment upon completion of testing.
5. Provide copies of all test data and results to Owner and Engineer.
6. Resulting pump capacities shall be within 5 percent of the previously supplied certified curves.
7. Replace or rework pumping equipment or components which fails to meet the specified requirements.

B. Manufacturer's Field Services: Check pumps and motors for alignment (using laser alignment device) after installation and prior to field testing.

3.03 DISINFECTION

A. Disinfect all water contact surfaces prior to placement in service.

B. Disinfectant: 200 ppm chlorine solution or dusting chlorine compound per AWWA C654.

3.04 DEMONSTRATION

A. Provide minimum of 4 hours of operator training after pumps are in service.

END OF SECTION

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SECTION 43 21 30

NON-CLOG SUBMERSIBLE PUMPS

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish, install, and test submersible pumping units and accessories as indicated on the Drawings and as specified herein. Pumps shall be solids handling type.

B. Four (4) submersible pumps will be installed throughout the facility.
   1. Two (2) Reclaim Tank - Backwash Waste
   2. Two (2) Reclaim Tank - Reclaim Water

C. Related Sections
   1. Section 09 91 50 - Shop Painting
   2. Section 09 97 21 - Coating Systems for Water Facilities
   3. Section 26 05 05 - Basic Electrical Materials and Methods
   4. Section 26 24 19 - Motor Control
   5. Section 40 23 00 - Process Piping General Provisions
   6. Section 40 90 00 - Instrumentation and Control for Process System
   7. Section 44 44 00 - Process Equipment General Provisions

1.02 DEFINITIONS

A. AFBMA: Anti-friction Bearing Manufacturers Association

B. AISI: American Iron and Steel Institute

C. ASTM: American Society for Testing and Materials

D. FM: Factory Mutual

E. HI: Hydraulic Institute Standards

F. NEC: National Electrical Code

G. NEMA: National Electrical Manufacturers Association

H. NFPA: National Fire Protection Association

1.03 DESIGN REQUIREMENTS

A. As presented below:

	Backwash Waste Pumps	**Reclaim Water Pumps**
Quantity	2	2
Design Condition (GPM)	100	220
TDH (total dynamic head)	25 feet	~~38~~ **60** feet
Minimum Motor HP (nominal)	3	~~7.5~~ **15**
Minimum Pump Efficiency (%)	30%	30%
Maximum Motor RPM	1,750	1,750
Discharge Size (inches)	4	4 ***see note**

***Table Note: Reclaim water pump discharge (two each) shall have a transition from the 4-inch pump discharge to the 6" reclaim pipe size. Contractor shall furnish fittings, reducers, or appurtenances to transition to the piping size from the discharge size of the pump.**

~~B. The pumps shall meet the following future conditions:~~
~~1. Backwash pumps shall produce 100 gpm at 24 ft Total Dynamic Head (TDH). Reclaim Water pumps shall produce 220 gpm at 35 feet TDH.~~
~~2. Motor horsepower shall be 3 HP, minimum for Backwash pumps and 7.5 HP minimum for Reclaim water pumps. Motor speed shall be 1750rpm, maximum. The motor shall have a minimum service factor of 1.2.~~

1.04 SUBMITTALS

A. Shop Drawings in accordance with Section 01 33 00 and include the following:
1. Name of manufacturer.
2. Size and model number.
3. Performance curves.
4. Certified performance curves.
5. Detailed specifications and dimensions.
6. Motor specifications.
7. Installation guide.
8. Printed warranty.

B. Operating and Maintenance Data in accordance with Section 01 78 23.

C. Certified Installation Inspection and Start-up Services.

1.05 QUALITY ASSURANCE

A. The pumps shall be heavy duty, electric submersible centrifugal non-clog units non-overloading throughout the entire operating range of the pump suitable for continuous operation at full nameplate load while the motor is completely or totally submerged.

1.06 WARRANTY

A. The pump manufacturer shall warrant the pumps, motors, and guide removal systems to the Owner against defects in materials and workmanship for a period of five years or 10,000 hours of operation under normal use and service.

B. The pump manufacturer's warranty shall be in printed form and previously published as the manufacturer's standard warranty for all similar units manufactured. A copy of the warranty shall be provided to the Owner at system start-up.

PART 2 PRODUCTS

2.01 MANUFACTURER/MODEL:

A.

	Backwash Waste Pumps	Reclaim Water Pumps
Hydromatic	S4NRC	S4SD

B. Pre-approved Equivalent.

2.02 COMPONENTS

A. Pumps:
1. Each pump shall be of the sealed submersible type as manufactured by Hydromatic and be capable of pumping municipal sewage with spherical solids up to three inches in diameter. The castings (cord cap, motor housing, bearing housing, seal plate) shall be of high quality, ASTM A48, Class 30, gray cast iron. The pump discharge shall be fitted with 4-inch standard ANSI 125# flange, faced and drilled. All external mating parts shall be machined and Buna N rubber O-ring sealed on a beveled edge. Flat faces and gaskets shall not be acceptable. All fasteners exposed to the pump's liquids shall be of 300 series stainless steel.
2. The pump volute shall be ASTM Class 30 and shall consist of a centerline discharge on piece design. The passages are to be large enough to pass the same size solid as the impeller.
3. Impeller shall be either ASTM Class 30 cast iron or ASTM Class 65 ductile iron. The impeller mounting is to be a slip fit onto a tapered shaft and a drive key. The impeller shall be attached to the shaft by a stainless steel fastener and impeller washer. The impeller is to be balanced to ISO1944 standards and is to be a two vane, or multi-vane, recessed vortex impeller.
4. An upper radial bearing and lower thrust bearing shall be required in the motor. The upper bearing shall be heavy-duty radial single row ball bearing while the lower bearing shall be a double row heavy duty angular contact ball bearing of the thrust limiting design. Minimum of 50,000 hours of B10 bearing life for radial and thrust bearings while operating across entire hydraulic operating range of the pump. Bearings shall be lubricated for life from the factory and will be accomplished through the non-toxic, low viscous, dielectric oil in the frame
5. The pump/motor shaft shall be 0.002" at BEP. The rotor and stator in the motor housing shall be separated and protected from the pumped liquid by an oil-filled seal housing incorporating two (2) John Crane seals. Both lower and upper seals shall be a Carbon-Ceramic faces and be replaceable without disassembly of the seal chamber and without the use of special tools. Seals shall be mounted in tandem. The seal housing/chamber shall be equipped with two moisture sensing probes installed between the seals. Mechanical seals must be locally available and nonproprietary.

B. Pump Shaft:
1. Provide an AISI type 416 stainless steel pump shafts.
2. The pump and motor shafts shall be the same unit.
3. Couplings are not acceptable.

C. Impeller:
1. The impellers shall be gray cast iron, dynamically balanced, 2 vane, non-clogging design having a long through let without acute turns.
2. Impeller shall be keyed to the shaft. Securing of the impeller shall be accomplished via a special taper action, locking device.
3. A wear ring system shall be used to provide efficient sealing between the volute and suction side of the impeller. Each pump shall be equipped with a nitrile rubber coated steel or bronze ring insert that is drive fitted to the volute inlet.

D. Motor:
1. The pump motors shall be a squirrel-cage, induction, shell type design, housed in a NEMA B type, oil-filled watertight chamber. The stator windings and leads shall be insulated with moisture resistant Class H insulation rated for 155°C (311°F). The stator will be dipped and baked three times in Class F varnish and heat-shrunk fitted into the stator housing. The use of bolts, pins, or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty, capable of up to 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum.
2. Thermal sensors used to monitor stator temperatures shall be imbedded in the stator lead coils to monitor the temperature of each phase winding and set to open at 125 degrees C (260°F). These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and connected to the control panel to stop the pump and signal an alarm condition. A float leakage sensor shall be provided to detect water in the stator chamber. These shall work in conjunction with the controls to signal an alarm condition. The submersible pump manufacturer shall provide the over/temp/moisture sensor control and monitoring unit to the Owner.

3. The junction chamber shall be hermetically sealed from the motor by an elastomer O-ring seal.
4. Motors shall be 480 volt, 3-phase, 60 Hz.
5. The pump shaft shall rotate on two bearings rated for B10 life of 40,000 hours at anticipated axial and radial loading. Motor bearings shall be permanently greased. The upper bearing shall be a single roller bearing and the lower bearing shall be a two-row angular contact bearing.
6. Provide two totally independent mechanical shaft seal assemblies, installed in tandem, each with its own independent spring system acting in a common direction. The seals shall operate in an oil reservoir that hydrodynamically lubricates the lapped seal faces at a constant rate. The lower seals shall be tungsten-carbide both faces. The upper seal unit shall contain one positively driven rotating carbon ring installed in an oil-filled chamber with positive anti-leak sealing drain and inspection plug. Each seal interface shall be held in contact by its own spring system. The seals shall not require routine maintenance or adjustment or depend on direction of rotation for sealing. Seals shall be capable of being easily inspected and replaced. Shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower units will not be acceptable.
7. Motor shall be oil filled; seal chambers shall contain only ecologically safe paraffin base oil.
8. Pump shall be capable of running dry while out of pumped liquid for extended periods without damage.
9. The power cable shall be sized according to the NEC and ICEA standards. It shall be of sufficient length to reach the junction box without splices. The outer jacket of the cable shall be oil resistant chloroprene rubber. The cable entry to the motor shall consist of a single cylindrical elastomer grommet flanked by washers. The motor and cable shall be capable to continuous submergence under water without loss of watertight integrity to a depth of 65 feet.
10. ~~Recycle pump~~ **Motors** shall be designed for operation with a variable frequency drive. Motors shall be rated inverter duty per the requirements of Division 26

2.03 ACCESSORIES

A. Power Cable:
   1. The pumps shall be supplied with power cable sized according to NEC standards and shall be of sufficient length to reach the motor terminal housing without the need of any splices.
   2. The outer jacket shall be oil resistant chloroprene rubber.

B. Discharge Connection Base
   1. Sealing of the pumping unit to the permanently mounted discharge connection shall be accomplished by a simple downward motion of the pump guided to and wedged tightly against the discharge connection. Final connection shall insure zero leakage between pump and discharge connection flange.
   2. No portion of the pumping unit shall bear directly on the sump floor or pedestal.

C. Pump Removal System:
   1. Provide a pump removal system consisting of galvanized pipes to guide the pumping unit to the discharge connection elbow where shown on the Drawings. Provide anchorage for guides to concrete slab.
   2. Provide 316 stainless steel lifting cable of sufficient length to permit raising the pump for inspection and removal.
   3. The working load of the lifting system shall be 50 percent greater than the pump unit weight.

D. Cable Holder and Safety Hooks:
   1. Furnish PVC coated cable holders to hold power cables and float switches.
   2. Provide stainless steel safety chain hooks for lifting chain or cable.

PART 3 EXECUTION

3.01 DELIVERY OF EQUIPMENT

A. Delivery of equipment shall be coordinated with the requirements of the Contractor.

3.02 INSTALLATION

A. Install equipment in accordance with manufacturer's recommendations and as shown on Drawings.

B. Equipment manufacturer to furnish necessary anchor bolts, nuts, washers, gaskets and anchor bolt templates.

C. Install all anchors in accordance with certified prints supplied by equipment manufacturer.

3.03 DISINFECTION

A. After all the potable water process equipment, piping, and filters are completed, they shall be disinfected in accordance with the Virginia Department of Health Standards

B. Perform disinfection of all process piping and equipment in accordance with the following:
   1. AWWA C651.
   2. AWWA C653.

C. Hold chlorine solution in pipe for a minimum of 24 hours.
   1. Initial Dosage: 50 ppm minimum.
   2. Residual Dosage After Hold Period: 10 ppm minimum.

D. Operate all valves and other equipment during disinfection to ensure complete coverage.

E. Flush system with potable water within 24 hours after disinfection is completed.

F. After flushing, obtain 2 sets of samples taken a minimum of 24 hours apart.
   1. Take sample sets from various representative areas of the piping.
   2. Minimum Samples Required: 2.

G. Perform coliform and chlorine residual tests on each sample.

H. Rechlorinate if any samples test positive for coliform.

I. After satisfactory test results are achieved, the piping may be connected to the potable water system.

3.04 SYSTEM AND EQUIPMENT STARTUP

A. Conform to the requirements of Section 01 75 00.

B. The manufacturer or single source supplier of equipment included in each section shall inspect the completed installation; make all necessary adjustments, corrections, or modifications prior to start-up. See Section 44 44 00.

C. Provide written certification that check-out services have been completed and 1 week notice prior to start-up and demonstration.

D. Place various items of equipment into operation, along with related piping and control systems, at times acceptable to Owner. After satisfactory start-up of these systems and their related equipment, they will remain in continuous or intermittent operation as required by the Owner.

E. All equipment and accessories shall be adjusted and calibrated prior to any start-up and any equipment placed into temporary operation prior to Final Completion of the total Project shall be readjusted and/or recalibrated as necessary.

F. Contractor shall supervise, control, and be responsible for operation and maintenance of new equipment and/or systems during start up.

G. No system start-ups will be held on holidays, Fridays, or the day before a holiday.

3.05 DEMONSTRATION AND TRAINING

A. Provide factory trained serviceman to instruct the Owner's personnel in the proper operation and maintenance of the equipment and certify to the Engineer that system is installed and operating properly, refer to Sections 01 75 00 and 40 05 00.

B. Following completion of successful equipment start-up, the Contractor shall arrange for a factory representative and installer of each operating piece of 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.

C. For each piece of operating equipment, the factory representative and installer shall provide two separate training sessions to the Owner's operations and maintenance staff. The two training sessions shall be separated in time by at least 1 week (7 days) and shall be arranged to meet the schedules of the Owner's operations and maintenance staff.

D. Each training session shall be inclusive of a minimum 4 hours on-site instructional time. All travel time and costs necessary to perform each training session shall be considered as additional and incidental to four hours of on-site instructional training time.

E. The training session time shall be separate and distinct from the time spent on equipment start-up.

F. Contractor shall coordinate the schedule for each training session a minimum of 2 weeks (14 days) ahead of schedule.

G. All final copies of the Operation & Maintenance manuals for each piece of operating equipment shall be delivered to the Engineer a minimum of 1 week (7 days) prior to scheduling the initial training session.

H. At a minimum, each training session shall include the following:
   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.

I. Prepare and insert additional data in operations and maintenance manuals if need for additional data becomes apparent during instructions.

END OF SECTION

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SECTION 44 44 39

FLUORIDE FEED EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install complete chemical feed system for injecting fluoride.

B. Work Included: This section includes furnishing, installing, and placing into successful operation one complete fluoridation system. Fluoridation system shall include a tank with scale, and peristaltic positive displacement metering pump. The equipment and appurtenances shall be furnished by the same supplier.

1.02 REFERENCES

A. WDNR NR 811.

B. Recommended Standards for Water Works "Ten State Standards", 1997 Edition.

C. NSF - NSF International, Ann Arbor, MI.

1.03 SUBMITTALS

A. Refer to Section 01 33 00.

B. Shop Drawings: Indicate system schematics, equipment locations, details, and control schematics.

C. Product Data: Submit manufacturer's Product Data indicating chemical treatment methods, chemicals, equipment, and installation and maintenance instructions.

D. Submit reports in accordance with Section 01 75 00 and include:
   1. Report indicating start-up of treatment system is completed and operating properly.
   2. Report indicating analysis of system water after treatment.
   3. Report indicating analysis of fluoride residuals measured immediately after each injecting point and post filtration.

E. Operation and Maintenance Manuals: Prior to start-up, furnish operation and maintenance manuals in accordance with Section 01 78 23.

1.04 DEFINITIONS

A. PVC: Polyvinyl chloride.

B. NPT: National pipe thread.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Provide equipment by one supplier.

B. Regulatory Requirements: Materials and equipment provided in this Section shall comply with the recommended practices and standards of NSF International.

1.06 WARRANTY

A. All equipment, unless otherwise stated, shall be warranted by the manufacturer for 1 year from the date of start-up.

PART 2 PRODUCTS

2.01 GENERAL

A. Use common components to the greatest degree possible to simplify spare parts inventory and service.

2.02 TANKS

A. Manufacturers:
   1. Snyder
   2. Polyprocessing
   3. Assmann

B. Description:
   1. Number: 1.
   2. Volume: 160-gallon.
   3. Diameter: 35-inch maximum.
   4. Material: Polyethylene, complying with NSF requirements and compatible with intended chemical.
   5. Construction: 1-piece seamless construction with ultraviolet inhibitor capable of storing liquid chemicals up to a specific gravity of 1.90.
   6. Calibration: 1-gallon increments.
   7. Closed top with threaded lid.
   8. Tank and all wetted parts shall be chemically compatible with fluoride solution.

C. Equip as follows:
   1. 7-inch threaded cap
   2. 1-1/2-inch PVC dip leg with suction tubing and strainer inside tank.
   3. 1-1/2-inch NPT bulkhead on top of tank for metering pump pressure relief return. Install with lines through bulkhead with grommet to prevent vapor escape.
   4. 2-inch NPT bulkhead for venting the tank.
   5. Metering pump pressure relief return(s).
   6. Secondary containment basin
      a. Min. capacity shall be sized to fully contain the volume of the feed tank.
      b. Manufactured of high-density polyethylene materials. Materials shall be compatible the materials being stored in the tank.

2.03 METERING SCALE

A. Provide one 2,000-pound capacity Force Flow Model 40–DR20LP chem–scale, or equal, complete with Force Flow Model Solo G2 indicator, or equal. Indicator shall be 115-volt, single-phase and shall provide a 4-20 mA output proportional to the weight on the scale. Verify scale size is sufficient with the 160-gallon solution tank and containment basin provided. Scale and Solo G2 indicator shall be capable of displaying in 0.1-pound increments to determine daily chemical usage.

2.04 FEED PUMPS

A. Manufacturer
   1. Feed pump ~~units shall be Blue-White Industries,~~ shall be Flex-Flo Pro-Series M-1 manufactured in the U.S.A. by Blue-White Industries ~~Model AIN10V-6T-0 (16.0 GPD), or equal~~.

B. Description:

1. Provide one (1) ~~Blue-White Industries, Model AIN10V-6T-0 (16.0 GPD),~~ chemical feed pumps.~~, or equal~~. Pumps shall be capable of producing 0.67 gph at 100 psi.

~~2. Metering pump shall be a positive displacement, peristaltic-type tubing pump with a variable speed motor, non-spring-loaded roller assembly located in the pump head, integral tube failure detection system, and flexible tubing with attached connection fittings.~~

~~a. There shall be no valves, diaphragms, springs, or dynamic seals in the fluid path. Process fluid shall contact the pump tubing assembly and connection fittings only.~~

~~b. Pump shall be capable of self-priming at the rated maximum pressure.~~

~~c. Pump shall be capable of running dry without damage.~~

~~d. Pump shall provide suction lift of up to 30 feet of water.~~

~~3. Metering pump head shall be a single, unbroken track with a clear removable cover.~~

~~a. Hastelloy C-276 tube failure detection sensors shall be wholly located in the pump head. Tube failure detection system shall not trigger with water contact. Float switch-type switches shall not be used.~~

~~b. Squeeze rollers shall be directly coupled to a one-piece Valox 420 SEO rotor. Three polymeric squeeze rollers located 120 degrees apart shall be provided. The roller diameters and occlusion gap shall be factory set to provide the optimum tubing compression; field adjustment shall not be required.~~

~~c. Rotor assembly shall be installed on a D-shaped, chrome-plated motor shaft and removable without tools.~~

~~d. For tubing installation and removal, rotor assembly shall be rotated by the motor drive. Hand cranking of the rotor assembly shall not be required.~~

~~e. Pump head and tubing compression surface shall be corrosion resistant Valox 420 SEO thermoplastic.~~

~~f. The pump head cover shall be clear, acrylic thermoplastic with an integral bearing fitted to support the overhung load on the motor shaft.~~

~~g. Cover shall be positively secured to the pump head using three thumb screws. Tools shall not be required to remove the pump head cover.~~

~~4. Pump tube shall be assembled to connection fittings of PVDF material.~~

~~a. Connection fittings shall be permanently clamped to the tubing with stainless steel clamps. To prevent tubing misalignment and ensure accuracy, fittings shall insert into keyed slots located in the pump head and secured in place by the pump head cover. Fitting shall not rotate when installed.~~

~~b. Connection fittings shall accept 1/4-inch i.d. by 3/8-inch o.d. flexible tubing.~~

~~5. Pump drive assembly shall be factory installed and totally enclosed in a NEMA 3R, outdoor-rated enclosure.~~

~~a. Motor shall be DC gear motor-rated for continuous-duty with overload protection. Variable speed motor shall be adjustable from 5 percent to 100% in 1 percent increments. Motor shall continuously rotate over the entire adjustment range; start/stop pulsation shall not be permitted.~~

~~b. Enclosure material shall be injection molded Valox 420 SEO with NEMA 3R rating. Provide slots in the enclosure base for shelf mounting and two slots in the rear panel for wall mounting. Stainless steel mounting hardware shall be provided.~~

~~c. Provide 6-foot-length power supply cord with NEMA 5/15 U.S. 115 Vac attachment plug.~~

~~d. A wiring compartment shall be provided for connection of input/output signal wires, and alarm output load. Conduit hubs, liquid-tight connectors, connector through holes and tapped holes shall be sized in U.S. inches.~~

~~6. Control circuitry:~~

~~a. Provide front panel user touchpad controls for stop/start, configuration menu access and navigation, operating mode selection, auto priming, and service timer reset.~~

~~b. The front panel touchpad and LCD display shall be wholly enclosed by a clear acrylic door secured by two slide clamps.~~

~~c. Provide LCD display for menu-driven configuration settings, pump output value, service alerts, and tube failure detection (TFD) system, alarms status, remote input signal values, tubing life timer value.~~

~~d. Provide for manual control of pump output volume via manual speed percentage operating mode.~~

~~e. Provide for remote control of pump output volume via 4-20 mA, 0 to 10 Vdc, and 0 to 1000 Hz pulse-operating modes.~~

~~f. Provide one contact closure alarm output rated at 1A-250 Vac, 0.8A-30 Vdc. Alarm output shall close in the event that the Tube Failure Detection (TFD) system senses a tube failure.~~

~~g. The pump shall be listed to UL standard 778–Motor Operated Pump, CSA Standard C22.2-Process Control Equipment, and NSF/ANSI Standard 61-Drinking Water System Components-Health Effects.~~

~~h. Tube Failure Detection (TFD) system sensors shall be wholly located in the pump head. TFD system will stop the pump within 3 seconds of leak detection. To prevent false alarms because of rain, washdown, condensation, etc., tube failure detection system shall not trigger with water contact.~~

~~7. Spare Parts: Provide two replacement hoses.~~

2. The chemical metering pumps shall be positive displacement, peristaltic type tubing pumps with a variable speed motor, non-spring-loaded roller assembly located in the pump head, integral tube failure detection system, and flexible tubing with attached connection fittings.
   a. Process fluid shall contact the pump tubing assembly and connection fittings only.
   b. Capable of self-priming at the rated maximum pressure.
   c. Capable of running dry without damage.
   d. Suction lift shall be 30 feet of water.
   e. Pump shall have a one-year manufacturer's warranty that includes chemical damage to the pump head and roller assembly caused by a ruptured pump tube assembly.
3. Tube Assemblies:
   a. Pump tube shall be of a material suitable for continuous contact with hydro-fluorosilicic acid (19.1%).
   b. Connection fittings shall accept 1/4-inch ID by 3/8-inch OD flexible tubing.
   c. Connection fittings shall be permanently clamped to the tubing with stainless steel clamps. To prevent tubing misalignment and ensure accuracy, fittings shall insert into keyed slots located in the pump head and secured in place by the pump head cover. Fitting shall not rotate when installed.
4. Control Circuitry:
   a. Provide front panel user touchpad controls for stop/start, configuration menu access and navigation, operating mode selection, auto priming, and service timer reset.
   b. Provide LCD display for menu driven configuration settings, pump output value, service alerts, tube failure detection (TFD) system alarms status, remote input signal values, tubing life timer value.
   c. Provide for manual control of pump output volume via manual speed percentage operating mode.
   d. Provide for remote control of pump output volume via 4-20mA operating mode.
   e. Pump will be wired to operate in series with the activation of the well pump motor and will be flow paced off of the finished water flow meter.
   f. Secondary feeder control will be provided by a confirmation of the flow switch on the well pump discharge piping.
   g. Provide one contact closure alarm output rated at 1A-250VAC, 0.8A-30VDC. Alarm output shall close in the event that the Tube Failure Detection (TFD) system is triggered.
5. Drive System:
   a. The pumps shall have a capacity to pump fluoride at the rate specified above into a water flow rate at 10 to 80 psi. The pumps shall be designed to operate at no lower than 20 percent of the feed range at the minimum capacity.
   b. 10,000:1 turndown.
   c. The pumps shall be 120 VAC, single phase, 60 Hz. A wiring compartment shall be provided for connection of input/output signal wires, and alarm output load. Conduit hubs, liquid-tight connectors, connector through holes and tapped holes shall be sized in U.S. inches.
6. Tube Failure Detection (TFD) system sensors shall be wholly located in the pumphead. TFD system will stop the pump within three seconds of leak detection. To prevent false alarms due to rain, wash-down, condensation, etc., tube failure detection system shall not trigger with water contact. Process fluid waste ports or leak drains shall not be provided.
7. Provide one (1) spare parts kit for each pump including a complete liquid end assembly and 2 spare tubes.

2.05 ACCESSORIES

A. Wall Bracket: Provide polyethylene plastic wall shelves for the pumps, large enough for the pumps to mount on. Wall bracket shall be chemically resistant.

B. Tubing and Fittings: Provide all required tubing and fittings for a complete installation, including injection fittings, main connections, and suction strainers.

C. Pressure Gauge
   1. Quantity: one (1)
   2. Range 0-100 PSI (sized for system)
   3. Provide with diaphragm seal and isolation ball valve.
   4. Manufacturers: Plat-O-Matic or equal preapproved by Engineer.

D. Pressure Relief Valve
   1. Furnish and install one (1) pressure relief valve on the metering pump discharge line.
   2. Provided by the pump manufacturer and resistant to the chemical being fed.
   3. Manufacturer shall size the valve for the feed system.
   4. Furnish and install pressure relief tubing and fittings from the pressure relief valve to the tank.

E. Back Pressure Valve
   1. Furnish and install one (1) backpressure valve on the metering pump discharge line.
   2. Provided by the pump manufacturer and resistant to the chemical being fed.
   3. Manufacturer shall size the valve for the feed system.

F. Safety Equipment: Provide one (1) set of chemical handling equipment including goggles, apron, and rubber gloves.

G. Main Line Feed Point (Corporation Stop):
   1. Provide 3/4-inch NPT ball valve main connection complete with diffuser.
   2. Product: Saf-T-Flo EB-130-B-H or pre-approved equal.
   3. Solution tube insertion length shall be such that fluoride is injected into the static mixer at 1/3 diameter of the water pipe.
   4. The solution tube tip shall be the manufacturers standard tip configuration.
   5. The flexible hose assembly shall be of a material compatible with the chemical being fed and the working pressure in the feed system.

2.06 FINISHES

A. Factory-fabricated items shall have a factory-applied finished paint system.

B. Other items shall be painted per Division 9.

C. Plastic solution tank shall not be painted.

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with manufacturer's Product Data, including installation instructions and details.

B. Provide at least 1 day of installation supervision by the manufacturer's representative.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:
   1. Inspect and approve the completed installation, make all necessary adjustments, corrections, or modifications prior to start-up.

2. After start-up is authorized by Engineer, furnish a qualified representative to inspect the completed installation, to supervise the system's initial start-up, and to train the operating personnel in operation and equipment maintenance.
3. At least 1 day shall be reserved for start-up and adjustment. See Section 01 75 00.
4. After equipment has been placed into operation, make all final adjustments for the proper operation of the equipment.

3.03 WARRANTY

~~A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.~~

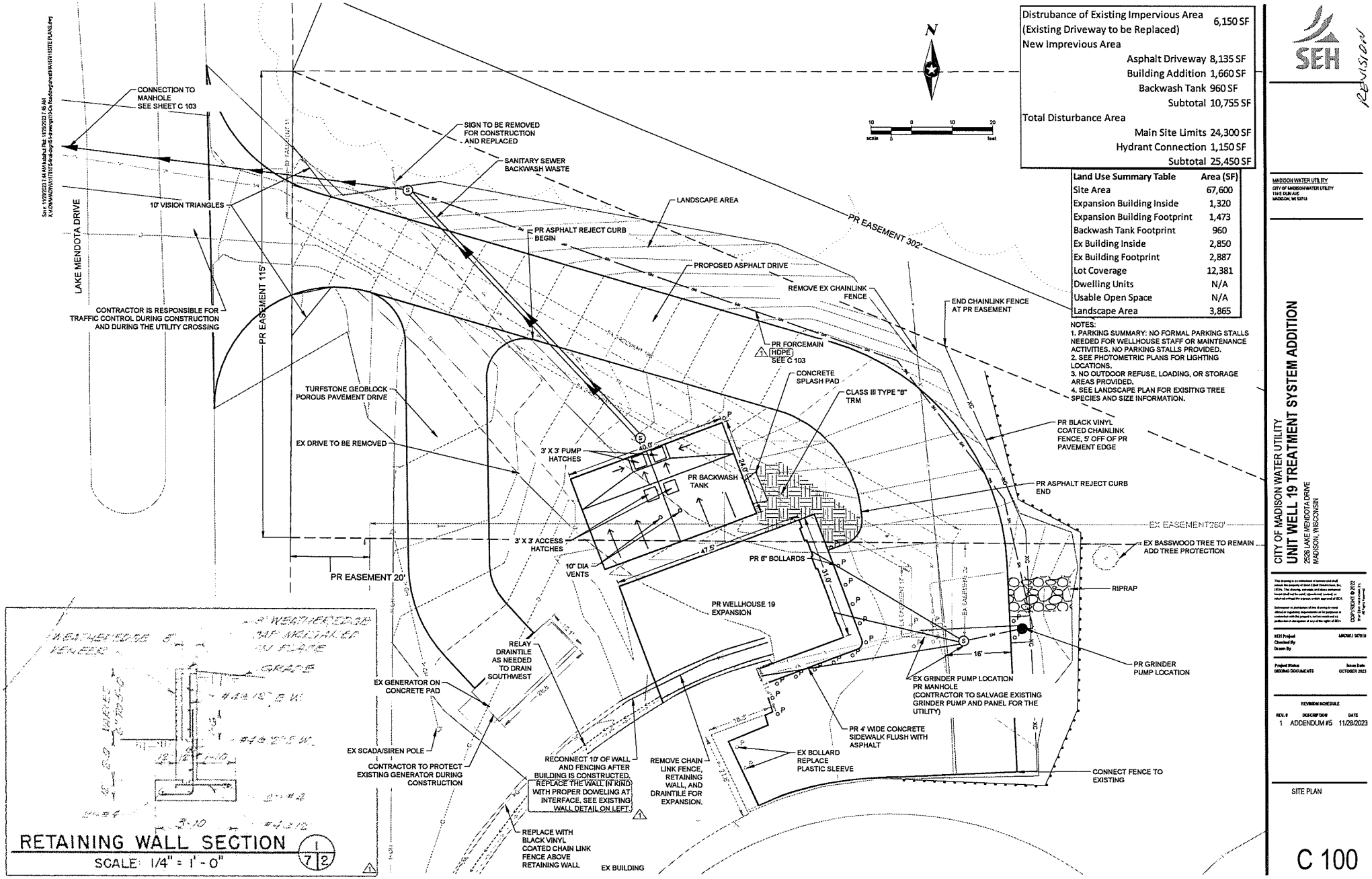
A. All equipment, unless otherwise stated in the contract, shall be warranted per Section 01 78 37.

3.04 OPERATOR TRAINING

A. Provide a minimum of 4 hours of operator training at Owner's convenience after equipment is operational.

B. Ensure plant personnel are sufficiently trained and thoroughly acquainted with operations and maintenance materials to operate all components of the system.

END OF SECTION



Distrubance of Existing Impervious Area (Existing Driveway to be Replaced)	6,150 SF
New Imprevious Area	
Asphalt Driveway	8,135 SF
Building Addition	1,660 SF
Backwash Tank	960 SF
Subtotal	10,755 SF
Total Disturbance Area	
Main Site Limits	24,300 SF
Hydrant Connection	1,150 SF
Subtotal	25,450 SF

Land Use Summary Table	Area (SF)
Site Area	67,600
Expansion Building Inside	1,320
Expansion Building Footprint	1,473
Backwash Tank Footprint	960
Ex Building Inside	2,850
Ex Building Footprint	2,887
Lot Coverage	12,381
Dwelling Units	N/A
Usable Open Space	N/A
Landscape Area	3,865

NOTES:
1. PARKING SUMMARY: NO FORMAL PARKING STALLS NEEDED FOR WELLHOUSE STAFF OR MAINTENANCE ACTIVITIES. NO PARKING STALLS PROVIDED.
2. SEE PHOTOMETRIC PLANS FOR LIGHTING LOCATIONS.
3. NO OUTDOOR REFUSE, LOADING, OR STORAGE AREAS PROVIDED.
4. SEE LANDSCAPE PLAN FOR EXISITNG TREE SPECIES AND SIZE INFORMATION.

SEH

REVISION

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167918
Checked By:
Drawn By:

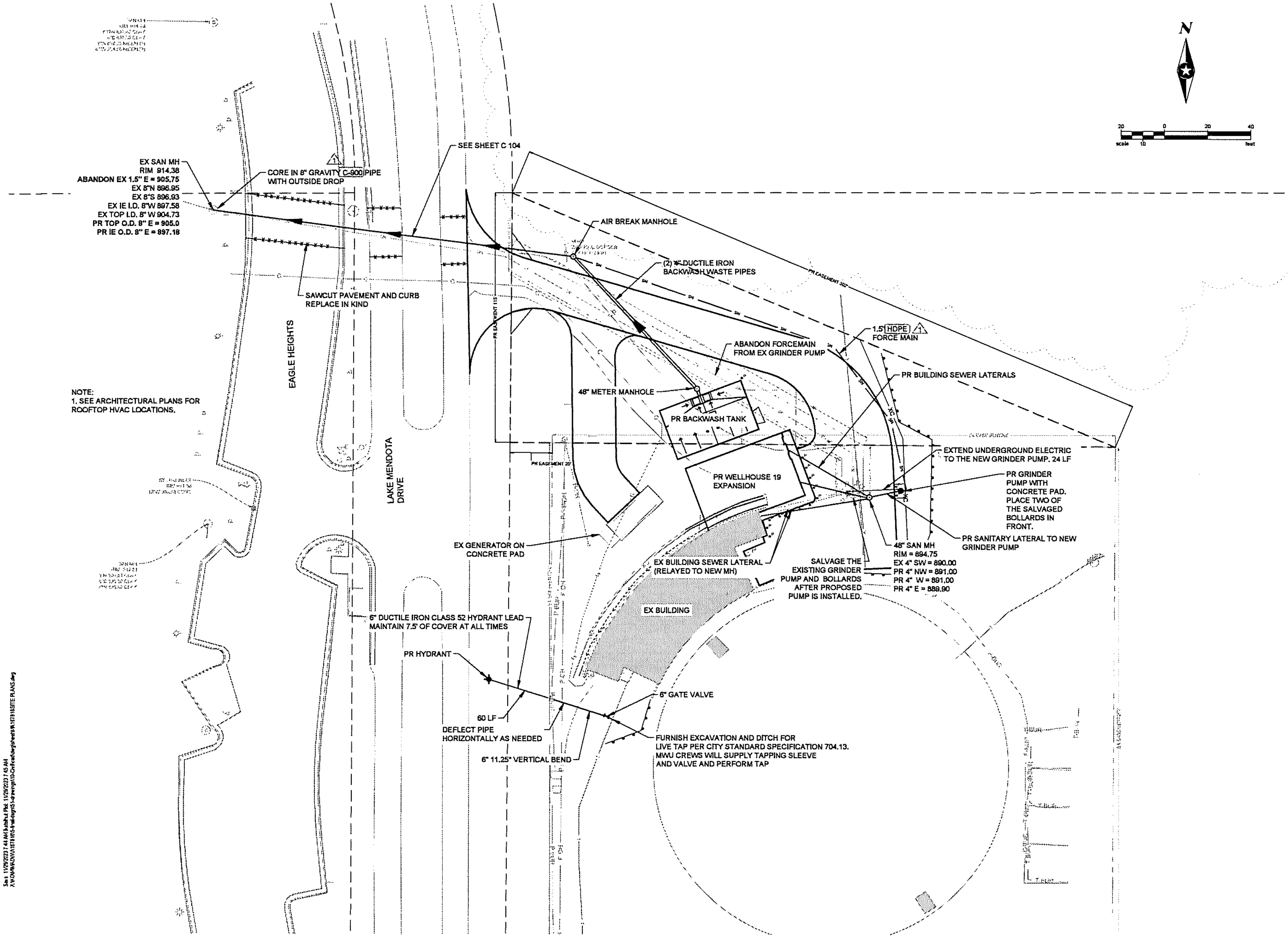
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #5	11/28/2023

SITE PLAN

C 100



NOTE:
1. SEE ARCHITECTURAL PLANS FOR ROOFTOP HVAC LOCATIONS.

REVISION

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MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167919
Checked By
Drawn By

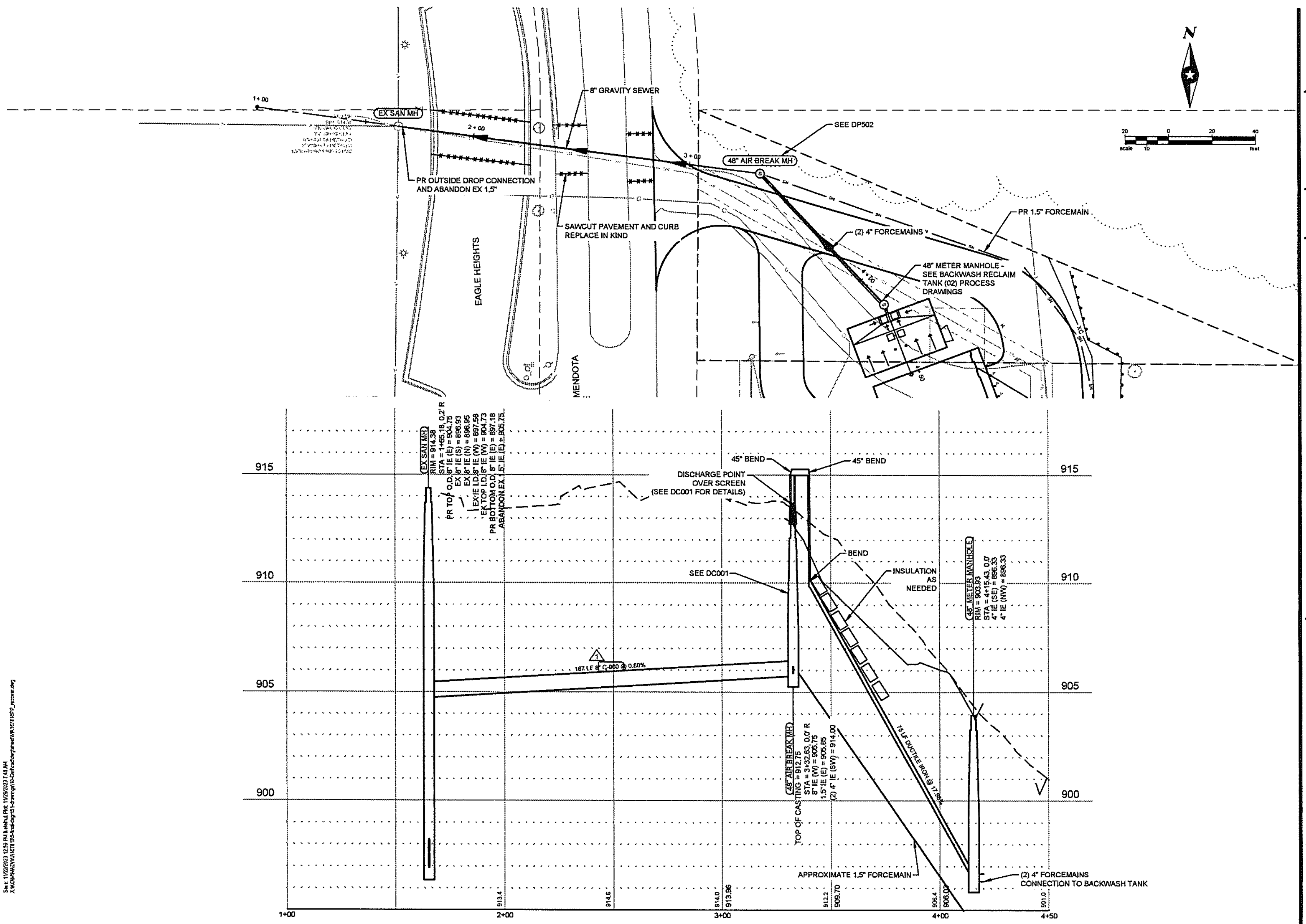
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #5	11/28/2023

UTILITY PLAN

C 103



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MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167816
Checked By
Drawn By

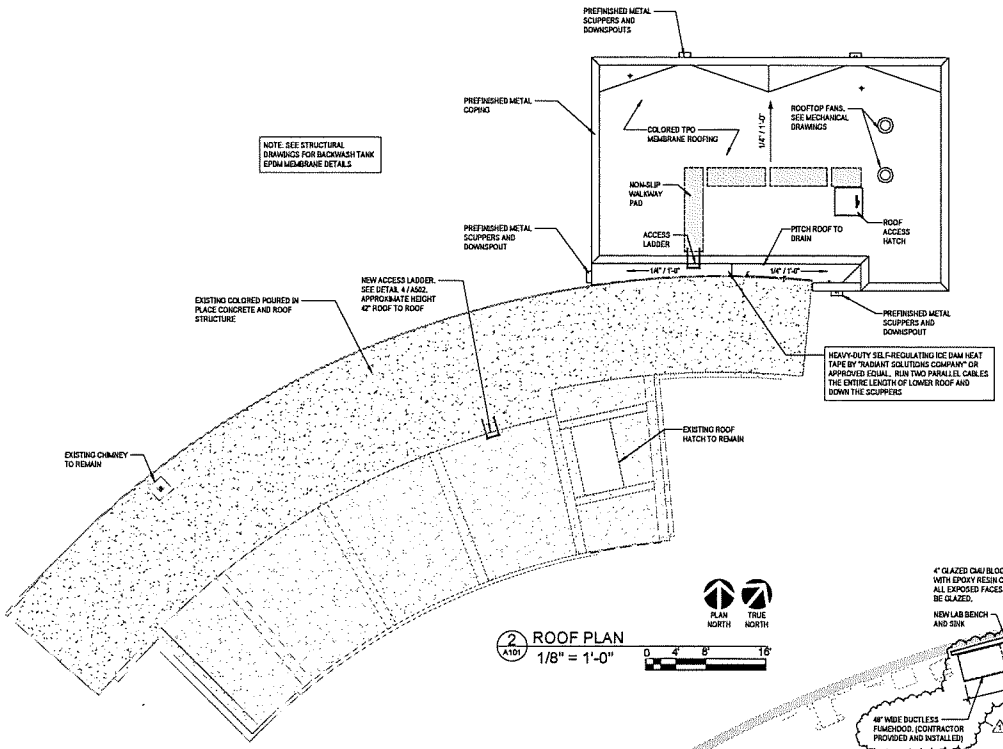
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER 2023

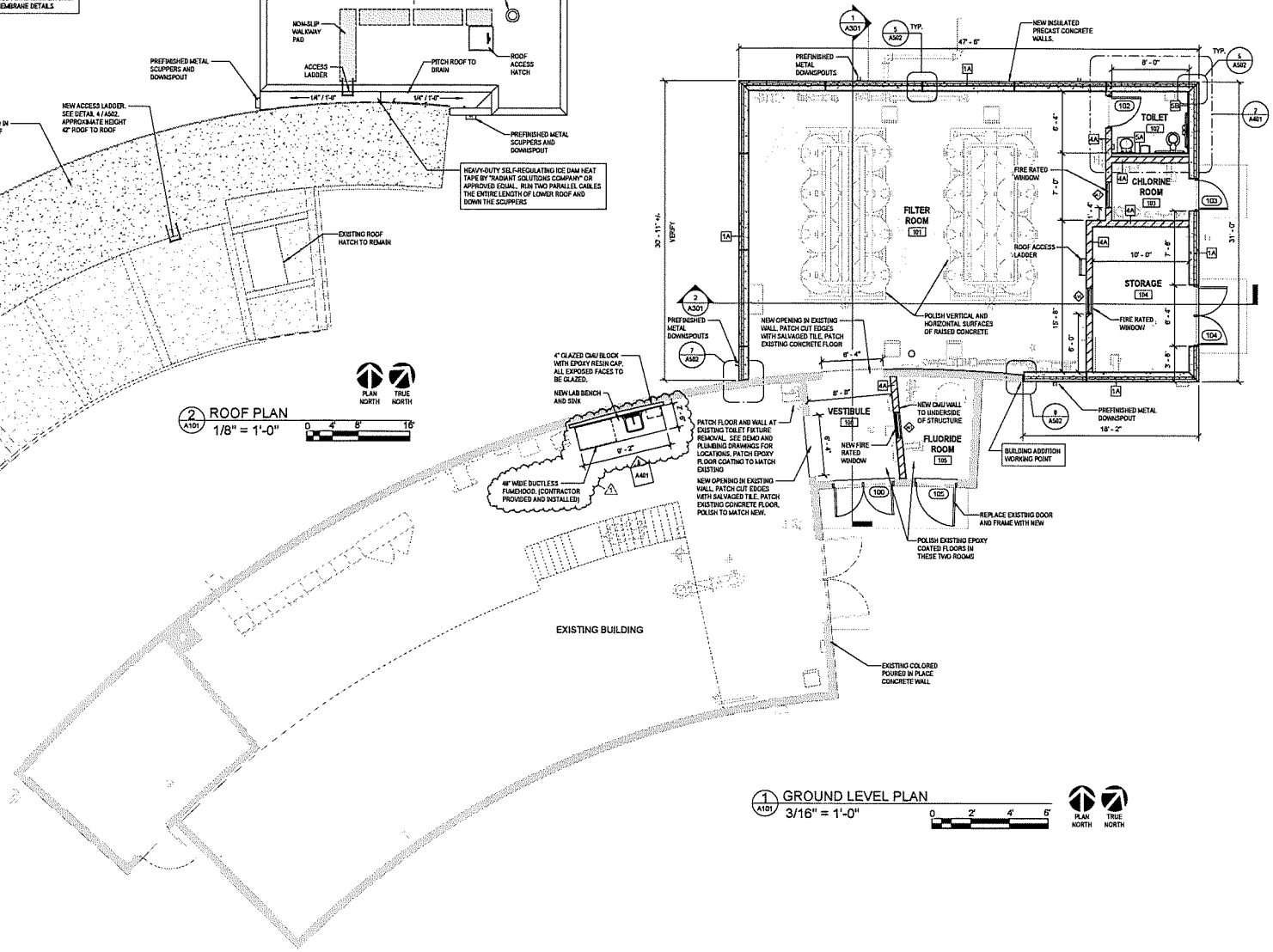
REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #5	11/28/2023

PLAN & PROFILE

C 104





SEH

REVISION

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167918
Checked By	
Drawn By	JRL
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #5	11/28/23

FLOOR AND ROOF PLANS

01
A101

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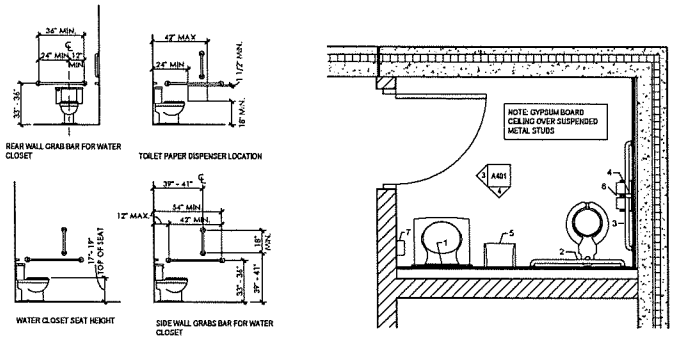
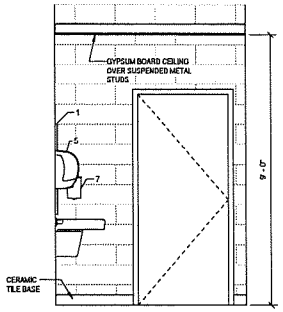
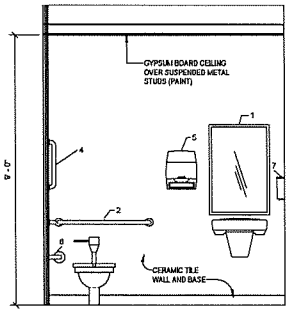


1 A401 TOILET ROOM STANDARDS
1/4" = 1'-0"

2 A401 ENLARGED PLAN
1/2" = 1'-0"



3 A401 TOILET ROOM ELEVATION
1/2" = 1'-0"



4 A401 TOILET ROOM ELEVATION
1/2" = 1'-0"

SPECIALTIES SCHEDULE	
KEYNOTE	DESCRIPTION
1	24" x 36" MIRROR
2	36" GRAB BAR (HORIZONTAL)
3	42" GRAB BAR (HORIZONTAL)
4	18" GRAB BAR (VERTICAL)
5	PAPER TOWEL DISPENSER
6	TOILET PAPER DISPENSER
7	SOAP DISPENSER

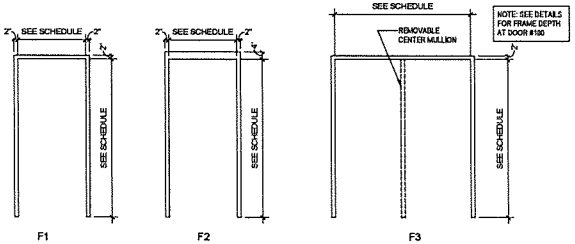
ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR	BASE	WALL FINISH				CEILINGS		REMARKS
				NORTH	SOUTH	EAST	WEST	FINISH	MATERIAL	
100	VESTIBULE	PLSH	-	PT	PT	PT	PT	-	S.T.L	POLISH EXISTING CONCRETE FLOOR
101	FILTER ROOM	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
102	TOILET	PLSH	CT	PT	CT	CT	PT	PT	GYP	
103	CHLORINE ROOM	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
104	STORAGE	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
105	FLUORIDE ROOM	PLSH	-	PT	PT	PT	PT	-	S.T.L	POLISH EXISTING CONCRETE FLOOR

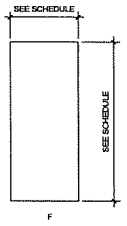
PLSH: POLISHED CONCRETE FLOOR
CT: CERAMIC TILE
PT: PAINT
S.T.L: SPRAYED CELLULOSE THERMAL INSULATION

DOOR SCHEDULE

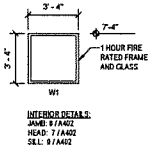
DOOR NUMBER	DOOR				FRAME		FIRE RATING	HW GROUP	DETAILS			REMARKS
	HEIGHT	WIDTH	MAT'L	TYPE	MAT'L	TYPE			HEAD	JAMB	SILL	
100	8'-0"	6'-0"	HM	F	HM	F3	-	1	10/A402	11/A402	2/A402	REMOVABLE CENTER MULLION (PAINT)
102	7'-0"	3'-0"	HM	F	HM	F2	-	3	3/A402	4/A402		
103	7'-0"	3'-0"	HM	F	HM	F1	-	2	1/A402	1/A402	2/A402	
104	7'-0"	6'-0"	HM	F	HM	F3	-	1	1/A402	1/A402	2/A402	REMOVABLE CENTER MULLION (PAINT)
105	8'-0"	4'-0"	HM	F	HM	F1	-	4	5/A402	8/A402	2/A402	



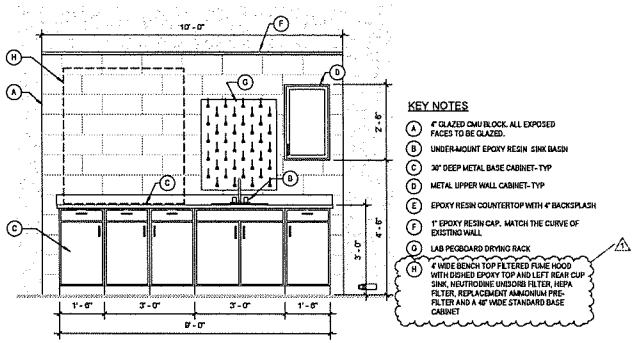
FRAME TYPES



DOOR TYPES



WINDOW TYPES



KEY NOTES

A. 4" GLAZED CMU BLOCK. ALL EXPOSED FACES TO BE GLAZED.
B. UNDER-MOUNT EPOXY RESIN SINK BASIN
C. 30" DEEP METAL BASE CABINET- TYP
D. METAL UPPER WALL CABINET- TYP
E. EPOXY RESIN COUNTERTOP WITH 4" BACKSPLASH
F. 1" EPOXY RESIN CAP. MATCH THE CURVE OF EXISTING WALL
G. LAB PEGBOARD DRYING RACK
H. 4' WIDE BENCH TOP FILTERED FUME HOOD WITH DISHED EPOXY TOP AND LEFT REAR CUP SINK, NEUTROBINE UNIDORB FILTER, HEPA FILTER, REPLACEMENT AMMONIUM PRE-FILTER AND A 48" WIDE STANDARD BASE CABINET

5 A401 INTERIOR ELEVATION
1/2" = 1'-0"

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SEH

REVISION

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167618
Checked By
Drawn By JRL

Project Status SEDDING DOCUMENTS
Issue Date OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #5	11/28/23

ENLARGED PLAN, SCHEDULES AND DETAILS

01
A401

FOUNDATION & FLOOR PLAN GENERAL NOTES:

(TYPICAL UNLESS NOTED OTHERWISE)

1. VERIFY ALL DIMENSIONS AND CONDITIONS WITH ARCHITECTURAL DRAWINGS.
2. VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS WITH MECH, ELEC, & PROCESS DRAWINGS. REINFORCE AS NECESSARY PER TYP DETAILS ON DS501 & DS511.
3. VERIFY ALL SIZES AND LOCATIONS OF STOOPS, APRONS, AND OTHER WALL OPENINGS WITH ARCHITECTURAL DRAWINGS.
4. SEE ARCH AND CIVIL DRAWINGS FOR REFERENCE DATUM.
5. SLAB CONSTRUCTION JOINTS ARE NOT INDICATED ON PLAN. REFER TO GENERAL STRUCTURAL NOTES FOR SPACING AND SUBMIT PROPOSED LOCATIONS FOR APPROVAL.
6. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS.
7. ALL FOOTINGS ARE CENTERED UNDER WALLS AND PIERS UNLESS NOTED OTHERWISE.

FOUNDATION PLAN KEYNOTES:

(1) IMK FILTER SKID - SEE PROCESS DRAWINGS FOR LOCATION. SEE TYPICAL DETAIL FOR CONCRETE PAD.

(2) 8" NON-BEARING CMU WALL TYP - SEE ARCH, REINF W/ #5 @ 48" OC, TYP

(3) THICKENED SLAB - TYP BELOW INTERIOR NON-BEARING CMU WALLS - SEE DTL 4/DS511

(4) ~~CONTRACTOR TO FIELD VERIFY EXISTING~~ BOT FTG ELEV AND MATCH BOT FTG ELEV WITH EXISTING. SIMILAR TO DETAIL 6/DS502 ⚠1

(5) PIPE BLOCKOUT - SEE PROCESS FOR LOC AND ELEVATION SEE TYPICAL DETAIL FOR REINF, AT CONC WALL OPNG.

(6) PIPE PENETRATION THROUGH EXISTING STRUCTURE - SEE 12/DS501 ⚠1

(7) DEMO EXISTING CMU WALL FOR WALL OPENING - SEE ARCH DRAWINGS. CONTRACTOR TO PROVIDE ADDITIONAL LATERAL BRACING AT TOP OF EXISTING WALL AS REQUIRED PER 3/DS511

(8) DEMO EXISTING CONC WALL. CONTRACTOR TO PROVIDE TEMPORARY SHORING OF ADJACENT ROOF STRUCTURE PRIOR TO CUTTING WALL OPENINGS - SEE ARCH DRAWINGS FOR EXTENT AND LOC. SEE STRUCTURAL ROOF PLAN FOR LINTEL INFORMATION

(9) REMOVE AND REPLACE EXISTING SLAB ON GRADE FOR ELECTRICAL WORK. SEE ELECTRICAL DRAWINGS FOR SIZE AND LOCATION. SEE TYPICAL DETAIL 3/DS502

(10) CONTRACTOR TO FIELD VERIFY EXISTING FOOTING STEP AND MATCH ELEVATIONS AT STOOP FOOTING STEP

(11) AT (E) SLAB ON GRADE, PROVIDE #4 DOWELS @ 24" OC INTO EXISTING SLAB ON GRADE W/STRUCT ADHESIVE

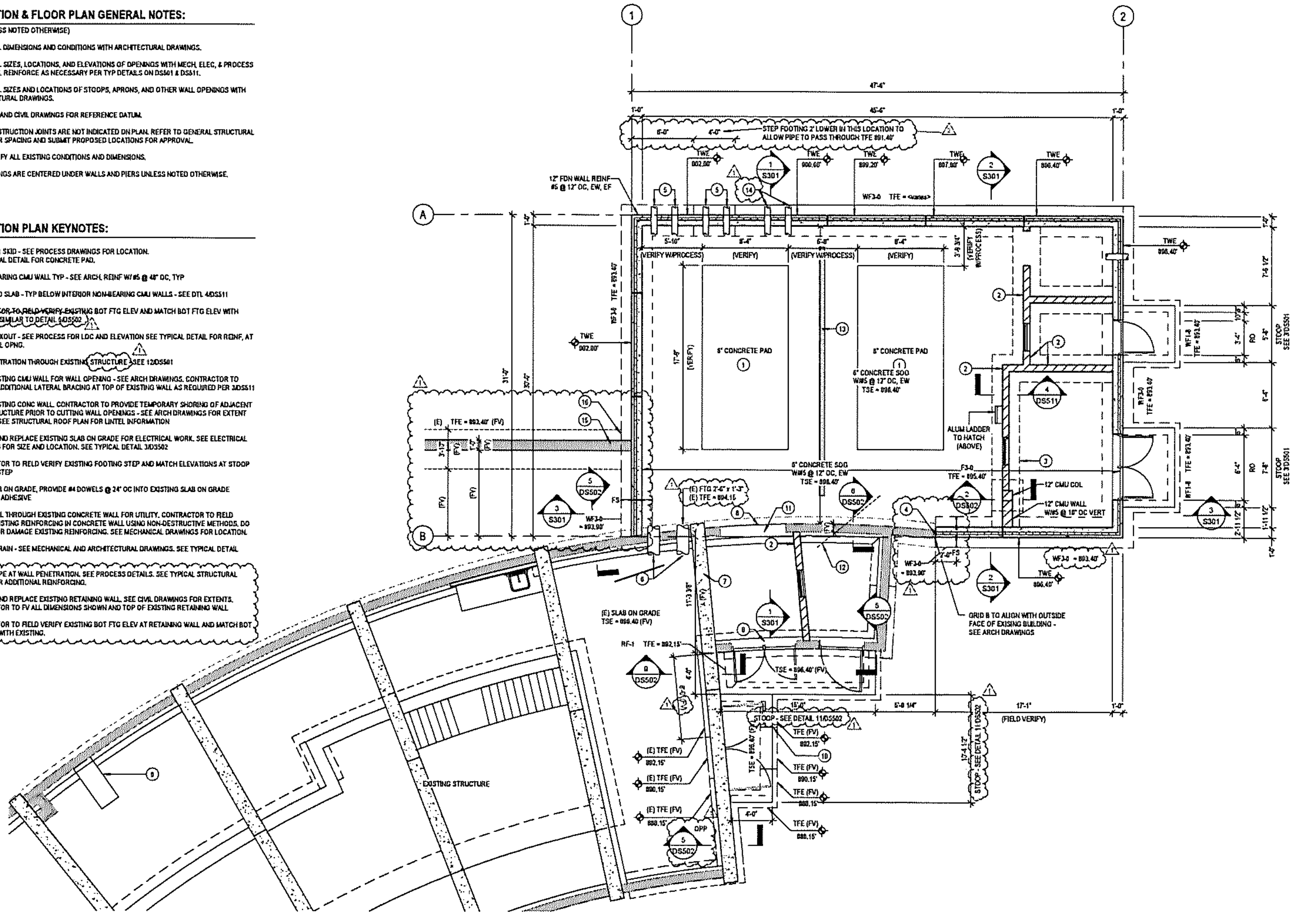
(12) CORE DRILL THROUGH EXISTING CONCRETE WALL FOR UTILITY. CONTRACTOR TO FIELD VERIFY EXISTING REINFORCING IN CONCRETE WALL USING NON-DESTRUCTIVE METHODS. DO NOT CUT OR DAMAGE EXISTING REINFORCING. SEE MECHANICAL DRAWINGS FOR LOCATION.

(13) TRENCH DRAIN - SEE MECHANICAL AND ARCHITECTURAL DRAWINGS. SEE TYPICAL DETAIL 12/DS502.

⚠1 (14) CAST IN PIPE AT WALL PENETRATION. SEE PROCESS DETAILS. SEE TYPICAL STRUCTURAL DETAIL FOR ADDITIONAL REINFORCING.

(15) REMOVE AND REPLACE EXISTING RETAINING WALL. SEE CIVIL DRAWINGS FOR EXTENTS. CONTRACTOR TO FV ALL DIMENSIONS SHOWN AND TOP OF EXISTING RETAINING WALL.

(16) CONTRACTOR TO FIELD VERIFY EXISTING BOT FTG ELEV AT RETAINING WALL AND MATCH BOT FTG ELEV WITH EXISTING.



FOUNDATION & FLOOR PLAN

1/S101 3/16" = 1'-0"

PROJECT NORTH

FOOTING SCHEDULE		
MARK	SIZE	REINFORCING
~~F3-0~~	~~3'-0" x 3'-0" x 1'-0"~~	~~(3) #5 EA WAY, BOTTOM~~
RF-1 ⚠1	1'-0" x 1'-0" (FV) TO MATCH EXISTING DEPTH	SEE DETAIL 9/DS502
~~WF1-0~~	~~1'-6" WIDE x 1'-0" DEEP x CONTINUOUS~~	~~(2) #5 REBAR CONTINUOUS, BOTTOM~~
WF3-0	3'-0" WIDE x 1'-0" DEEP x CONTINUOUS	(3) #5 REBAR CONTINUOUS, BOTTOM

SEH

Revision

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: NRD, SMJ
Drawn By: ALM

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE		
REV.#	DESCRIPTION	DATE
1	ADDENDUM 3	11/20/2023
2	ADDENDUM 5	11/28/23

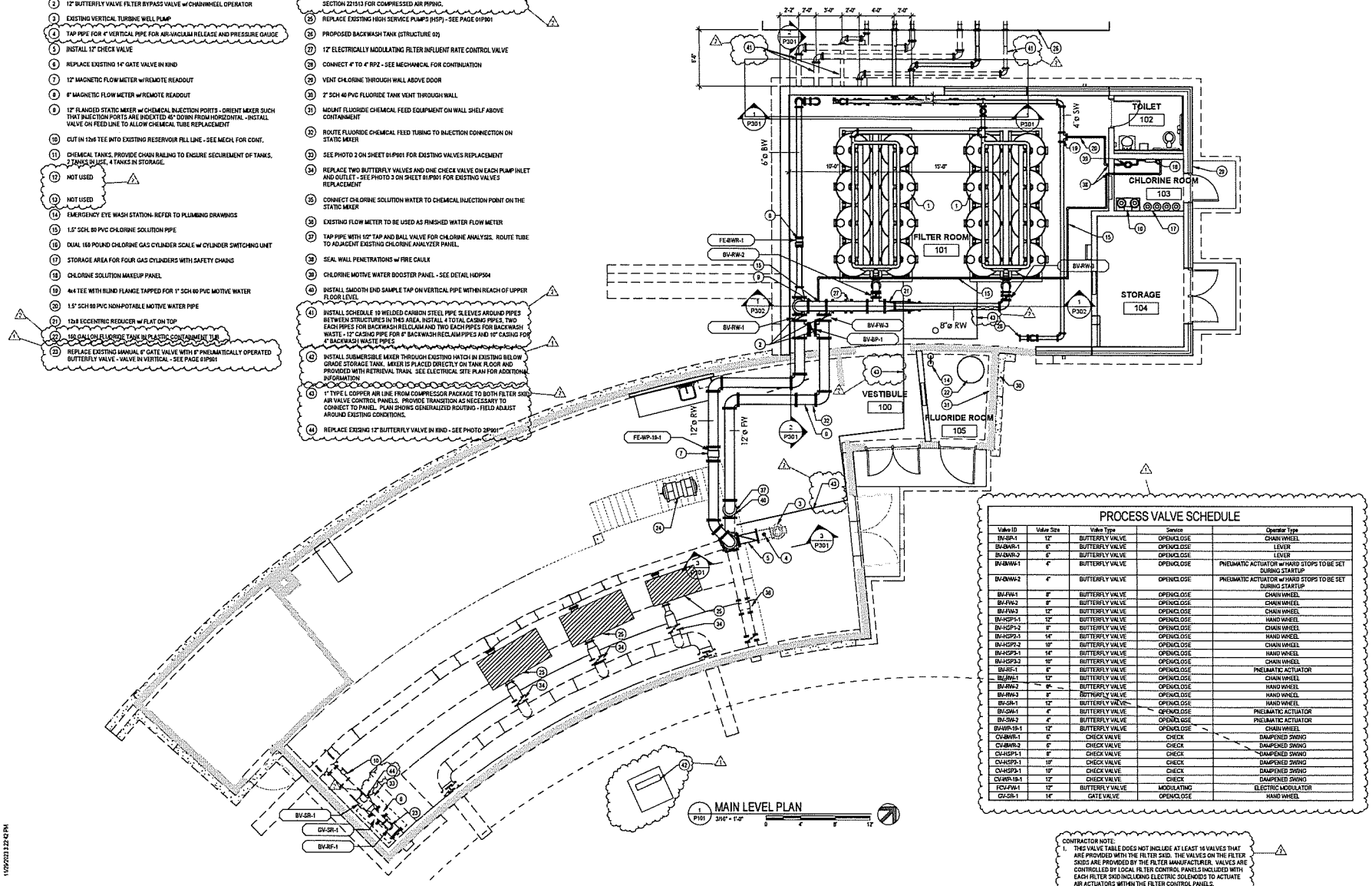
FOUNDATION & FLOOR PLAN

01

S101

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE AND PRESSURE GAUGE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXTED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS. PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS. 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. NOT USED
13. NOT USED
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH. 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x8 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 150 GALLON FLUORIDE TANK IN PLASTIC CONTAINMENT TUB
23. REPLACE EXISTING MANUAL 8" GATE VALVE WITH 8" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01P901
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS - REFER TO SPEC. SECTION 221519 FOR NEW PACKAGED AIR COMPRESSOR AND SECTION 221313 FOR COMPRESSED AIR PIPING.
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01P901
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL H/DP504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEEN STRUCTURES IN THIS AREA. INSTALL 4 TOTAL CASING PIPES, TWO EACH PIPES FOR BACKWASH RELCLAIM AND TWO EACH PIPES FOR BACKWASH WASTE - 12" CASING PIPE FOR 8" BACKWASH RECLAIM PIPES AND 10" CASING FOR 4" BACKWASH WASTE PIPES
42. INSTALL SUBMERSIBLE MIXER THROUGH EXISTING HATCH IN EXISTING BELOW GRADE STORAGE TANK. MIXER IS PLACED DIRECTLY ON TANK FLOOR AND PROVIDED WITH RETRIEVAL TRAIN. SEE ELECTRICAL SITE PLAN FOR ADDITIONAL INFORMATION
43. 1" TYPE L COPPER AIR LINE FROM COMPRESSOR PACKAGE TO BOTH FILTER SKID AIR VALVE CONTROL PANELS. PROVIDE TRANSITION AS NECESSARY TO CONNECT TO PANEL. PLAN SHOWS GENERALIZED ROUTING - FIELD ADJUST AROUND EXISTING CONDITIONS.
44. REPLACE EXISING 12" BUTTERFLY VALVE IN KIND - SEE PHOTO 2/P901



1 MAIN LEVEL PLAN
P101 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BP-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RF-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	6"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WP-19-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP2-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-WP-19-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

CONTRACTOR NOTE:
1. THIS VALVE TABLE DOES NOT INCLUDE AT LEAST 16 VALVES THAT ARE PROVIDED WITH THE FILTER SKID. THE VALVES ON THE FILTER SKIDS ARE PROVIDED BY THE FILTER MANUFACTURER. VALVES ARE CONTROLLED BY LOCAL FILTER CONTROL PANELS INCLUDED WITH EACH FILTER SKID INCLUDING ELECTRIC SOLENOIDS TO ACTUATE AIR ACTUATORS WITHIN THE FILTER CONTROL PANELS.
2. FIELD ROUTE 1/2" TYPE L COPPER AIR LINE FROM MAIN 1" COMPRESSOR LINE TO EACH OF THE FIVE PNEUMATIC ACTUATORS ON VALVES BV-BWW 1, BV-BWW2, BV-RF-1, BV-SW-1, AND BV-SW-2.

SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2550 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	MS
Drawn By	LAP

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 3	11/09/2023
2	ADDENDUM NO. 5	11/28/2023

PROCESS PLAN

01
P101

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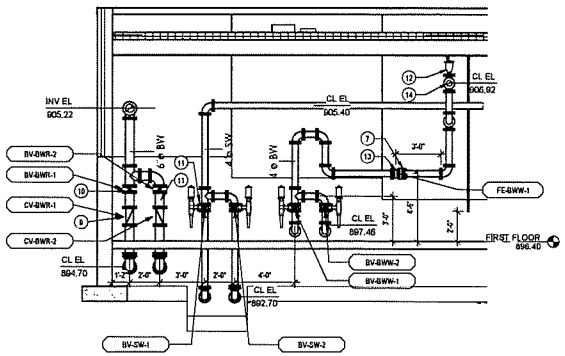
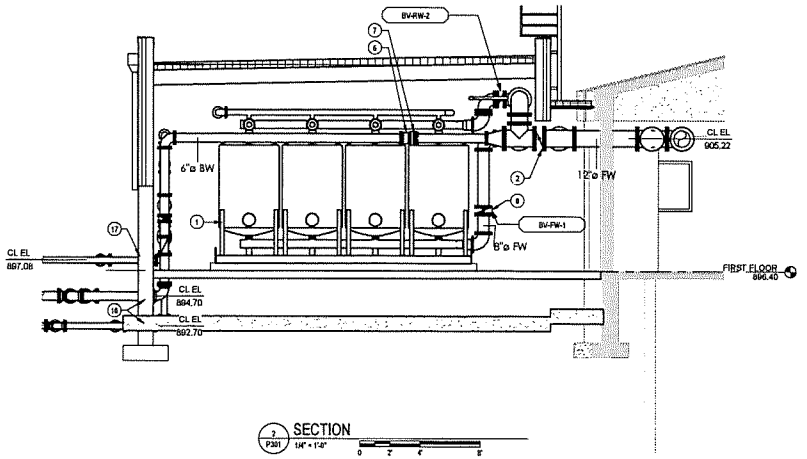
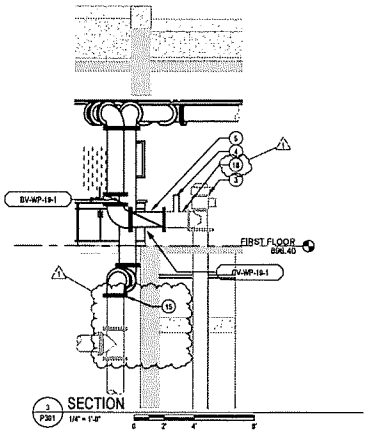


1 SECTION P301 1/4" = 1'-0"



2 SECTION P301 1/4" = 1'-0"



3 SECTION P301 1/4" = 1'-0"

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE AND INSTALL AIR VACUUM VALVE
5. INSTALL 12" CHECK VALVE
6. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
7. FLANGED COUPLING ADAPTER
8. 8" FILTER SHUTOFF BUTTERFLY VALVE w/ HANDWHEEL OPERATOR
9. 6" SWING CHECK VALVE
10. 6" PLUG VALVE w/ LEVER OPERATOR
11. 4" PNEUMATICALLY OPERATED BUTTERFLY VALVE - TYP. FOR BACKWASH WASTE AND SPRAY WASH PIPES
12. AIR AND VACUUM RELIEF VALVE
13. 4" BACKWASH WASTE FLOW METER
14. CONTRACTOR TO VERIFY ELEVATION AFTER FILTER EQUIPMENT INSTALLED
15. CONNECT TO EXISTING 12" WELDED STEEL WELLHOUSE PIPING - CONTRACTOR TO VERIFY EXISITING PIPE ID AND OD OF PIPE TO PROVIDE PROPER TRANSION PIECE TO NEW 12" FLANGED DUCTILE IRON PIPE
16. CONSTRUCT 12" SQUARE BLOCKOUT IN FOUNDATION TO PASS PIPE THRUGH
17. FLAMU WALL PIPE
18. INSTALL PRESSURE GAUGE

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SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

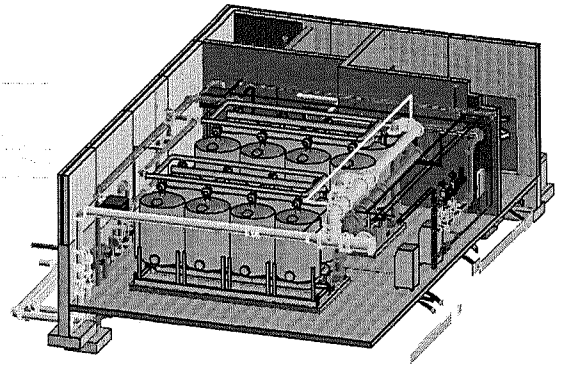
SEH Project	MADWU 187918
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

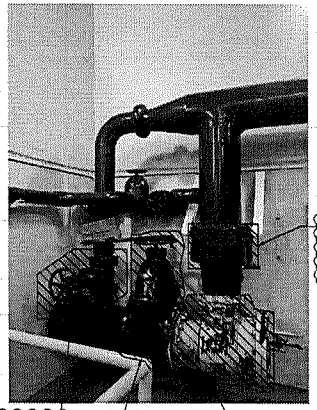
REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 1	11/28/2023

PROCESS SECTIONS

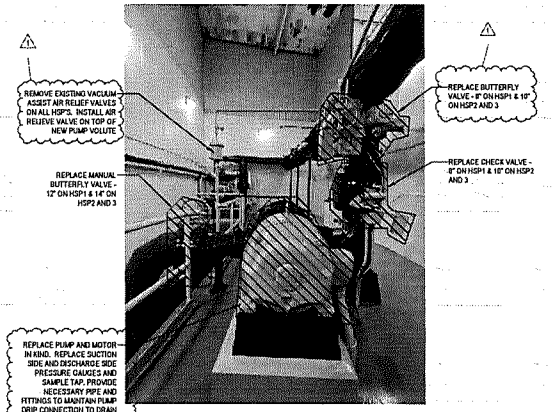
01
P301



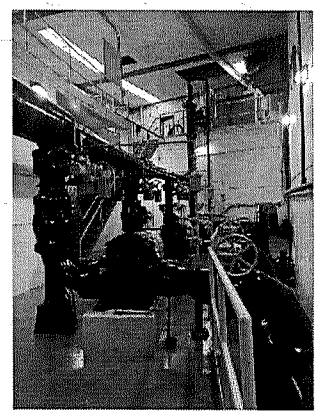
1 P901 FILTER ISOMETRIC FOR REFERENCE ONLY
NOT TO SCALE



2 P901 RESERVIOR FILL VALVE
NOT TO SCALE

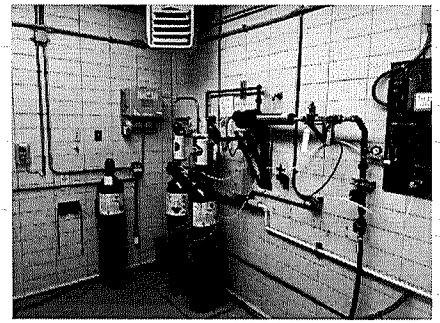


3 P901 HSP PUMP PHOTO -TYP. OF 3
NOT TO SCALE



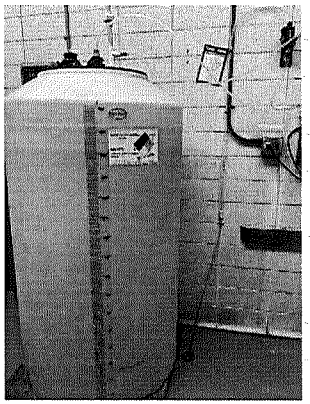
SEE PHOTO 3/01P901 FOR TYPICAL REPLACEMENT NOTES

4 P901 THREE HSP'S PHOTO
NOT TO SCALE



REMOVE ALL EQUIPMENT, PIPING, VALVES, SCALES, TANKS, AND FIXED ITEMS AND APPURTENANCES AS DIRECTED BY THE ENGINEER OR OWNER. SALVAGE EQUIPMENT DESIGNATED BY OWNER TO OWNER

5 P901 EXISTING GAS CHLORINE REMOVAL PHOTO
NOT TO SCALE



REMOVE ALL EQUIPMENT, PIPING, VALVES, SCALES, TANKS, AND FIXED ITEMS AND APPURTENANCES AS DIRECTED BY THE ENGINEER OR OWNER. SALVAGE EQUIPMENT DESIGNATED BY WEINER TO OWNER

6 P901 EXISTING FLUORIDE EQUIPMENT REMOVAL
NOT TO SCALE

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SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2536 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADMU 167818
Checked By	MS
Drawn By	LAP

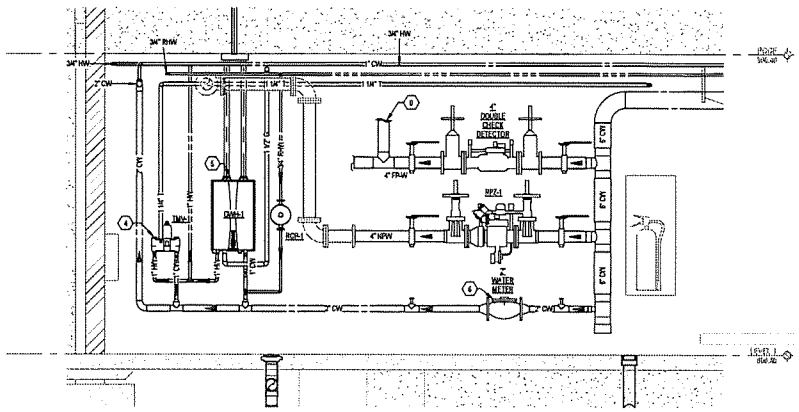
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

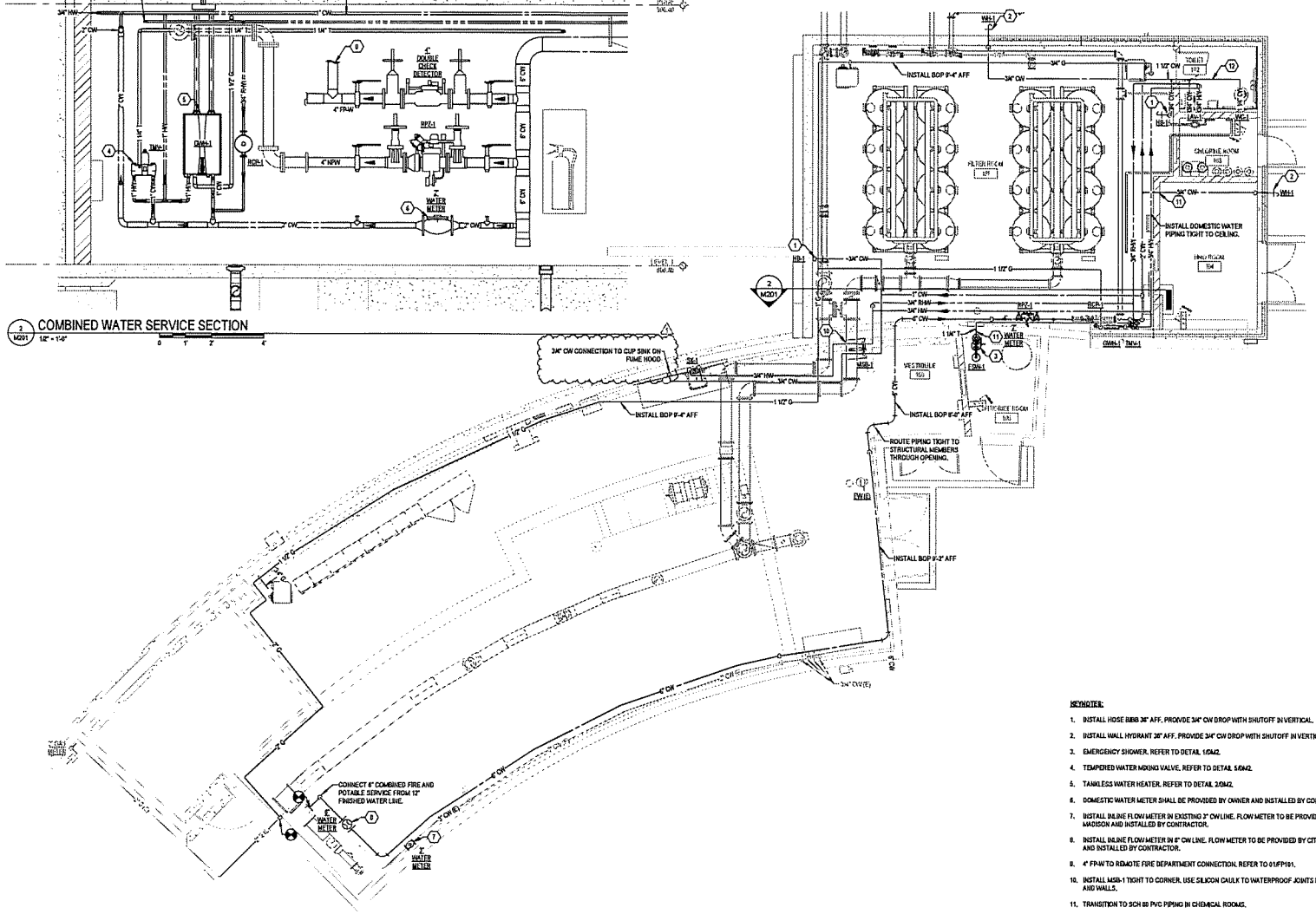
REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 3	11/29/2023

PROCESS ISOMETRIC 3D VIEWS FOR REFERENCE ONLY

01
P901



1 M201 COMBINED WATER SERVICE SECTION 1/2" = 1'-0"



1 M201 MAIN LEVEL DOMESTIC WATER AND GAS PLAN 3/16" = 1'-0"

PROJECT NORTH

KEYNOTES:

1. INSTALL HOSE BIBB 36" AFF. PROVIDE 3/4" CW DROP WITH SHUTOFF IN VERTICAL.
2. INSTALL WALL HYDRANT 36" AFF. PROVIDE 3/4" CW DROP WITH SHUTOFF IN VERTICAL.
3. EMERGENCY SHOWER. REFER TO DETAIL 1/DM2.
4. TEMPERED WATER MIXING VALVE. REFER TO DETAIL 5/DM2.
5. TANKLESS WATER HEATER. REFER TO DETAIL 2/DM2.
6. DOMESTIC WATER METER SHALL BE PROVIDED BY OWNER AND INSTALLED BY CONTRACTOR.
7. INSTALL INLINE FLOW METER IN EXISTING 3" CW LINE. FLOW METER TO BE PROVIDED BY CITY OF MADISON AND INSTALLED BY CONTRACTOR.
8. INSTALL INLINE FLOW METER IN 6" CW LINE. FLOW METER TO BE PROVIDED BY CITY OF MADISON AND INSTALLED BY CONTRACTOR.
9. 4" FP/W TO REMOTE FIRE DEPARTMENT CONNECTION. REFER TO 01/FP101.
10. INSTALL MSB-1 TIGHT TO CORNER. USE SILICON CAULK TO WATERPROOF JOINTS BETWEEN MSB-1 AND WALLS.
11. TRANSITION TO SCH 80 PVC PIPING IN CHEMICAL ROOMS.
12. PROVIDE WATER HAMMER ARRESTOR PER SPECIFICATION SECTION 22 11 19.

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SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167618
Checked By	NJB
Drawn By	DBJ
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/29/2023

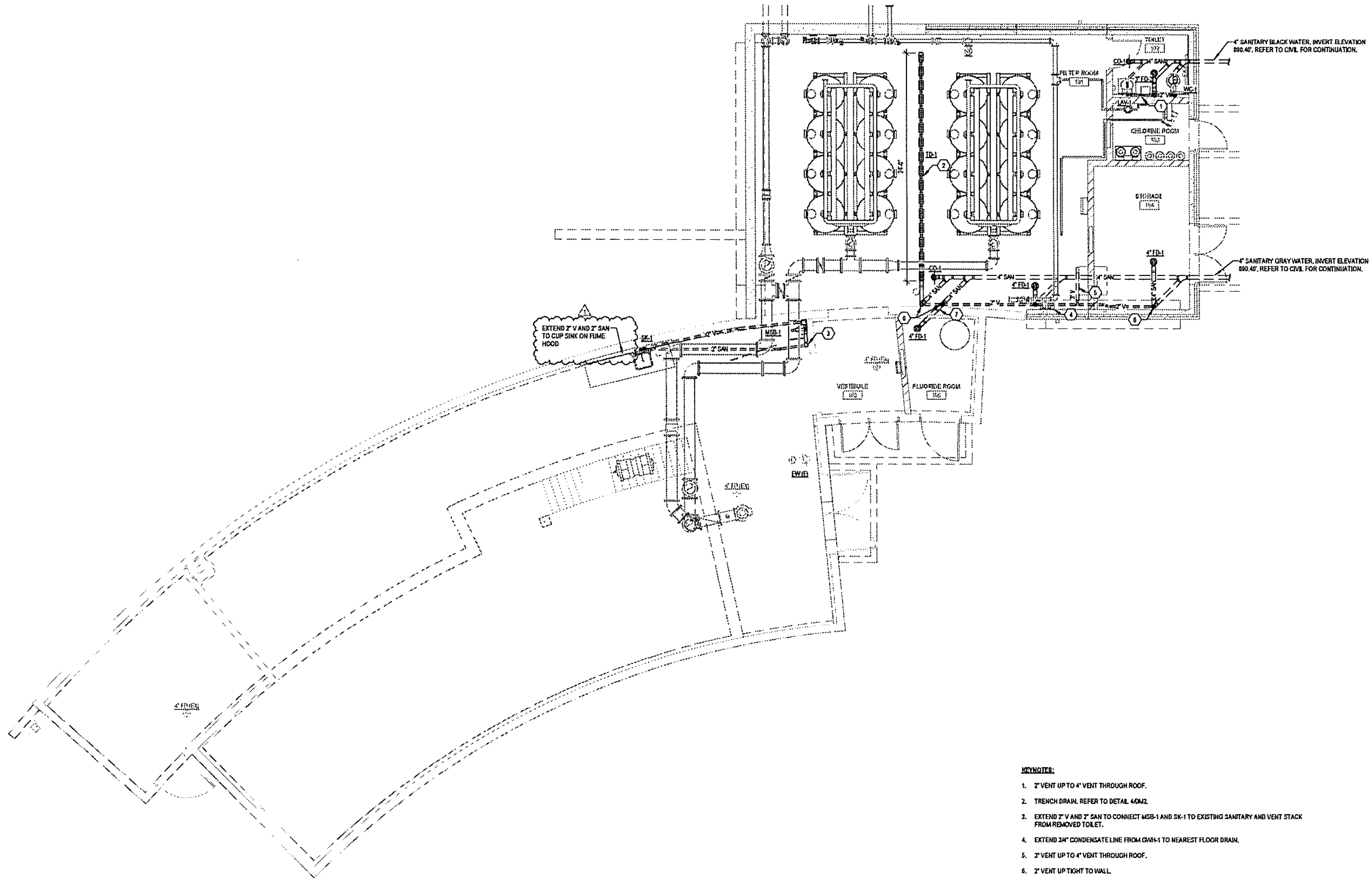
FIRST LEVEL DOMESTIC WATER AND GAS PLAN

01
M201

REVISION

SEH

Project Owner
MADISON WATER UTILITY



1 M202 MAIN LEVEL SANITARY WASTE AND VENT PLAN
3/16" = 1'-0"
PROJECT NORTH

KEYNOTES:

1. 2" VENT UP TO 4" VENT THROUGH ROOF.
2. TRENCH DRAIN. REFER TO DETAIL 4/DM2.
3. EXTEND 2" V AND 2" SAN TO CONNECT MSB-1 AND SK-1 TO EXISTING SANITARY AND VENT STACK FROM REMOVED TOILET.
4. EXTEND 3/4" CONDENSATE LINE FROM GWH-1 TO NEAREST FLOOR DRAIN.
5. 3" VENT UP TO 4" VENT THROUGH ROOF.
6. 2" VENT UP TIGHT TO WALL.
7. CORE DRILL THROUGH EXISTING FOUNDATION WALL ABOVE TOP OF FOOTING.

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187818
Checked By	NJB
Drawn By	DBJ
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV.#	DESCRIPTION	DATE
1	ADDENDUM 3	11/28/2023

FIRST LEVEL SANITARY WASTE AND VENT PLAN

01
M202

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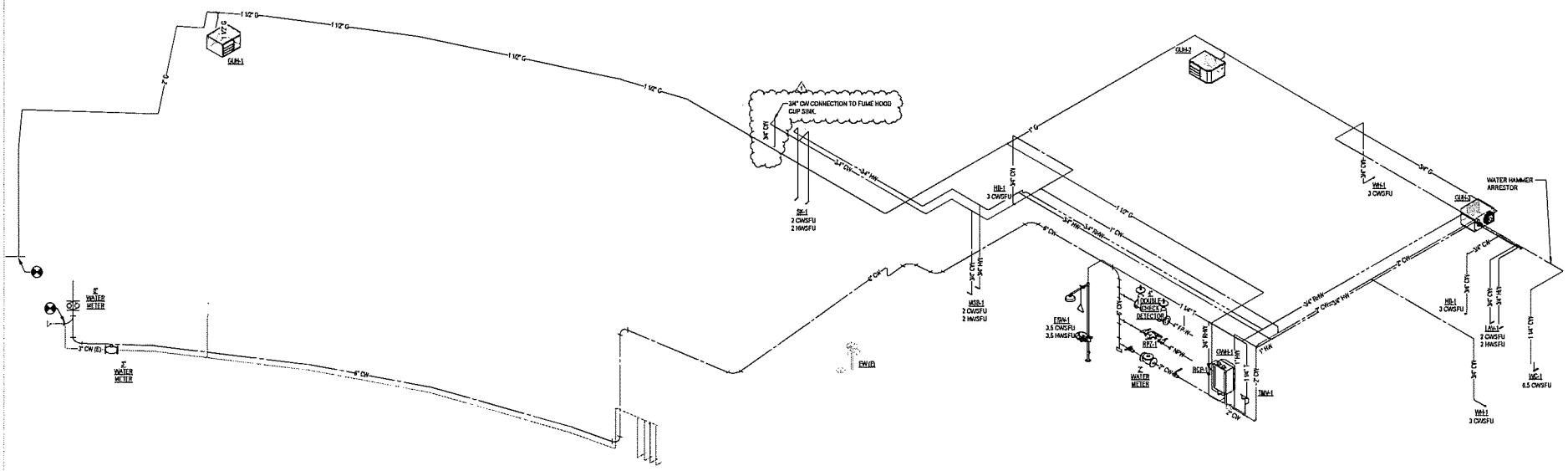
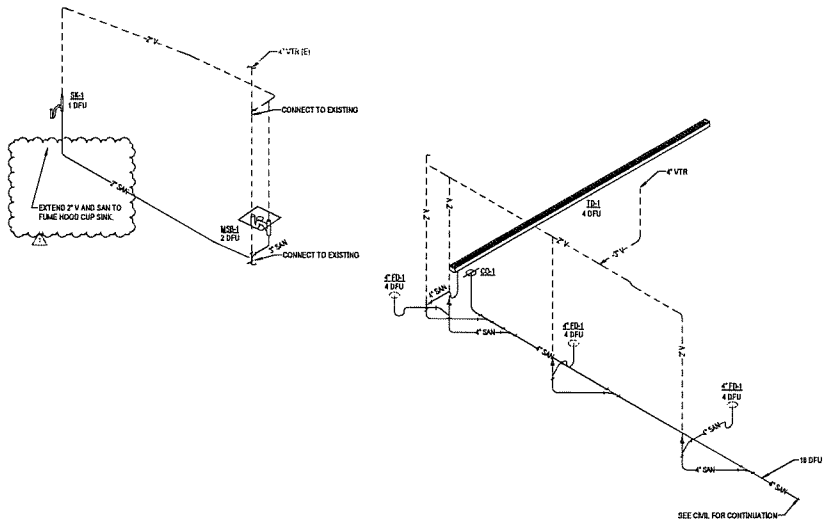


1 DOMESTIC WATER AND GAS RISER
M301 NOT TO SCALE



2 SANITARY WASTE AND VENT RISER
M301 NOT TO SCALE

11/29/2023 1:41:10 PM

SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2205 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	NJS
Drawn By	DBJ

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/28/2023

RISER DIAGRAMS

01
M301

POWER GENERAL NOTES

A. PROVIDE HOUSE KEEPING PADS FOR ALL FLOOR AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4" WIDER AND LONGER THAN EQUIPMENT TO BE PLACED ON IT, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT GENERAL RECEPTACLE, ELECTRICAL EQUIPMENT, AND MECHANICAL EQUIPMENT LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

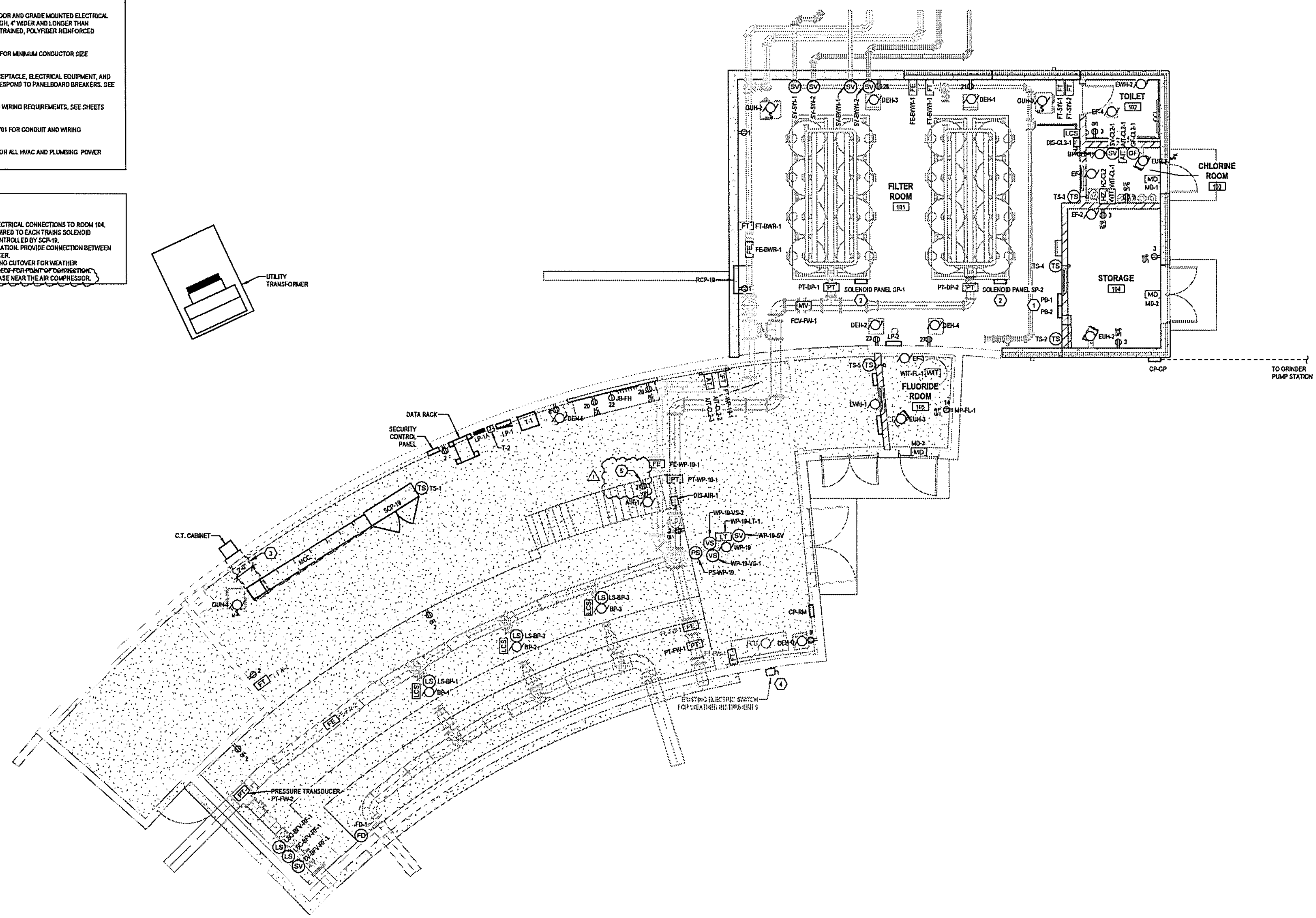
D. SEE ONE-LINE DIAGRAMS FOR CONDUIT AND WIRING REQUIREMENTS. SEE SHEETS E502, E503, AND E504.

E. SEE PANELBOARD SCHEDULES ON SHEET E701 FOR CONDUIT AND WIRING REQUIREMENTS.

F. SEE MECHANICAL PLANS AND SCHEDULES FOR ALL HVAC AND PLUMBING POWER REQUIREMENTS AND DETAILS.

KEYNOTES

1. PROVIDE TWO PULLBOXES FOR FUTURE ELECTRICAL CONNECTIONS TO ROOM 104.
2. FILTER TRAIN VALVE SOLENOIDS ARE PRE-WIRED TO EACH TRAINS SOLENOID TERMINATION PANEL. SOLENOIDS TO BE CONTROLLED BY SCP-19.
3. SEE DETAIL 6/DE03 FOR DUCT BANK INSTALLATION. PROVIDE CONNECTION BETWEEN C.T. CABINET AND MCC MAIN CIRCUIT BREAKER.
4. PROVIDE TEMPORARY UTILITY POWER DURING CUTOVER FOR WEATHER ~~INSTRUMENTATION. USE EXISTING DISCONNECT FOR POINT OF CONNECTION.~~
5. MOUNT RECEPTACLE UNDERNEATH STAIRCASE NEAR THE AIR COMPRESSOR.



1 POWER PLAN
E301 3/16" = 1'-0"

11/29/2023 8:55:15 AM

REVISION

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CBW
Drawn By	DOH

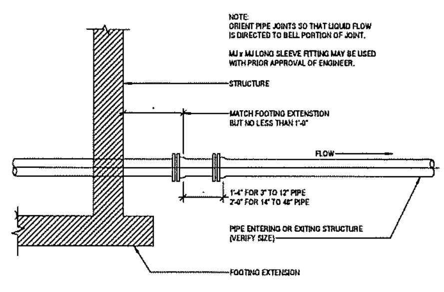
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

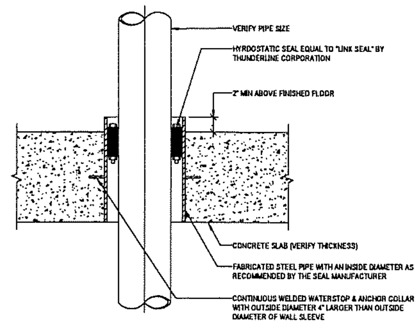
REV. #	DESCRIPTION	DATE
1	ADDENDUM 5	11/28/2023

POWER PLAN - WELLHOUSE 19

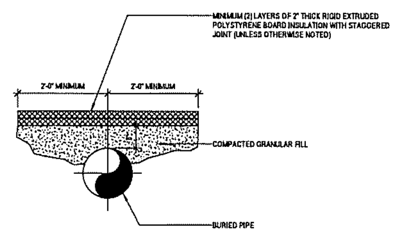
01
E301



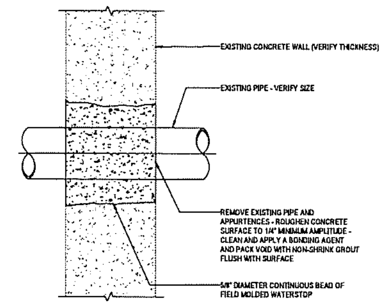
A DP502 PIPE CONNECTION - TYPE 2 DETAIL



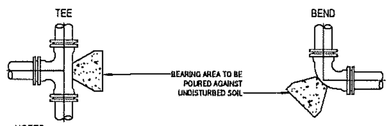
B DP502 SEALED FLOOR SLEEVE DETAIL



C DP502 PIPE INSULATION DETAIL



D DP502 EXISTING PIPE OPENING PATCH DETAIL



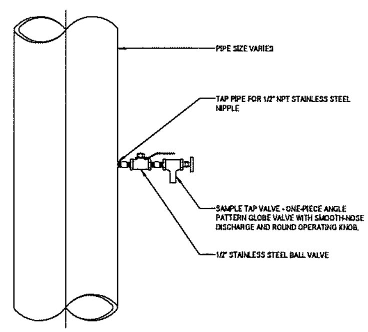
NOTES:

1. PLACE BETWEEN FITTING AND UNDISTURBED TRENCH WALL
2. MINIMUM THICKNESS: 12 INCHES
3. MINIMUM AREA IN SQUARE FEET SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

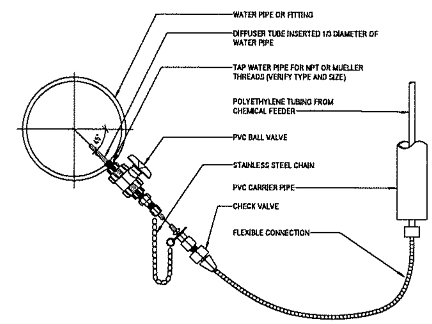
THRUST BLOCKING				
PIPE SIZE	TEE OR PLUG	1/4 BEND	1/32 AND 1/8 BEND	1/16 BEND
6"	2.9	3.1	1.6	0.8
8"	3.7	5.3	2.9	1.4
10"	5.7	8.1	4.4	2.2
12"	8.1	13.4	6.6	3.2
16"	15.1	21.4	11.6	5.9
20"	23.2	30.2	18.1	9.3
24"	33.6	48.5	26.1	13.3

4. SIZE BLOCKING BASED ON LARGER PIPE
5. VERIFY THAT BOLTS ARE ACCESSIBLE AFTER CONCRETE IS POURED

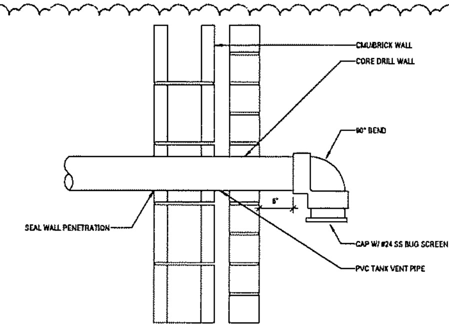
E DP502 CONCRETE THRUST BLOCKING DETAIL



F DP502 SAMPLE TAP-1



G DP502 CHEMICAL DIFFUSER DETAIL



H DP502 CHEMICAL TANK VENT WALL PENETRATION

11/29/2023 3:34:24 PM

SEH

REVISION

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167818
Checked By MG
Drawn By LAP

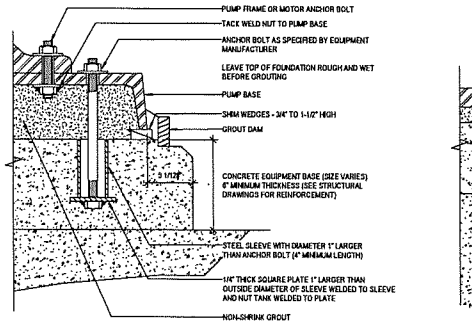
Project Status BIDDING DOCUMENTS
Issue Date OCTOBER, 2023

REVISION SCHEDULE

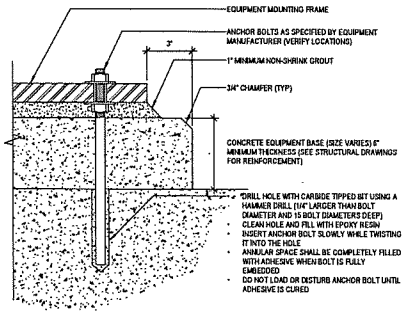
REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 5	11/08/2023

PROCESS PIPING DETAILS

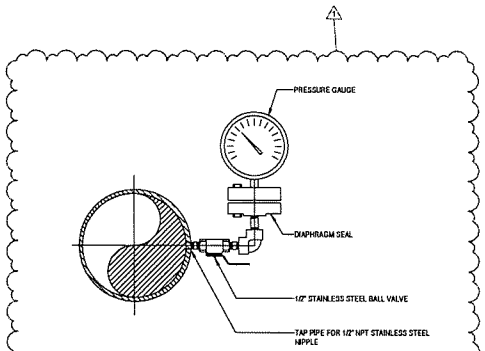
DP502



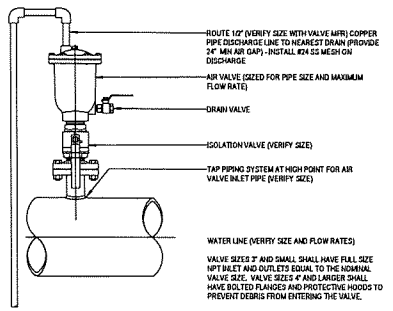
A DP504 PUMP BASE DETAIL



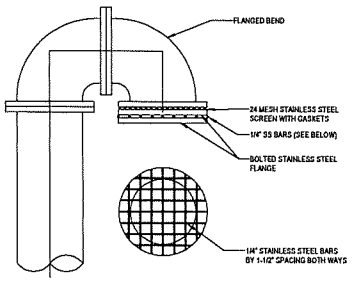
B DP504 EQUIPMENT BASE DETAIL



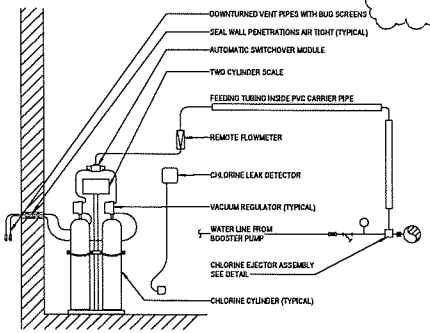
1 DP504 PRESSURE GAUGE DETAIL



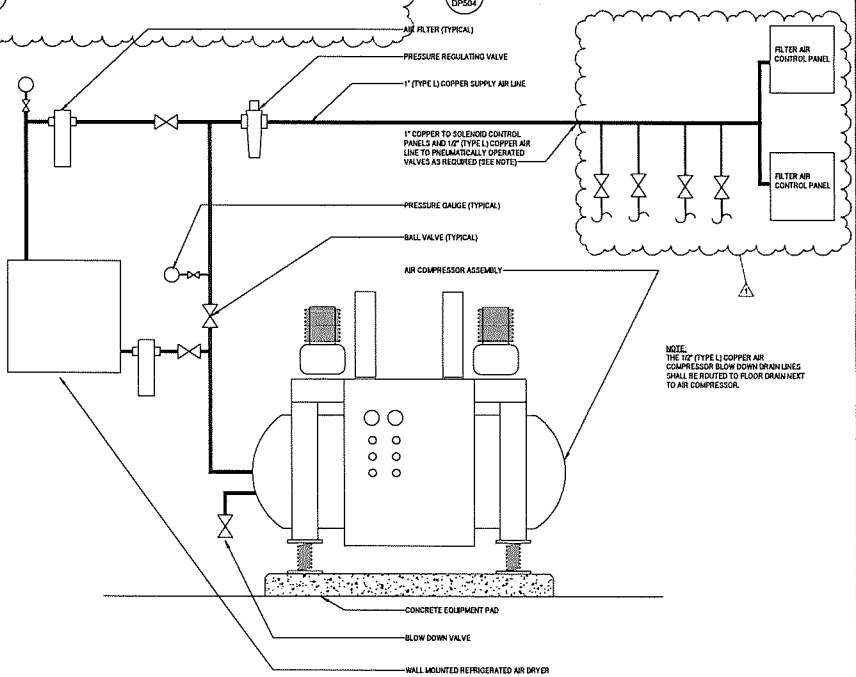
D DP504 AIR RELEASE VALVE DETAIL



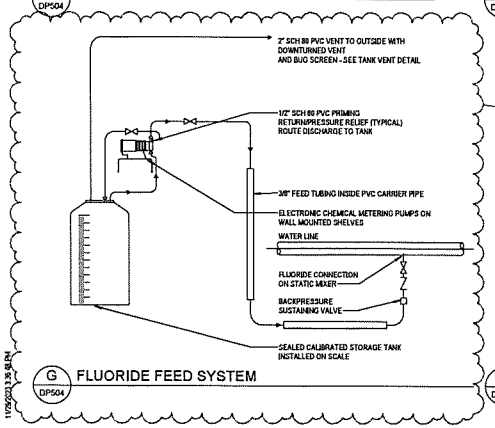
E DP504 VENT SCREEN DETAIL



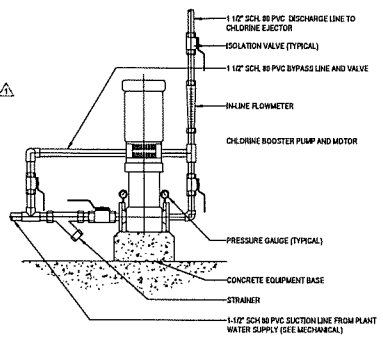
F DP504 CHLORINE GAS FEED SYSTEM-2



I DP504 AIR COMPRESSOR/DRYER ASSEMBLY



G DP504 FLUORIDE FEED SYSTEM



H DP504 CHLORINE BOOSTER PUMP

11/9/2023 2:35:36 PM

REVISION

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2538 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

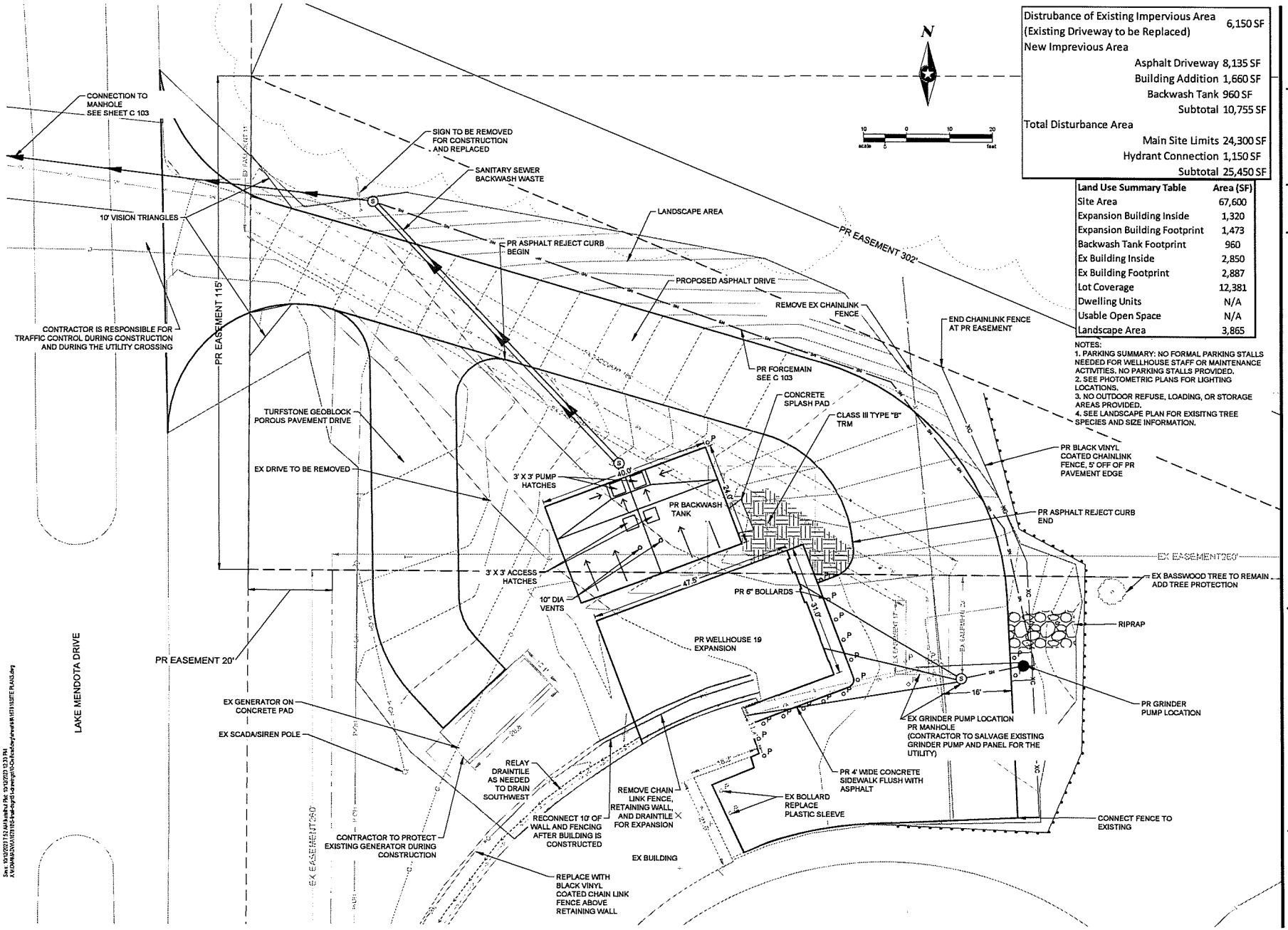
SEH Project	MADWU 167818
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 3	11/08/2023

MISCELLANENOUS PROCESS DETAILS

DP504



Distrubance of Existing Impervious Area (Existing Driveway to be Replaced)	6,150 SF
New Imprevious Area	
Asphalt Driveway	8,135 SF
Building Addition	1,660 SF
Backwash Tank	960 SF
Subtotal	10,755 SF
Total Disturbance Area	
Main Site Limits	24,300 SF
Hydrant Connection	1,150 SF
Subtotal	25,450 SF

Land Use Summary Table	Area (SF)
Site Area	67,600
Expansion Building Inside	1,320
Expansion Building Footprint	1,473
Backwash Tank Footprint	960
Ex Building Inside	2,850
Ex Building Footprint	2,887
Lot Coverage	12,381
Dwelling Units	N/A
Usable Open Space	N/A
Landscape Area	3,865

NOTES:
1. PARKING SUMMARY: NO FORMAL PARKING STALLS NEEDED FOR WELLHOUSE STAFF OR MAINTENANCE ACTIVITIES. NO PARKING STALLS PROVIDED.
2. SEE PHOTOMETRIC PLANS FOR LIGHTING LOCATIONS.
3. NO OUTDOOR REFUSE, LOADING, OR STORAGE AREAS PROVIDED.
4. SEE LANDSCAPE PLAN FOR EXISITNG TREE SPECIES AND SIZE INFORMATION.

SEH

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2226 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: LMDWU 187918
Checked By:
Drawn By:

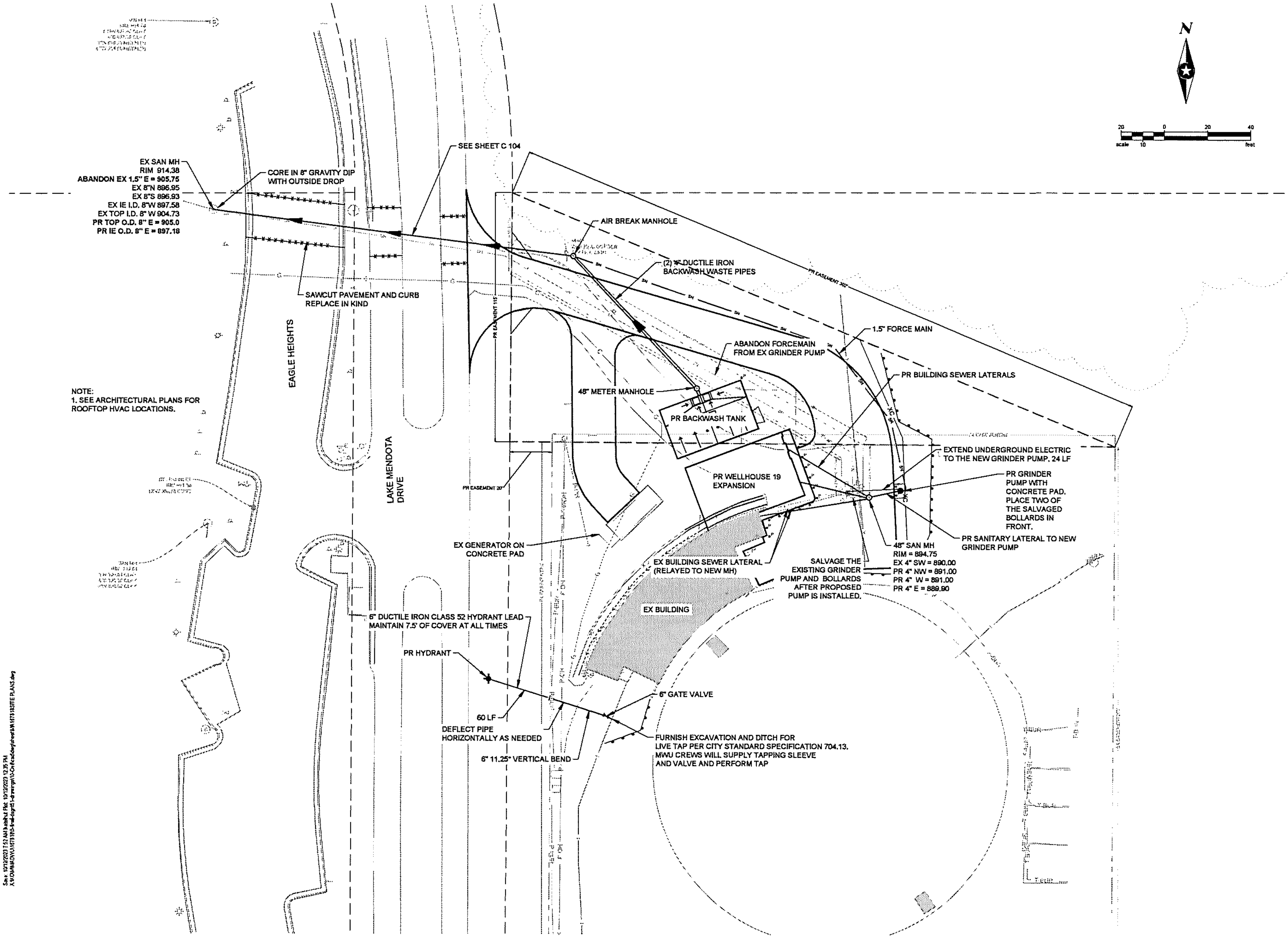
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER 2022

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

SITE PLAN

C 100



SEH

ORIGINAL

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167818
Checked By
Drawn By

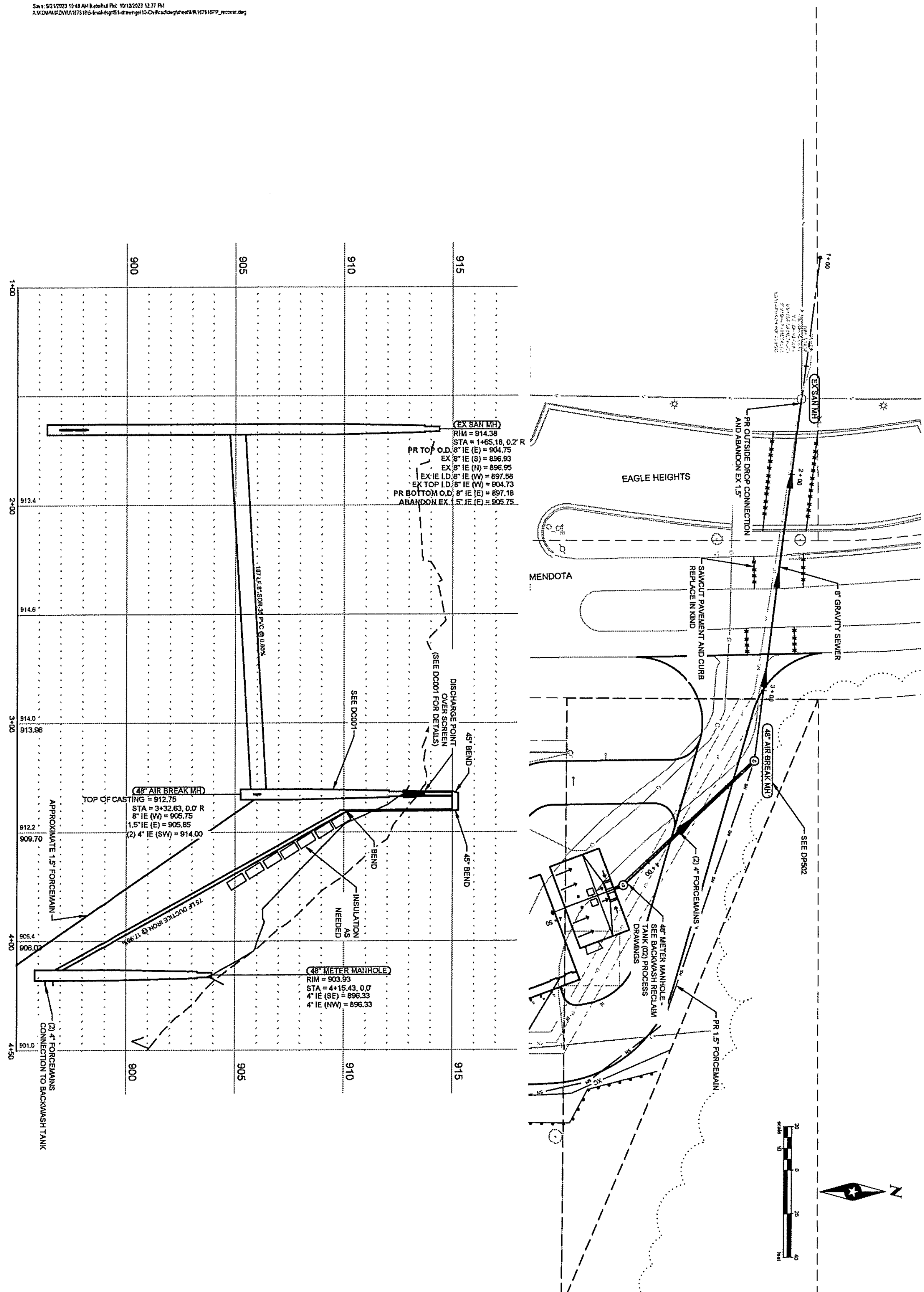
Project Status BIDDING DOCUMENTS
Issue Date OCTOBER 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

UTILITY PLAN

C 103



CITY OF MADISON WATER UTILITY

UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

MADISON WATER UTILITY

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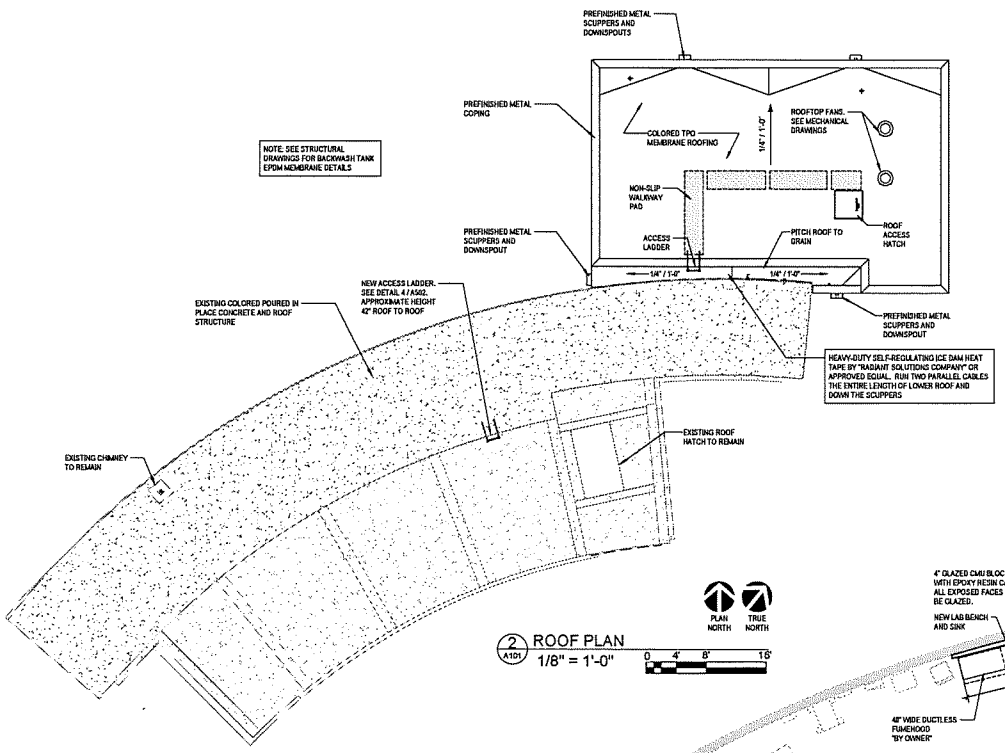
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER 2023

REVISION SCHEDULE
REV. # | DESCRIPTION | DATE

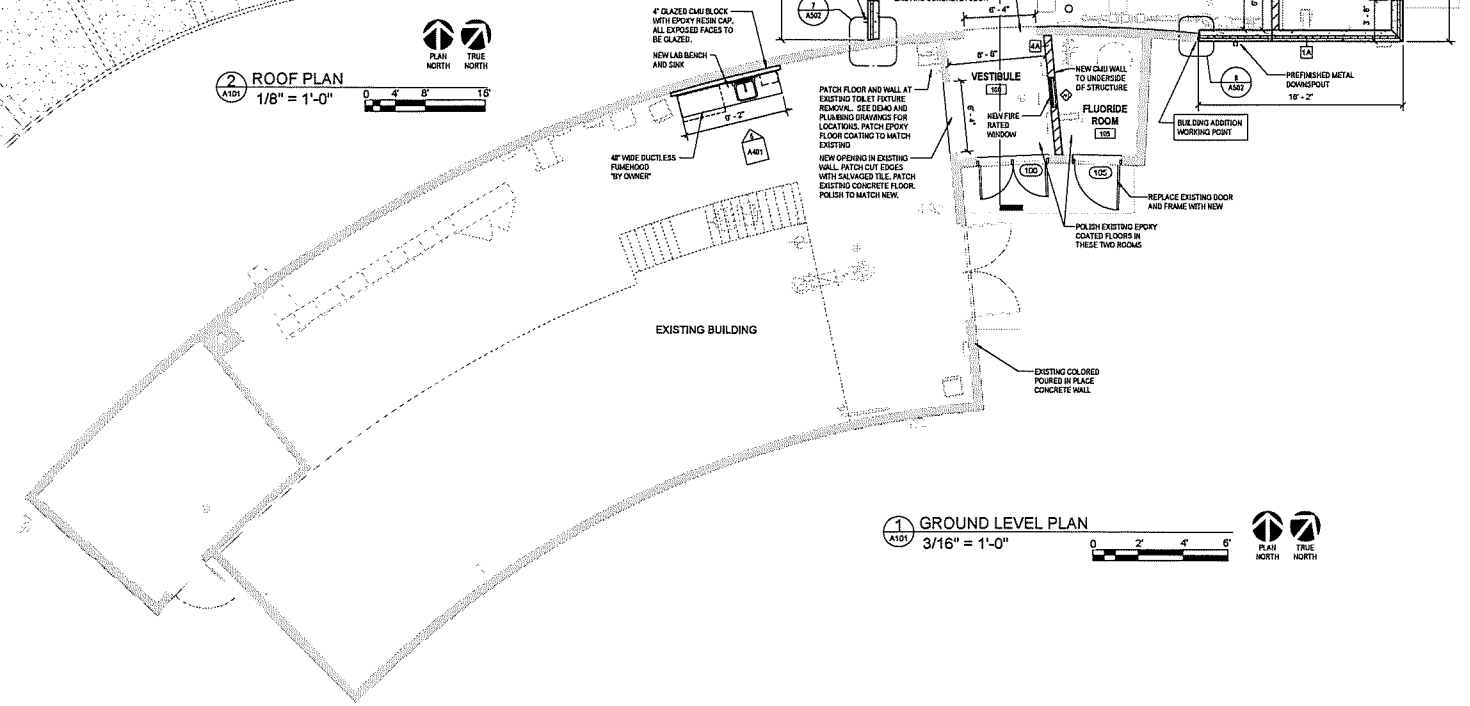
PLAN & PROFILE

C 104

ORIGINAL



2 A101 ROOF PLAN
1/8" = 1'-0"
0 4' 8' 16'



1 A101 GROUND LEVEL PLAN
3/16" = 1'-0"
0 2' 4' 6'

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 187918
Checked By
Drawn By JRL

Project Status DESIGN DOCUMENTS
Issue Date OCTOBER, 2023

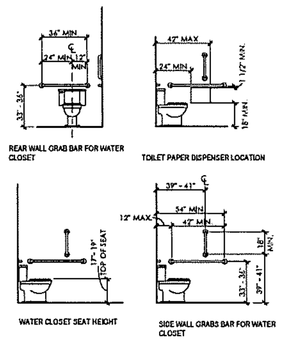
REVISION SCHEDULE

REV.#	DESCRIPTION	DATE

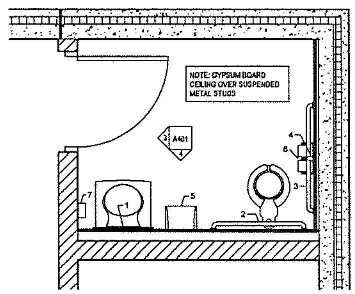
FLOOR AND ROOF PLANS

01
A101

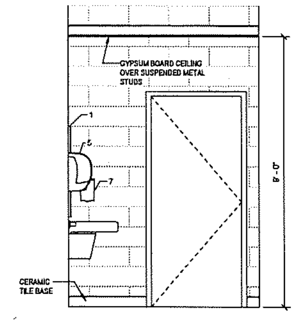
10/10/2023 9:25:35 AM



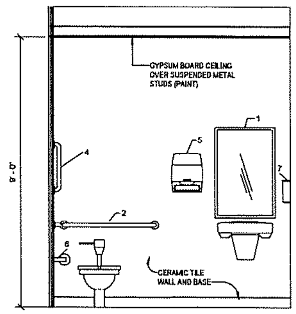
1 TOILET ROOM STANDARDS
A401 1/4" = 1'-0"



2 ENLARGED PLAN
A401 1/2" = 1'-0"



3 TOILET ROOM ELEVATION
A401 1/2" = 1'-0"



4 TOILET ROOM ELEVATION
A401 1/2" = 1'-0"

SPECIALTIES SCHEDULE	
KEYNOTE	DESCRIPTION
1	24" x 36" MIRROR
2	36" GRAB BAR (HORIZONTAL)
3	42" GRAB BAR (HORIZONTAL)
4	18" GRAB BAR (VERTICAL)
5	PAPER TOWEL DISPENSER
6	TOILET PAPER DISPENSER
7	SOAP DISPENSER

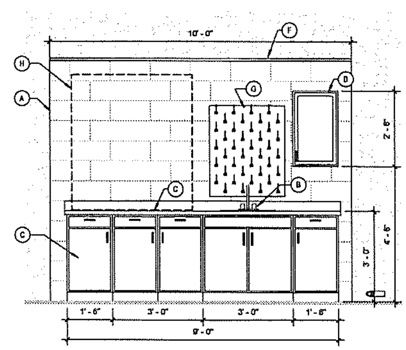
ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR	BASE	WALL FINISH NORTH	WALL FINISH SOUTH	WALL FINISH EAST	WALL FINISH WEST	CEILINGS FINISH	CEILINGS MATERIAL	REMARKS
100	VESTIBULE	PLSH	-	PT	PT	PT	PT	-	S.T.I.	POLISH EXISTING CONCRETE FLOOR
101	FILTER ROOM	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
102	TOILET	PLSH	CT	PT	CT	CT	PT	PT	GYP	
103	CHLORINE ROOM	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
104	STORAGE	PLSH	-	PT	PT	PT	PT	PT	STRUCT	
105	FLUORIDE ROOM	PLSH	-	PT	PT	PT	PT	-	S.T.I.	POLISH EXISTING CONCRETE FLOOR

PLSH: POLISHED CONCRETE FLOOR
CT: CERAMIC TILE
PT: PAINT
S.T.I.: SPRAYED CELLULOSE THERMAL INSULATION

DOOR SCHEDULE

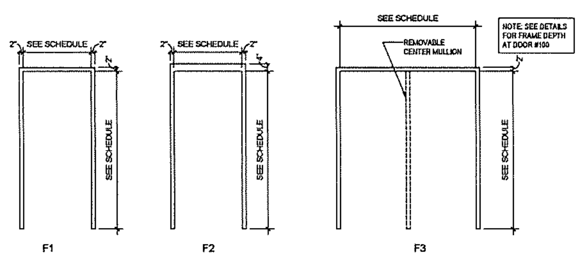
DOOR NUMBER	DOOR HEIGHT	DOOR WIDTH	DOOR MAT'L	DOOR TYPE	FRAME MAT'L	FRAME TYPE	FIRE RATING	HW GROUP	DETAILS HEAD	DETAILS JAMB	DETAILS SILL	REMARKS
100	8' - 0"	6' - 0"	HM	F	HM	F3	-	1	10/A402	11/A402	2/A402	REMOVABLE CENTER MULLION (PAINT)
102	7' - 0"	3' - 0"	HM	F	HM	F2	-	3	3/A402	4/A402		
103	7' - 0"	3' - 0"	HM	F	HM	F1	-	2	1/A402	1/A402	2/A402	
104	7' - 0"	6' - 0"	HM	F	HM	F3	-	1	1/A402	1/A402	2/A402	REMOVABLE CENTER MULLION (PAINT)
105	8' - 0"	4' - 0"	HM	F	HM	F1	-	4	5/A402	5/A402	2/A402	



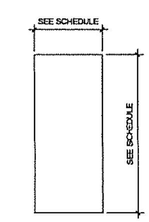
5 INTERIOR ELEVATION
A401 1/2" = 1'-0"

KEY NOTES

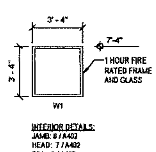
- (A) 4" GLAZED CMU BLOCK, ALL EXPOSED FACES TO BE GLAZED.
- (B) UNDER-MOUNT EPOXY RESIN SINK BASIN
- (C) 30" DEEP METAL BASE CABINET- TYP
- (D) METAL UPPER WALL CABINET- TYP
- (E) EPOXY RESIN COUNTERTOP WITH 4" BACKSPLASH
- (F) 1" EPOXY RESIN CAP. MATCH THE CURVE OF EXISTING WALL
- (G) LAB PEGBOARD DRYING RACK
- (H) DUCTLESS FUME HOOD (BY OWNER)



FRAME TYPES



DOOR TYPES



WINDOW TYPES

10/10/2023 8:30:22 AM

SEH

ORIGINAL

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By
Drawn By: JRL

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

REV.#	DESCRIPTION	DATE

ENLARGED PLAN, SCHEDULES AND DETAILS

01
A401

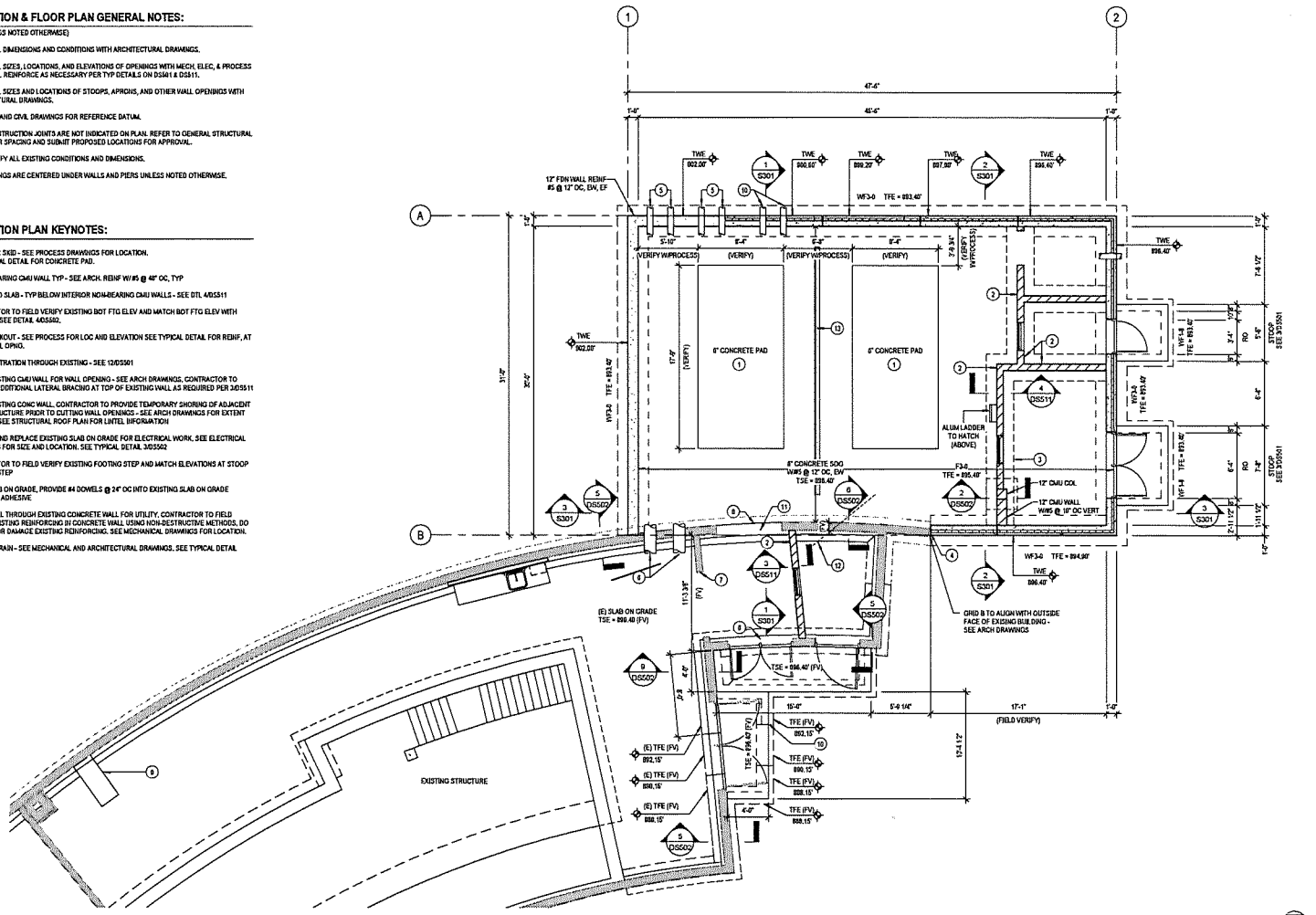
FOUNDATION & FLOOR PLAN GENERAL NOTES:

(TYPICAL UNLESS NOTED OTHERWISE)

1. VERIFY ALL DIMENSIONS AND CONDITIONS WITH ARCHITECTURAL DRAWINGS.
2. VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS WITH MECH, ELEC, & PROCESS DRAWINGS. REINFORCE AS NECESSARY PER TYP DETAILS ON D3/S401 & D3/S11.
3. VERIFY ALL SIZES AND LOCATIONS OF STOOPS, APRONS, AND OTHER WALL OPENINGS WITH ARCHITECTURAL DRAWINGS.
4. SEE ARCH AND CIVIL DRAWINGS FOR REFERENCE DATUM.
5. SLAB CONSTRUCTION JOINTS ARE NOT INDICATED ON PLAN. REFER TO GENERAL STRUCTURAL NOTES FOR SPACING AND SUBMIT PROPOSED LOCATIONS FOR APPROVAL.
6. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS.
7. ALL FOOTINGS ARE CENTERED UNDER WALLS AND PIERS UNLESS NOTED OTHERWISE.

FOUNDATION PLAN KEYNOTES:

1. IMX FILTER SKID - SEE PROCESS DRAWINGS FOR LOCATION. SEE TYPICAL DETAIL FOR CONCRETE PAD.
2. 8" NON-BEARING CMU WALL TYP - SEE ARCH. REINF W/ #5 @ 48" OC, TYP
3. THICKENED SLAB - TYP BELOW INTERIOR NON-BEARING CMU WALLS - SEE DTL 4/D5511
4. CONTRACTOR TO FIELD VERIFY EXISTING BOT FTG ELEV AND MATCH BOT FTG ELEV WITH EXISTING. SEE DETAIL 4/D5502.
5. PIPE BLOCKOUT - SEE PROCESS FOR LOC AND ELEVATION SEE TYPICAL DETAIL FOR REINF, AT CONC WALL OPNG.
6. PIPE PENETRATION THROUGH EXISTING - SEE 12/D5501
7. DEMO EXISTING CMU WALL FOR WALL OPENING - SEE ARCH DRAWINGS, CONTRACTOR TO PROVIDE ADDITIONAL LATERAL BRACING AT TOP OF EXISTING WALL AS REQUIRED PER 3/D5511
8. DEMO EXISTING CONC WALL, CONTRACTOR TO PROVIDE TEMPORARY SHORING OF ADJACENT ROOF STRUCTURE PRIOR TO CUTTING WALL OPENINGS - SEE ARCH DRAWINGS FOR EXTENT AND LOC. SEE STRUCTURAL ROOF PLAN FOR LINTEL INFORMATION
9. REMOVE AND REPLACE EXISTING SLAB ON GRADE FOR ELECTRICAL WORK, SEE ELECTRICAL DRAWINGS FOR SIZE AND LOCATION. SEE TYPICAL DETAIL 3/D5502
10. CONTRACTOR TO FIELD VERIFY EXISTING FOOTING STEP AND MATCH ELEVATIONS AT STOOP FOOTING STEP
11. AT (E) SLAB ON GRADE, PROVIDE #4 DOWELS @ 24" OC INTO EXISTING SLAB ON GRADE W/STRUCT ADHESIVE
12. CORE DRILL THROUGH EXISTING CONCRETE WALL FOR UTILITY, CONTRACTOR TO FIELD VERIFY EXISTING REINFORCING W/ CONCRETE WALL USING NON-DESTRUCTIVE METHODS. DO NOT CUT OR DAMAGE EXISTING REINFORCING. SEE MECHANICAL DRAWINGS FOR LOCATION.
13. TRENCH DRAIN - SEE MECHANICAL AND ARCHITECTURAL DRAWINGS. SEE TYPICAL DETAIL 12/D5502.



1 S101 FOUNDATION & FLOOR PLAN
3/16" = 1'-0"
0 4' 8' 12'

FOOTING SCHEDULE		
MARK	SIZE <varies>	REINFORCING <varies>
F3-0	3'-0" x 3'-0" x 1'-0"	(3) #5 EA WAY, BOTTOM
WF1-0	1'-0" WIDE x 1'-0" DEEP x CONTINUOUS	(2) #5 REBAR CONTINUOUS, BOTTOM
WF3-0	3'-0" WIDE x 1'-0" DEEP x CONTINUOUS	(3) #5 REBAR CONTINUOUS, BOTTOM

SEH

MADISON WATER UTILITY
CITY OF MADISON WATER UTILITY
119 E OLIN AVE
MADISON, WI 53713

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187818
Checked By	MRD, CMJ
Drawn By	ALM
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2022

REVISION SCHEDULE

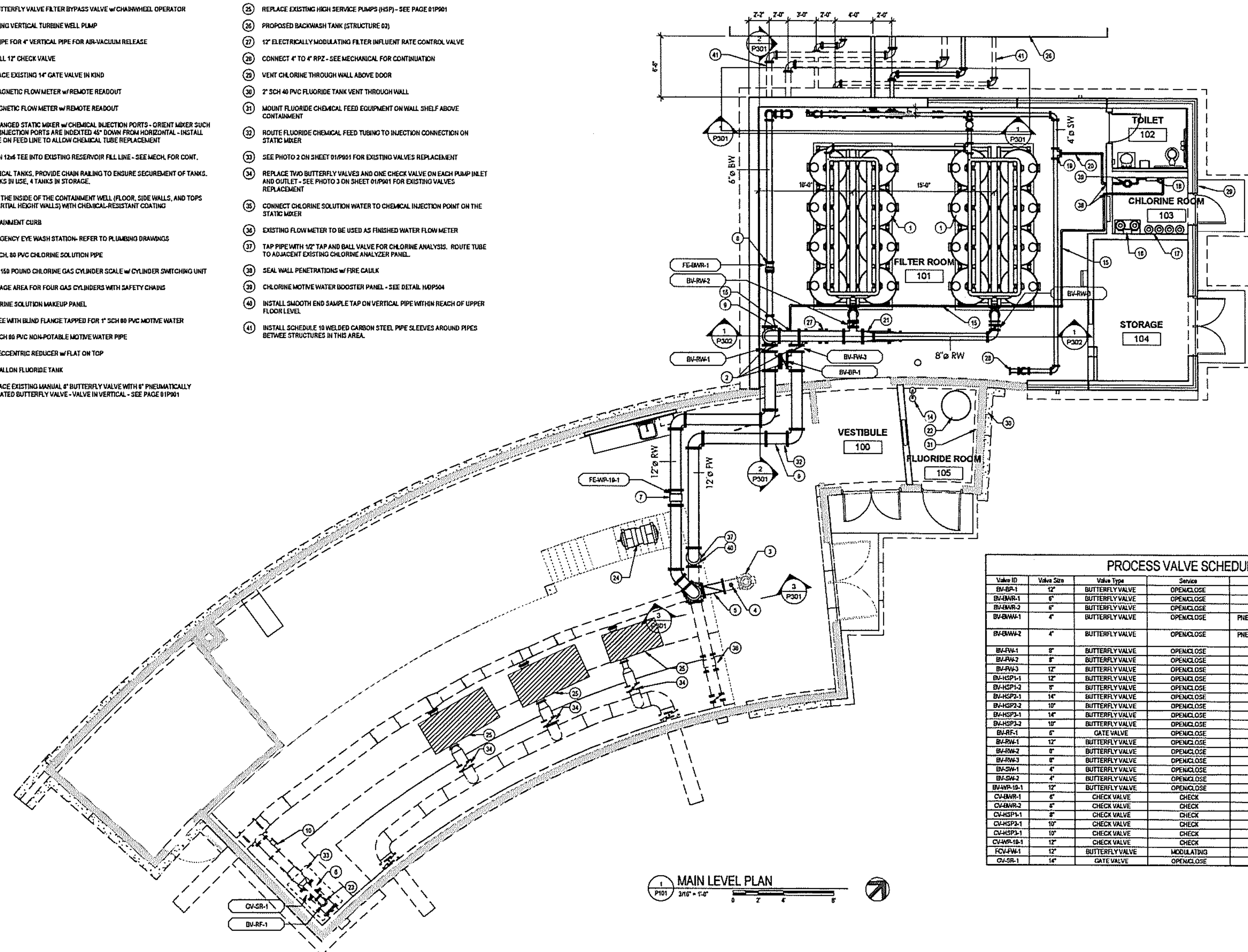
REV.#	DESCRIPTION	DATE

FOUNDATION & FLOOR PLAN

01
S101

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 8" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXTED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS. PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS. 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. COAT THE INSIDE OF THE CONTAINMENT WELL (FLOOR, SIDE WALLS, AND TOPS OF PARTIAL HEIGHT WALLS) WITH CHEMICAL-RESISTANT COATING
13. CONTAINMENT CURB
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH. 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x8 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 160 GALLON FLUORIDE TANK
23. REPLACE EXISTING MANUAL 8" BUTTERFLY VALVE WITH 8" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01P901
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01P901
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL H/0P504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEE STRUCTURES IN THIS AREA.



1 MAIN LEVEL PLAN
P101 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BP-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-RF-1	6"	GATE VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WP-19-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP2-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-WP-19-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

10/12/2023 3:25:38 PM

SEH

ORIGINAL

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: MG
Drawn By: LAP

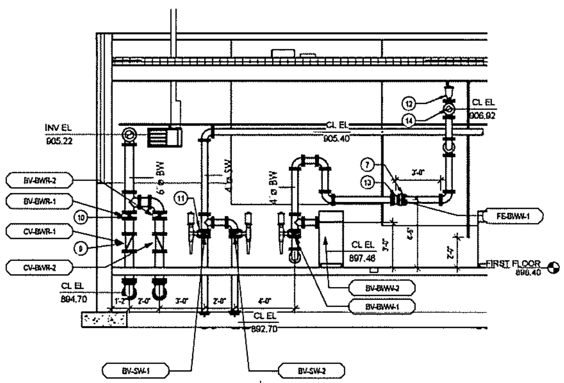
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

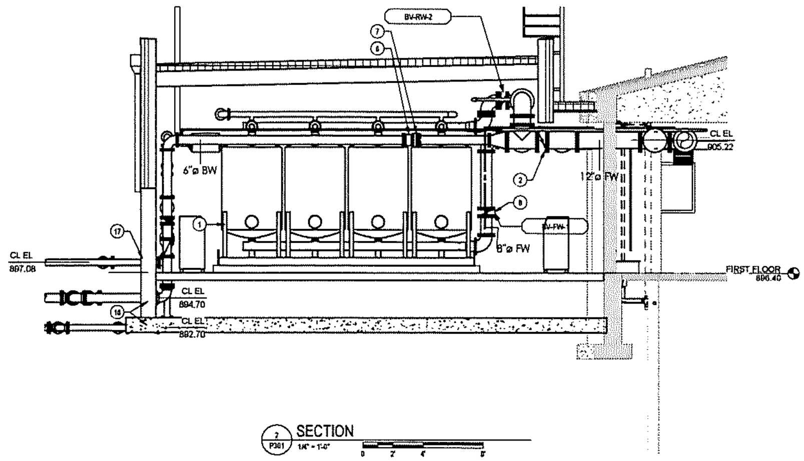
REV. #	DESCRIPTION	DATE

PROCESS PLAN

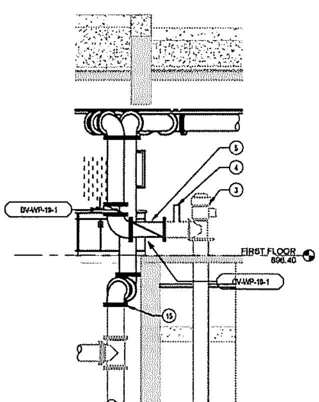
01
P101



1 SECTION P301 1/4" = 1'-0"



2 SECTION P301 1/4" = 1'-0"



3 SECTION P301 1/4" = 1'-0"

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
7. FLANGED COUPLING ADAPTER
8. 8" FILTER SHUTOFF BUTTERFLY VALVE w/ HANDWHEEL OPERATOR
9. 6" SWING CHECK VALVE
10. 6" PLUG VALVE w/ LEVER OPERATOR
11. 4" PNEUMATICALLY OPERATED BUTTERFLY VALVE - TYP. FOR BACKWASH WASTE AND SPRAY WASH PIPES
12. AIR AND VACUUM RELIEF VALVE
13. 4" BACKWASH WASTE FLOW METER
14. CONTRACTOR TO VERIFY ELEVATION AFTER FILTER EQUIPMENT INSTALLED
15. CONNECT TO EXISITING 12" WELDED STEEL WELLHOUSE PIPING
16. CONSTRUCT 12" SQUARE BLOCKOUT IN FOUNDATION TO PASS PIPE THROUGH
17. FLxMJ WALL PIPE

10/10/2023 9:44:12 AM

SEH

ORIGINAL

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167918
Checked By: MS
Drawn By: LAP

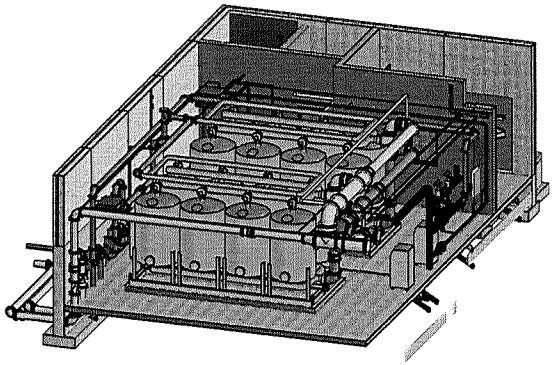
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

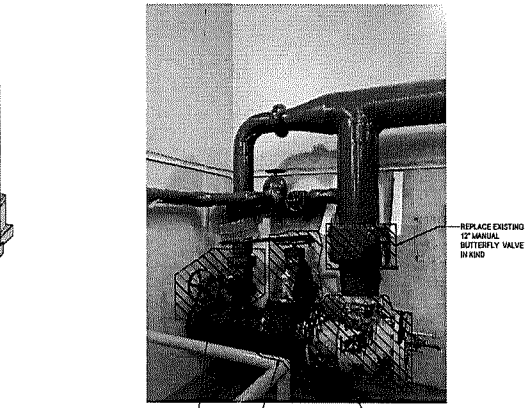
REV. #	DESCRIPTION	DATE

PROCESS SECTIONS

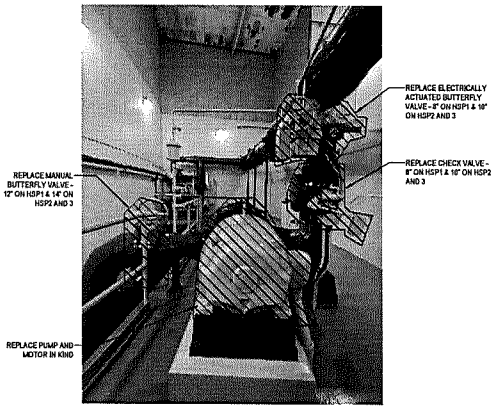
01
P301



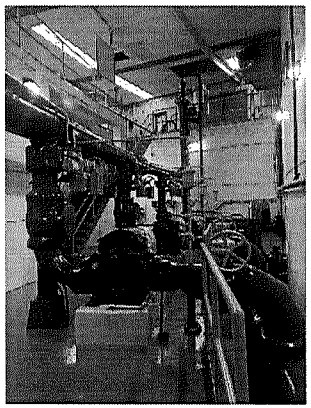
1 / P901 FILTER ISOMETRIC FOR REFERENCE ONLY
NOT TO SCALE



2 / P901 RESERVIOR FILL VALVE
NOT TO SCALE



3 / P901 HSP PUMP PHOTO -TYP. OF 3
NOT TO SCALE



SEE PHOTO 3/01/P901 FOR TYPICAL REPLACEMENT NOTES

4 / P901 THREE HSP'S PHOTO
NOT TO SCALE

10/10/2023 9:45:42 AM

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

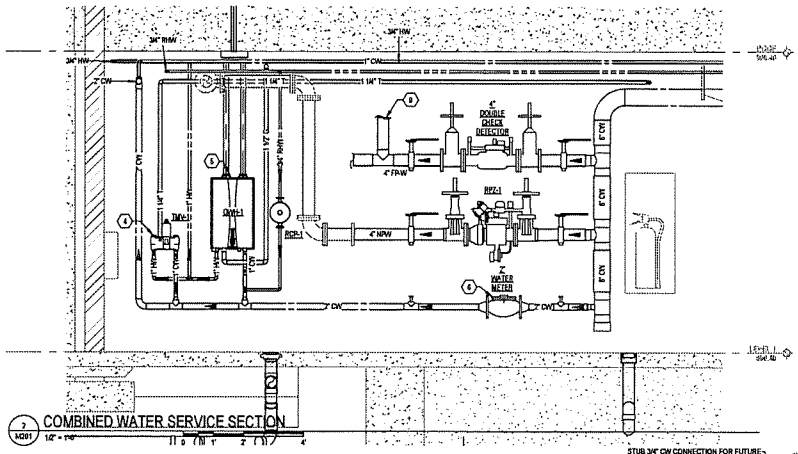
SEH Project	MADWU 181918
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
RECORD DOCUMENTS	OCTOBER, 2023

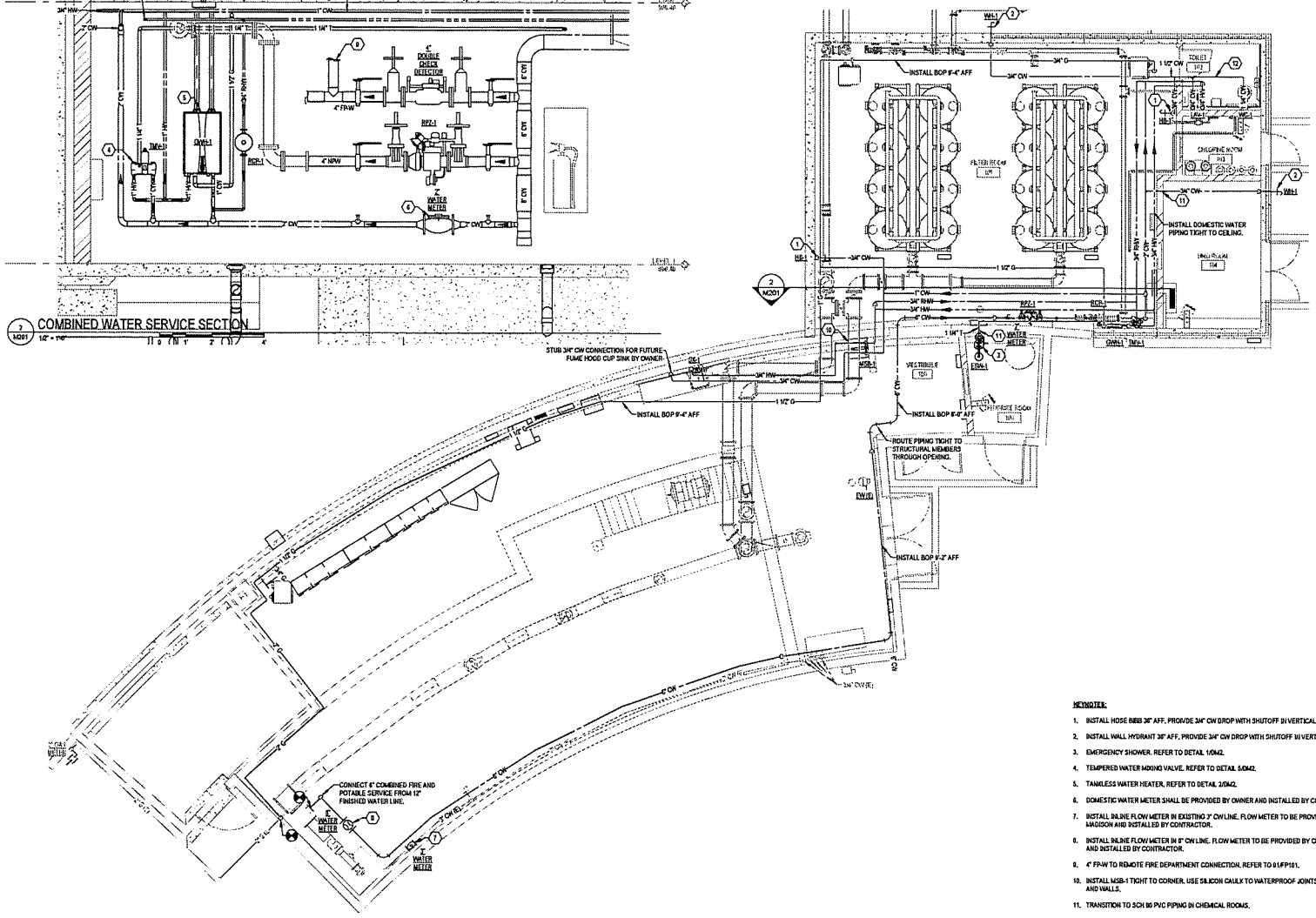
REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

PROCESS ISOMETRIC 3D VIEWS FOR REFERENCE ONLY

01
P901





KEYNOTES:

1. INSTALL HOSE BIBB 36" AFF. PROVIDE 3/4" CW DROP WITH SHUTOFF IN VERTICAL.
2. INSTALL WALL HYDRANT 36" AFF. PROVIDE 3/4" CW DROP WITH SHUTOFF IN VERTICAL.
3. EMERGENCY SHOWER. REFER TO DETAIL 1/DM2.
4. TEMPERED WATER MIXING VALVE. REFER TO DETAIL 5/DM2.
5. TANKLESS WATER HEATER. REFER TO DETAIL 2/DM2.
6. DOMESTIC WATER METER SHALL BE PROVIDED BY OWNER AND INSTALLED BY CONTRACTOR.
7. INSTALL INLINE FLOW METER IN EXISTING 3" CW LINE. FLOW METER TO BE PROVIDED BY CITY OF MADISON AND INSTALLED BY CONTRACTOR.
8. INSTALL INLINE FLOW METER IN 8" CW LINE. FLOW METER TO BE PROVIDED BY CITY OF MADISON AND INSTALLED BY CONTRACTOR.
9. 4" FPW TO REMOTE FIRE DEPARTMENT CONNECTION. REFER TO 01/FP101.
10. INSTALL MSB-1 TIGHT TO CORNER. USE SILICON CAULK TO WATERPROOF JOINTS BETWEEN MSB-1 AND WALLS.
11. TRANSITION TO SCH 80 PVC PIPING IN CHEMICAL ROOMS.
12. PROVIDE WATER HAMMER ARRESTOR PER SPECIFICATION SECTION 22 11 19.

1 M201 MAIN LEVEL DOMESTIC WATER AND GAS PLAN
3/16" = 1'-0"
0 4' 8' 12'

PROJECT NORTH

10/13/2023 8:47:11 AM

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

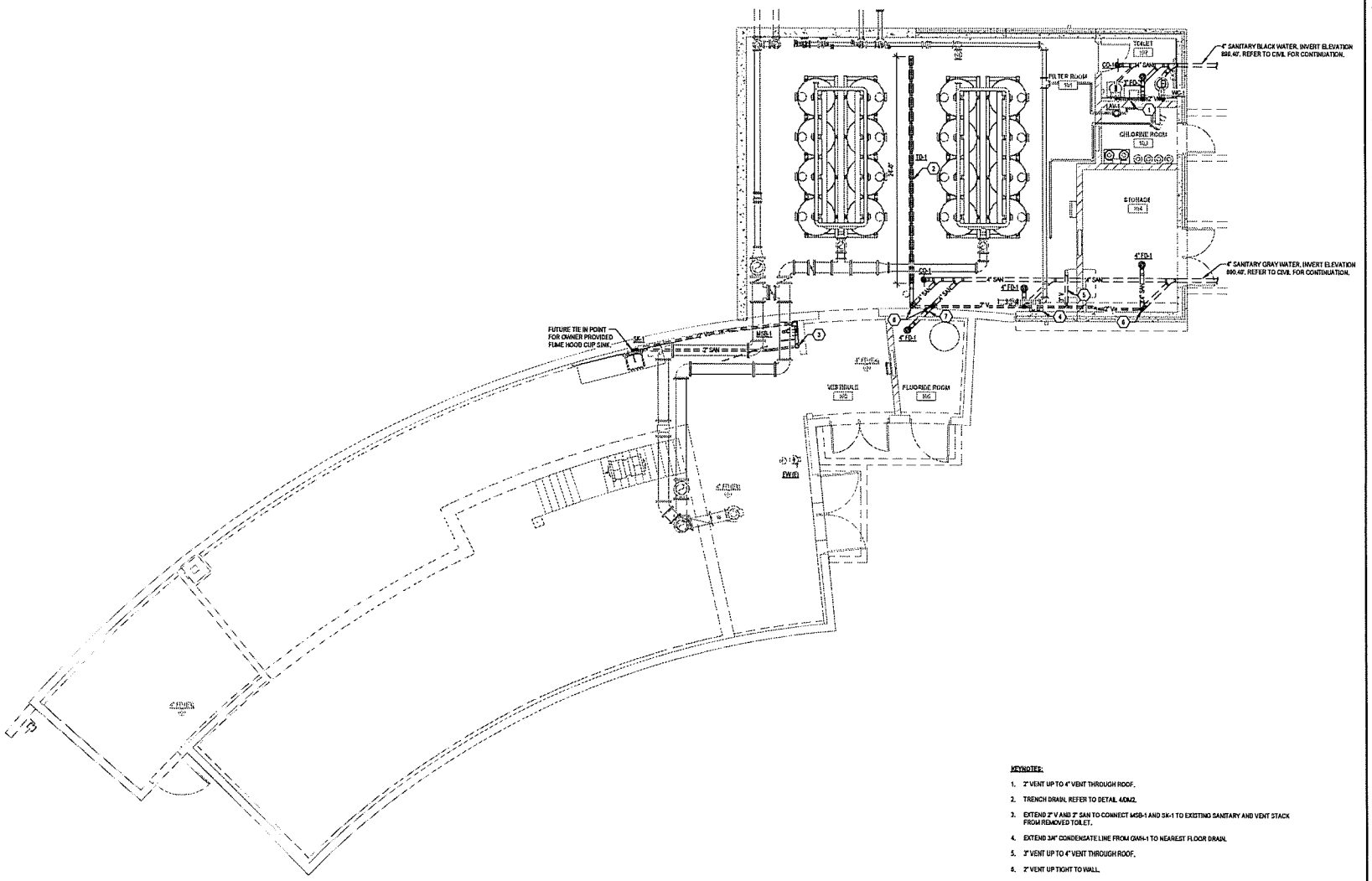
SEH Project	MADWU 187818
Checked By	MJB
Drawn By	DBJ
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

FIRST LEVEL DOMESTIC WATER AND GAS PLAN

01
M201



KEYNOTES:

1. 2" VENT UP TO 4" VENT THROUGH ROOF.
2. TRENCH DRAIN, REFER TO DETAIL 4/DM2.
3. EXTEND 2" V AND 2" SAN TO CONNECT MSB-1 AND SK-1 TO EXISTING SANITARY AND VENT STACK FROM REMOVED TOILET.
4. EXTEND 3/4" CONDENSATE LINE FROM CMH-1 TO NEAREST FLOOR DRAIN.
5. 3" VENT UP TO 4" VENT THROUGH ROOF.
6. 2" VENT UP TIGHT TO WALL.
7. CORE DRILL THROUGH EXISTING FOUNDATION WALL ABOVE TOP OF FOOTING.

1 M202 MAIN LEVEL SANITARY WASTE AND VENT PLAN
3/16" = 1'-0"
0 4' 8' 12'

PROJECT NORTH

10/17/2023 12:15 PM

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

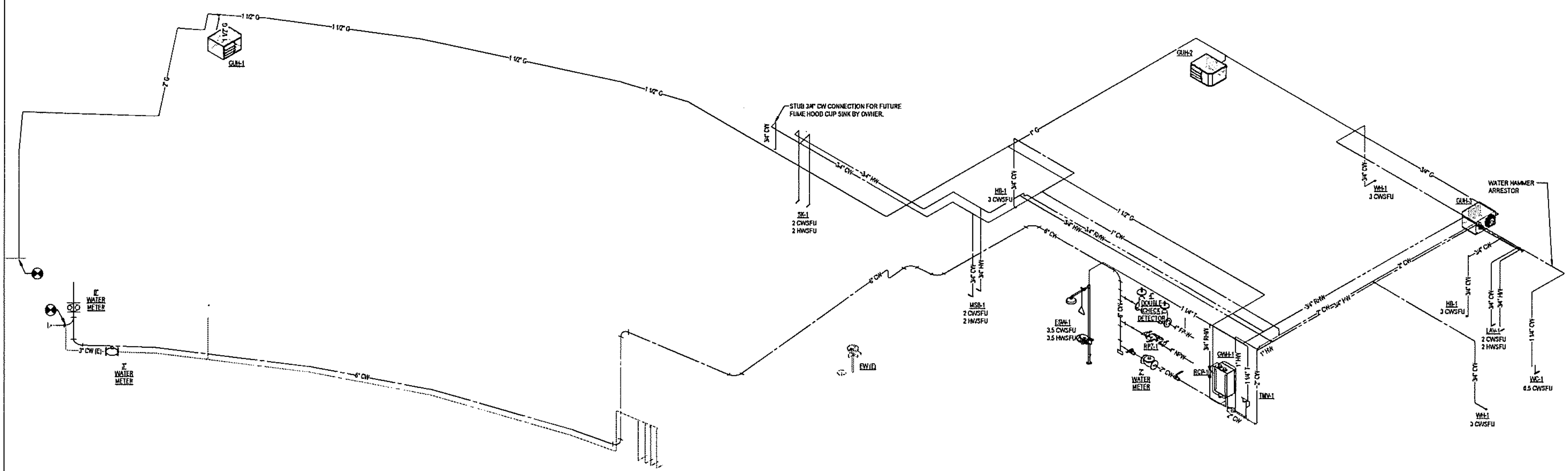
SEH Project	MADWU 167818
Checked By	MJB
Drawn By	GBJ
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

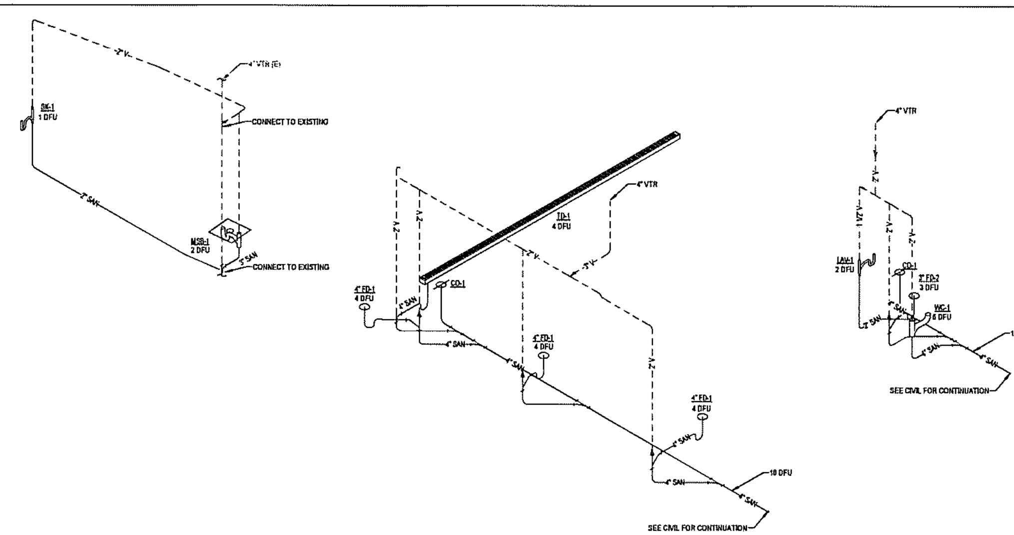
REV. #	DESCRIPTION	DATE

FIRST LEVEL SANITARY WASTE AND VENT PLAN

01
M202



1 M301 DOMESTIC WATER AND GAS RISER
NOT TO SCALE



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2 M301 SANITARY WASTE AND VENT RISER
NOT TO SCALE

SEH

ORIGINAL

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167819
Checked By	NJB
Drawn By	OBJ
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

RISER DIAGRAMS

01
M301

POWER GENERAL NOTES

A. PROVIDE HOUSE KEEPING PADS FOR ALL FLOOR AND GRADE MOUNTED ELECTRICAL EQUIPMENT, MINIMUM REQUIREMENTS: 6" HIGH, 4" WIDER AND LONGER THAN EQUIPMENT TO BE PLACED ON IT, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT GENERAL RECEPTACLE, ELECTRICAL EQUIPMENT, AND MECHANICAL EQUIPMENT LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

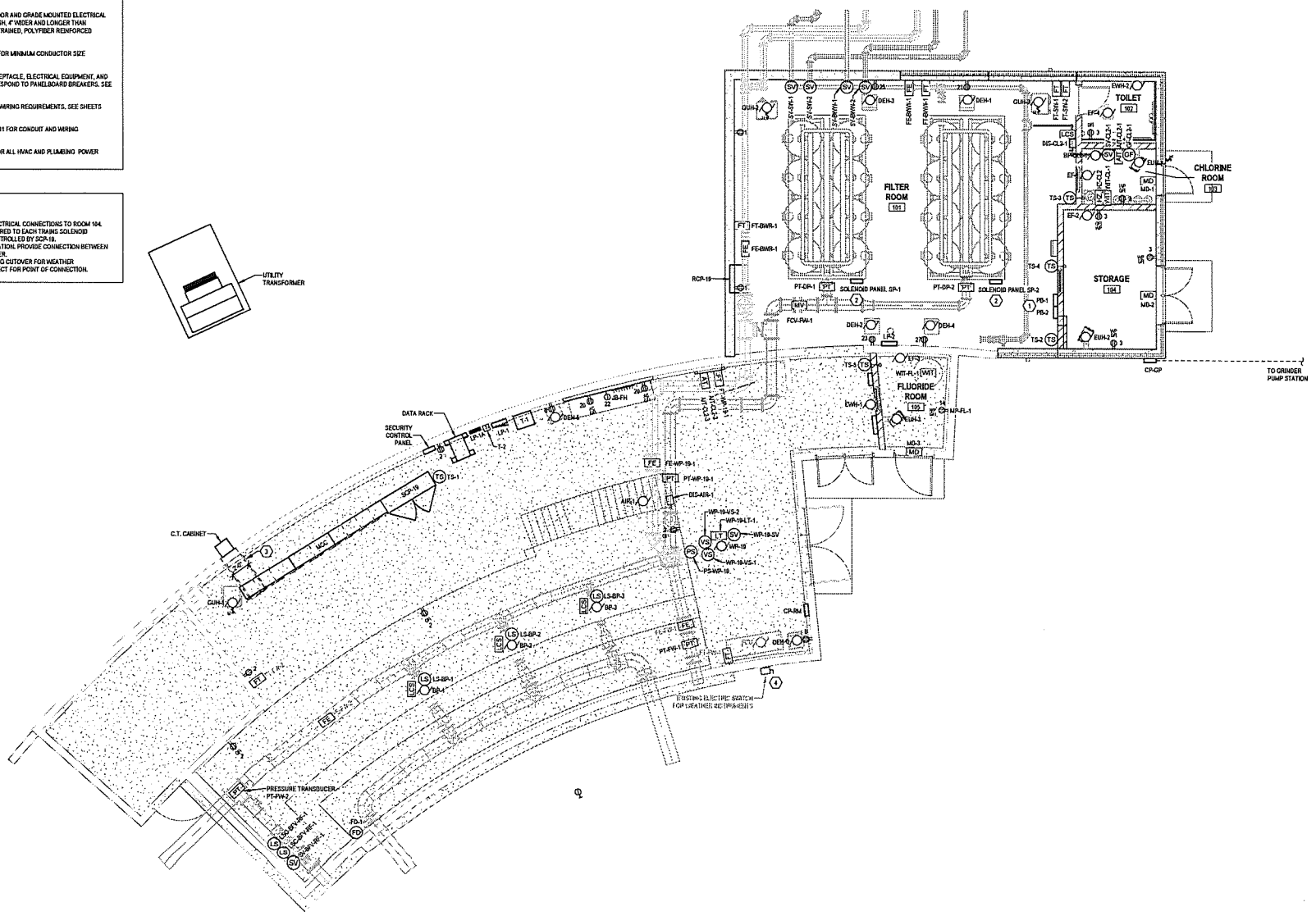
D. SEE ONE-LINE DIAGRAMS FOR CONDUIT AND WIRING REQUIREMENTS. SEE SHEETS E502, E503, AND E504.

E. SEE PANELBOARD SCHEDULES ON SHEET E701 FOR CONDUIT AND WIRING REQUIREMENTS.

F. SEE MECHANICAL PLANS AND SCHEDULES FOR ALL HVAC AND PLUMBING POWER REQUIREMENTS AND DETAILS.

KEYNOTES ⬡

1. PROVIDE TWO PULLBOXES FOR FUTURE ELECTRICAL CONNECTIONS TO ROOM 104.
2. FILTER TRAIN VALVE SOLENOIDS ARE PREWIRED TO EACH TRAINS SOLENOID TERMINATION PANEL. SOLENOIDS TO BE CONTROLLED BY SCP-19.
3. SEE DETAIL 6/E503 FOR DUCT BANK INSTALLATION. PROVIDE CONNECTION BETWEEN C.T. CABINET AND MCC MAIN CIRCUIT BREAKER.
4. PROVIDE TEMPORARY UTILITY POWER DURING CUTOVER FOR WEATHER INSTRUMENTATION. USE EXISTING DISCONNECT FOR POINT OF CONNECTION.



E301 POWER PLAN
3/16" = 1'-0"
0 4' 8' 12'

10/17/2023 11:48:48 AM

SEH

ORIGINAL

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

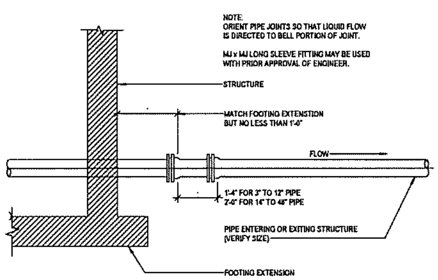
SEH Project	MADWU 167818
Checked By	CSW
Drawn By	DDH
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

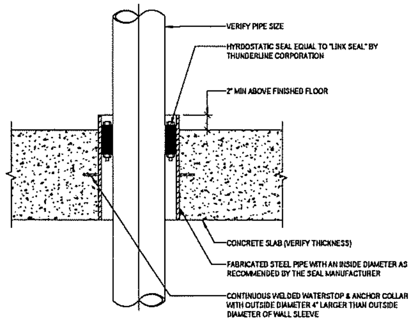
REV. #	DESCRIPTION	DATE

POWER PLAN - WELLHOUSE 19

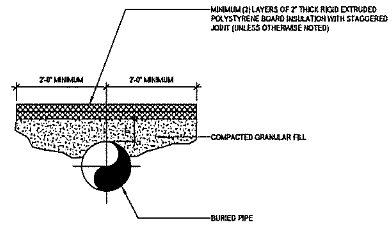
01
E301



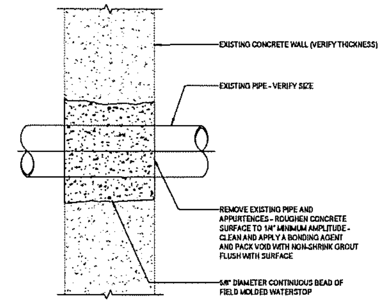
A DP502 PIPE CONNECTION - TYPE 2 DETAIL



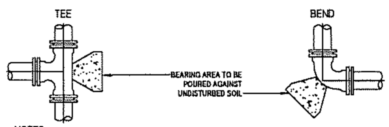
B DP502 SEALED FLOOR SLEEVE DETAIL



C DP502 PIPE INSULATION DETAIL



D DP502 EXISTING PIPE OPENING PATCH DETAIL



NOTES:

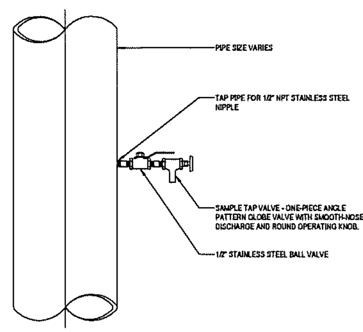
1. PLACE BETWEEN FITTING AND UNDISTURBED TRENCH WALL
2. MINIMUM THICKNESS: 12 INCHES
3. MINIMUM AREA IN SQUARE FEET SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

THRUST BLOCKING

PIPE SIZE	TEE OR PLUG	1/4 BEND	1/32 AND 1/8 BEND	1/16 BEND
6"	2.9	3.1	1.6	0.8
8"	3.7	5.3	2.9	1.4
10"	5.7	8.1	4.4	2.2
12"	8.1	12.4	6.6	3.2
16"	15.1	21.4	11.6	5.9
20"	23.2	30.2	18.1	9.3
24"	33.6	48.5	26.1	13.3

4. SIZE BLOCKING BASED ON LARGER PIPE
5. VERIFY THAT BOLTS ARE ACCESSIBLE AFTER CONCRETE IS POURED

E DP502 CONCRETE THRUST BLOCKING DETAIL



F DP502 SAMPLE TAP-1

10/19/2023 10:21:59 AM

SEH

ORIGINAL

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

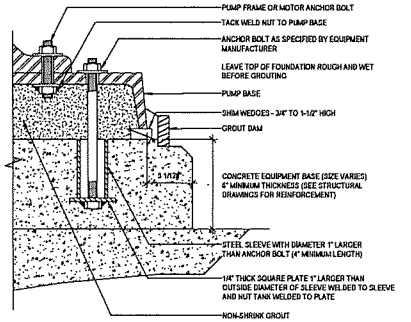
SEH Project	MADWU 167818
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

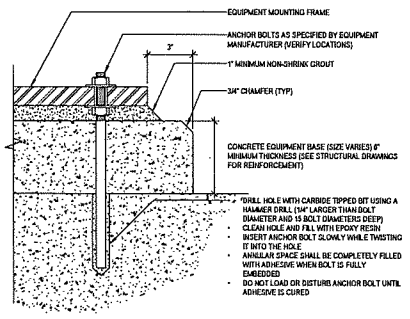
REV. #	DESCRIPTION	DATE

PROCESS PIPING DETAILS

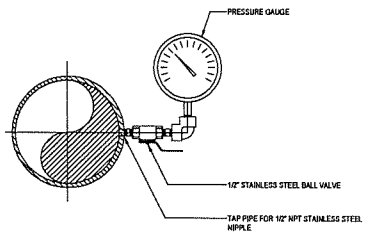
DP502



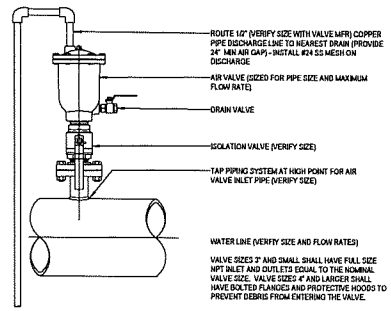
A DP504 PUMP BASE DETAIL



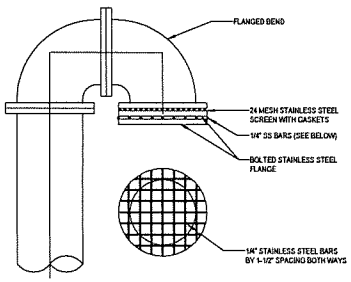
B DP504 EQUIPMENT BASE DETAIL



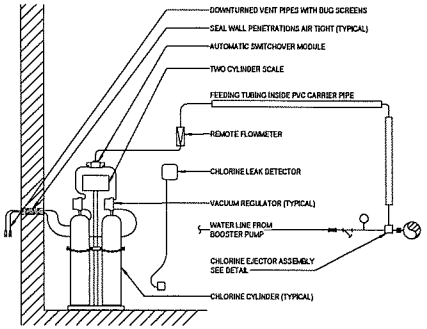
C DP504 AIR PIPE PRESSURE GAUGE DETAIL



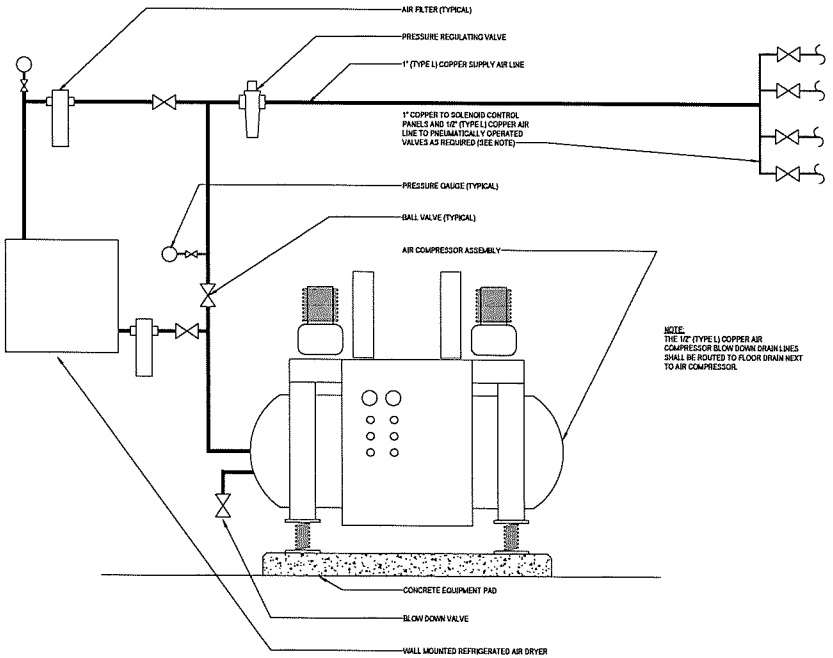
D DP504 AIR RELEASE VALVE DETAIL



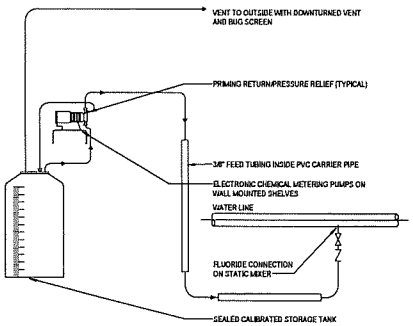
E DP504 VENT SCREEN DETAIL



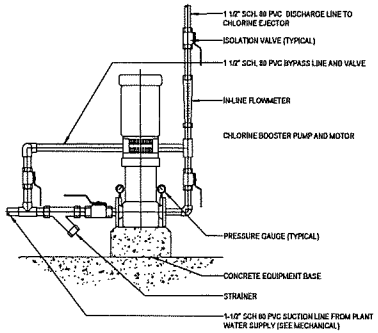
F DP504 CHLORINE GAS FEED SYSTEM-2



I DP504 AIR COMPRESSOR/DRYER ASSEMBLY



G DP504 FLUORIDE FEED SYSTEM



H DP504 CHLORINE BOOSTER PUMP

13/10/2023 10:22:32 AM

SEH

ORIGINAL

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167818
Checked By MS
Drawn By LAP

Project Status BIDDING DOCUMENTS
Issue Date OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

MISCELLANEOUS PROCESS DETAILS

DP504

Madison
Water Utility

www.madisonwater.org - 119 East Olin Avenue, Madison, WI 53713-1431 - TEL 608.266.4651 - FAX 608.266.4426

December 8, 2023

NOTICE OF ADDENDUM
ADDENDUM 6

CONTRACT NO. 9289
PROJECT NO. 10448
UNIT WELL 19 TREATMENT SYSTEM ADDITION

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

1. **Changes to SPECIFICATIONS:**

   a. Section 00 01 10 Table of Contents, REPLACE in its entirety.
   b. Section 33 28 31 Vertical Turbine Pump and Motor, ADD in its entirety.
   c. Section 43 21 13 Horizontal Split Case Centrifugal Pumps, REPLACE in its entirety.

2. **REPLACE the following DRAWINGS in their entirety:**

   a. 01 P101-Process Plan
   b. 01 P301-Process Sections
   c. 01 P901-Process Isometric 3D Views For Reference Only
   d. 01 E070-Removal Plan
   e. 01 E201-Lighting Plan
   f. 01 E301-Power Plan
   g. 01 E502-One-Line Diagram
   h. 01 E602-Schematics
   i. 01 E701-Schedules
   j. DE03-Details

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.

12/8/2023

Pete Holmgren, PE
Chief Engineer – Madison Water Utility

DOCUMENT 00 01 10

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SECTION 33 28 31

VERTICAL TURBINE PUMP AND MOTOR

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install one new vertical turbine motor on the existing well pump and motor mount/discharge head.

B. Disassembly, removal, and installation or connection of all necessary appurtenances that are associated with the Work, including but not limited to the following:
   1. Well discharge piping.
   2. Motor
   3. Electrical instrumentation equipment, piping, and wiring.
   4. Pre-lube piping.
   5. Seal drain piping.
   6. Well level instrumentation measurement devices.
   7. Any other appurtenances that are replaced, relocated, or temporarily removed.
   8. Coordination with the Owner for removal and reinstallation of the well pump and discharge head.
      a. Work by Others: Owner will remove the discharge head and well pump from the well, after the Contractor has disconnected the necessary items and removed the motor. Owner will reinstall the well pump and discharge head after inspection and repairs.

C. Related Sections:
   1. 01 12 16 Work Sequence
   2. 01 75 00 Starting and Adjusting
   3. 09 97 21 Coating systems for Water Treatment Facilities
   4. 26 05 10 Motors
   5. 40 23 00 Process Piping General Provisions
   6. 40 23 10 Process Water and Waste Piping
   7. 40 23 30 Process Piping Specialties
   8. 40 23 50 Process Piping Testing, Adjusting, and Disinfection
   9. 40 90 00 Control System Functional Descriptions
   10. 40 90 19 Instrumentation

1.02 EXISTING SYSTEM DESCRIPTION

A. Existing Well Pump:
   1. The existing well pump is Goulds Model: VIF-WS, Size: 14RJHC 4 Stage(s).
   2. Water lubricated open line shaft vertical hollow shaft turbine pump.
   3. Maximum no-load pump speed: 1,800 RPM.
   4. Specified Flow: 2200 GPM.
   5. Specified Head: 292 FT.
   6. Efficiency at Design: 85%
   7. To be removed and replaced by Owner.

B. Existing discharge head to be re-installed by Owner.

C. Existing Motor to be replaced by Contractor.

D. See Drawings for photo details.

1.03 SUBMITTALS

A. Comply with Section 01 33 00.

B. Submit Product Data which includes the following for each item furnished:
   1. Manufacturer, motor size and model number.
   2. Component materials.
   3. Detailed specifications
   4. Detailed assembly drawings and dimensions.
   5. Motor specifications.

C. Provide Operation and Maintenance manuals in accordance with Section 01 78 23.

1.04 GENERAL REQUIREMENTS

A. Motor equipment materials, construction features and performance specified herein are considered minimum requirements. Manufacturers shall incorporate specified requirements into standard products to fully conform to Specifications.

B. Contractors are advised that due to manufacturer's variations in equipment design, changes from Drawings in piping arrangement and layout, electrical and control circuitry, and related dimensions of equipment foundation and anchorage details may be required for equipment installations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Motor:
   1. U.S.
   2. General Electric.
   3. Westinghouse.

2.02 EQUIPMENT

A. Motor:
   1. Requirements:
      a. Suitable for mounting on existing pump discharge head.
      b. Vertical, solid shaft
      c. High efficiency electric.
      d. Code G, or better.
      e. Premium Efficiency, Inverter Duty
      f. Weather-protected, Type 1 enclosure.
      g. Rated for 200 HP.
      h. Maximum no load speed: 1,800 RPM.
      i. Non-reverse ratchet.
      j. Locate thrust bearing in top of unit.
      k. Motors shall have oversized terminal boxes.
      l. Exterior finish: Factory primed using two-part Tnemec N69 or Sherwin-Williams Macropoxy 646 epoxy paint.
   2. Characteristics:
      a. 3-phase.
      b. 60 Hz.
      c. 480 Volt.
   3. Comply with Section 26 05 10.

B. Instrumentation:
   1. Requirements:
      a. Pressure switch.
      b. Pre-lube solenoid.
      c. Pressure transducer.
      d. Vibration switches.

2. Comply with Section 40 90 00 and 40 90 19.

2.03 TOOL, SUPPLIES, AND SPARE PARTS

A. The Contractor shall furnish all special tools necessary to provide routine maintenance of the equipment.

B. The Contractor shall furnish all recommended lubricating oils and grease for start-up and initial operation.

C. The manufacturer shall submit a list of no less than four manufacturer's standard lubricants which may be used interchangeably for each type of lubricant required. Lubricants shall be NSF 61 approved.

PART 3 EXECUTION

3.01 INSTALLATION

A. Motor shall be installed on existing discharge head in accordance with manufacturer's requirements.

B. Motor oil shall be added upon installation.

C. The manufacturer and grades of oil and grease shall be in accordance with the manufacturer's recommendations and requirements.

D. Pump seal water plumbing:
   1. Install seal water discharge line assemblies between the pump seals.
   2. Install 3/4-inch discharge head drain lines between the discharge heads and the trench drain.
   3. Route lines in horizontal and vertical runs true to the lines of the pump, piping, and building.

E. Install instrumentation devices on the well head and discharge line including valves, piping, and electrical connections:
   1. Pressure switch.
   2. Pressure transducer.
   3. Pre-lube solenoid, piping, and valves.
   4. Vibration switches.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:
   1. Supervise motor installation.
   2. Inspect and approve final installation.
   3. Perform all necessary calibration and adjustments in accordance with manufacturer's recommendations.
   4. Coordinate start-up with installation of related equipment.

3.03 SYSTEM AND EQUIPMENT START-UP

A. Conform to the requirements of Section 01 75 00.

B. Provide written certification that check-out services have been completed and 1 week notice prior to start-up and demonstration.

C. Place various items of equipment into operation, along with related piping and control systems, at times acceptable to Owner. After satisfactory start-up of these systems and their related equipment, they will remain in continuous or intermittent operation as required by the Owner.

D. All equipment and accessories shall be adjusted and calibrated prior to any start-up and any equipment placed into temporary operation prior to Final Completion of the total Project shall be readjusted and/or recalibrated as necessary.

E. Contractor shall supervise, control, and be responsible for operation and maintenance of new equipment and/or systems during start up.

F. No system start-ups will be held on holidays, Fridays, weekends, or the day before a holiday.

3.04 DEMONSTRATION AND TRAINING

A. Provide factory trained serviceman to instruct the Owner's personnel in the proper operation and maintenance of the equipment and certify to the Engineer that motors and accessories are installed and operating properly.

B. Following completion of successful equipment start-up, the Contractor shall arrange for a factory representative and installer of each operating piece of 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.

C. For each piece of operating equipment, the factory representative and installer shall provide two separate training sessions to the Owner's operations and maintenance staff. The two training sessions shall be separated in time by at least 1 week (7 days) and shall be arranged to meet the schedules of the Owner's operations and maintenance staff.

D. Each training session shall be inclusive of a minimum 4 hours on-site instructional time. All travel time and costs necessary to perform each training session shall be considered as additional and incidental to four hours of on-site instructional training time.

E. The training session time shall be separate and distinct from the time spent on equipment start-up.

F. Contractor shall coordinate the schedule for each training session a minimum of 2 weeks (14 days) ahead of schedule.

G. All final copies of the Operation & Maintenance manuals for each piece of operating equipment shall be delivered to the Engineer a minimum of 1 week (7 days) prior to scheduling the initial training session.

H. At a minimum, each training session shall include the following:
   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.

I. Prepare and insert additional data in operations and maintenance manuals if need for additional data becomes apparent during instructions.

END OF SECTION

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SECTION 43 21 13

HORIZONTAL CENTRIFUGAL SPLIT CASE PUMPS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes the furnishing and installation of horizontal split case centrifugal pumps, motor, mounting bases, anchor bolts, and appurtenances necessary for satisfactory operation.

B. Pump shall be installed in lay length provided at the location of the existing booster pumps.
   1. The connections to the existing suction and discharge pipes at each pump location (3 pumps), requires the Contractor to perform work prior to ordering the pumps, in order to verify that the suction and discharge piping can be adapted to match the suction and discharge sizes on the new pumps. Prior to ordering pumps, the Contractor shall visit the site and verify existing conditions and pipe sizes and lay lengths and all conditions for the new pumps. If increasing or decreasing pipe fittings are required, the supply and installation of those fittings will be considered incidental to the complete installation of each pump. See drawings for additional detail.

C. Related Sections:
   1. Section 09 91 50 - Shop Painting
   2. Section 26 29 24 - Variable Frequency Drives

1.02 PERFORMANCE REQUIREMENTS

A. Liquid Temperature Range: 40-70 degrees F.

B. Meet or exceed the operating condition requirements listed at the end of this section.

C. NSF 61/372 compliant.

D. Performance Requirements.
   1. Small Booster Pump (QTY1):
      a. Design basis:
         1) Fairbanks Morse 1824 single-stage, split-case, horizontal centrifugal pump.
         2) Impeller: 444A329.
         3) Suction: 6-inch.
         4) Discharge: 5-inch.
         5) Speed: 1800 rpm.
      b. Design Condition:
         1) Full speed (1775 rpm).
         2) Provide 1,400 gpm against a total dynamic head of ~~175~~ **200** feet.
         3) Minimum efficiency at this speed = ~~77~~ **73** percent.
         4) Minimum shut-off head: 210 feet.
         5) Runout flow: 1,950 gpm at 120 feet.
   2. Large Booster Pumps (QTY 2):
      a. Design Basis
         1) Fairbanks Nijhuis ~~1823~~ 2824C single-stage, split case, horizontal centrifugal pump.
         2) Impeller: 444R330.
         3) Suction: 8-inch.
         4) Discharge: 6-inch.
         5) Speed: 1800 rpm.
      b. Design Condition:
         1) Full speed ~~on~~ (1775 rpm).
         2) Provide 2,100 gpm against a total dynamic head of ~~175~~ **200** feet.
         3) Minimum efficiency at this speed = ~~81~~ **78** percent.

4) Minimum shut-off head: 215 feet.
5) Runout flow: 2900 gpm at 105 feet.

1.03 SUBMITTALS

A. Product Data:
1. Preliminary characteristic performance curves.
2. List of pump components and materials.

B. Shop Drawings:
1. Pump schematic.
2. Component sizes and dimensions.
3. Field measurements of existing piping conditions including available space between pipe flanges to remain.

C. Test Reports: Certified factory H.I. performance test results for pumps to be provided prior to shipping.

D. Manufacturer's Operation and Maintenance Instructions.

E. Close-out:
1. Performance test results from installed units.
2. Provide within 7 days of field testing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fairbanks Morse, Kansas City, KS

B. Approved equal.

2.02 EQUIPMENT

A. High Service Pump Schedule
1. High Service Pump No. 1: HSP-1.
2. High Service Pump No. 2: HSP-2.
3. High Service Pump No. 3: HSP-3.

B. General Requirements:
1. Split case centrifugal pump with shaft in the horizontal orientation.
2. Quantity: three (3).
3. NSF 61 and NSF 372 Listed to comply with the Reduction of Lead in Drinking Water Act.
4. Maximum Speed: 1800 rpm.
5. Rated Motor Horsepower: (QTY 1) Small Booster:~~100~~ **125** HP; (QTY 2) Large Boosters: ~~125~~ **150** HP.
6. Power Supply: 480V, 3-phase, 60 Hz.
7. Acceptable Pumps:
   a. Fairbanks Morse Pump
      1) Size: 5-inch 1824 (QTY 1); and 6-inch 1823 (QTY 2).
      2) Maximum pressure: 250 psig.
   b. Other pumps are acceptable only if they meet all the requirements of this specification and with prior approval by Engineer.

C. Materials
1. Casing: Cast iron (ASTM A48.)
2. Impeller (for use with chlorinated water above 2 PPM): Alpha Nickel Aluminum Bronze or 316 Stainless Steel.
3. Shaft Sleeve: 316 stainless steel.

4. Shaft: Steel AISI C1045.
5. Casing Wear Ring: 416 stainless steel.
6. Impeller Wear Ring: 316 stainless steel.
7. Base Plate: Structural steel or cast iron.

D. All pumps furnished under this section shall be provided by the same manufacturer.

2.03 COMPONENTS

A. Casing:
1. Horizontal split cast design.
2. Flange Connections: ANSI 125 pound rated.
3. Tapped and plugged holes for priming and draining. Furnish and install a 0.75-inch air release valve installed in a provided tap in the top of the volute of each casing, to facilitate air removal from the water column. See Section 40 23 20 for Air Release Valve requirements. Install with isolation ball valve. Route discharge per the air release detail and provide stainless steel screen.
4. Provide for removal of the rotating element without disconnecting the suction or discharge piping.
5. Furnish lower half of casting with cored passageways from the high-pressure area of the volute to each seal box for positive lubrication without the use of external flushing lines.
6. Integrally cast bearing arms with lower half of casing to ensure positive bearing alignment.
7. Bolt-on bearing arms are not acceptable.

B. Impeller:
1. Enclosed type, vacuum cast in one piece.
2. Dynamically balanced.
3. Key to shaft.
4. Exterior Finish: Turned.
5. Interior Finish: Finished smooth, free of burrs, trimmings, and irregularities.

C. Shaft Sleeves:
1. Seal sleeve to impeller hub by means of an O-ring.
2. Positively drive sleeve to the keyway.
3. Fasten the sleeve to the shaft by means that the manufacturer recommends.

D. Shaft Seal: Mechanical, Type 21.

E. Shaft:
1. One piece, finished and polished on all sections.
2. Length: Shortest practicable distance between bearings to minimize deflection and vibration.
3. Maximum Allowable Deflection: 0.002 inches at any point on the pump operating curve.

F. Casing Wearing Ring:
1. Radial type.
2. Press fit into casing.

G. Bearings:
1. Regreasable lubrication ball type.
2. Average Life: 100,000 hours.
3. Radial Loads: Provide single row inboard bearings.
4. Thrust Loads: Provide double row outboard bearings.
5. Mount bearings in moisture and dust proof machined housing.
6. Housing:
   a. Registered fits to ensure alignment.
   b. Pinned, to prevent rotation.
   c. Bolt to bearing arms.
7. Supply each housing with grease fitting and plugged relief port.

H. Coupling:
1. Provide flexible coupling to connect pump and motor shaft.

2. All metal type with flexible rubber insert.
3. Enclose entire rotating coupling element by means of a coupling guard.

I. Base Plate:
1. Mount pump and motor on:
   a. Groutable steel base plate.
   b. Steel drip rim base plate.
2. Incorporate integral drip channels on each side.
3. Provide NPT connection and plug for each channel.
4. Capable of supporting pump and motor without the use of additional supports or members.

J. Nameplate:
1. Mount permanent nameplate in a prominent location on the pump.
2. Include the following information:
   a. Manufacturer's name.
   b. Serial number.
   c. Pump design characteristics.

K. Motors:
1. NEMA configuration.
2. Premium efficiency.
3. Totally enclosed, fan-cooled.
4. Design for normal starting torque and low starting current.
5. Size: Sufficient to operate pump from shutoff head to open discharge without operating in the motor service factor.
6. Horsepower Rating: Sufficient to operate pump at any point on the head-capacity curve without overloading the nameplate horsepower rating of the motor, regardless of service factor.
7. Class F thermostat, one per phase.
8. Motor shall be inverter duty, 10:1 turndown (6-60 Hz), and meeting NEMA MG1 Part 31.
9. Manufacturers:
   a. US Motors.
   b. Marathon.
   c. WEG.
   d. Baldor.

L. Shop Coatings: Coat pump and base in accordance with Section 09 91 50.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install pump in accordance with manufacturer's recommendations.

3.02 FIELD QUALITY CONTROL

A. Field Testing:
1. Conduct test of the pumping equipment in the presence of the Engineer.
2. Testing Period: One hour minimum, or longer as may be required to determine compliance with the specifications.
3. Provide all power, gages, measurement devices, and other apparatus required for the testing.
4. Remove all testing equipment upon completion of testing.
5. Provide copies of all test data and results to Owner and Engineer.
6. Resulting pump capacities shall be within 5 percent of the previously supplied certified curves.
7. Replace or rework pumping equipment or components which fails to meet the specified requirements.

B. Manufacturer's Field Services: Check pumps and motors for alignment (using laser alignment device) after installation and prior to field testing.

3.03 DISINFECTION

A. Disinfect all water contact surfaces prior to placement in service.

B. Disinfectant: 200 ppm chlorine solution or dusting chlorine compound per AWWA C654.

3.04 DEMONSTRATION

A. Provide minimum of 4 hours of operator training after pumps are in service.

END OF SECTION

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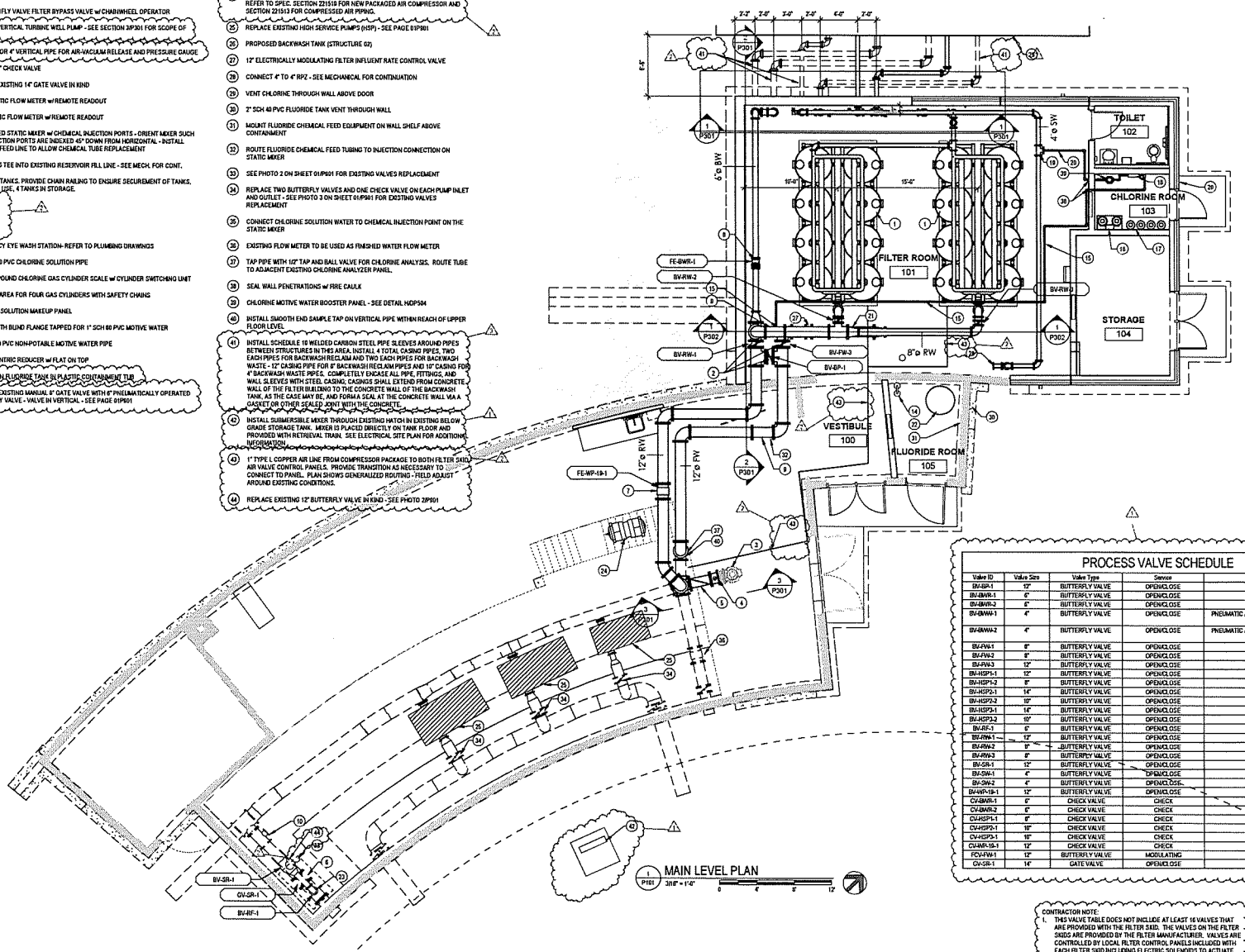
KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP - SEE SECTION 2/P301 FOR SCOPE OF WORK
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE AND PRESSURE GAUGE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 8" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS. PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS. 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. NOT USED
13. NOT USED
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH. 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x6 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 100 GALLON FLUORIDE TANK IN PLASTIC CONTAINMENT TUB
23. REPLACE EXISTING MANUAL 8" GATE VALVE WITH 8" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01/P501
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS - REFER TO SPEC. SECTION 221513 FOR NEW PACKAGED AIR COMPRESSOR AND SECTION 221313 FOR COMPRESSED AIR PIPING.
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01/P301
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P501 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P501 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL HDP504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEEN STRUCTURES IN THIS AREA. INSTALL 4 TOTAL CASING PIPES, TWO EACH PIPES FOR BACKWASH RECLAIM AND TWO EACH PIPES FOR BACKWASH WASTE - 12" CASING PIPE FOR 8" BACKWASH RECLAIM PIPES AND 10" CASING FOR 4" BACKWASH WASTE PIPES. COMPLETELY ENCASE ALL PIPE, FITTINGS, AND WALL SLEEVES WITH STEEL CASING. CASINGS SHALL EXTEND FROM CONCRETE WALL OF THE FILTER BUILDING TO THE CONCRETE WALL OF THE BACKWASH TANK, AS THE CASE MAY BE, AND FORM A SEAL AT THE CONCRETE WALL VIA A GASKET OR OTHER SEALED JOINT WITH THE CONCRETE.
42. INSTALL SUBMERSIBLE MIXER THROUGH EXISTING HATCH IN EXISTING BELOW GRADE STORAGE TANK. MIXER IS PLACED DIRECTLY ON TANK FLOOR AND PROVIDED WITH RETRIEVAL TRAIN. SEE ELECTRICAL SITE PLAN FOR ADDITIONAL INFORMATION.
43. 1" TYPE L COPPER AIR LINE FROM COMPRESSOR PACKAGE TO BOTH FILTER SKID AIR VALVE CONTROL PANELS. PROVIDE TRANSITION AS NECESSARY TO CONNECT TO PANEL. PLAN SHOWS GENERALIZED ROUTING - FIELD ADJUST AROUND EXISTING CONDITIONS.
44. REPLACE EXISTING 12" BUTTERFLY VALVE IN KIND - SEE PHOTO 2/P501



1 P101 MAIN LEVEL PLAN 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BP-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RF-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SR-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WP-19-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP2-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-MR-19-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

CONTRACTOR NOTE:
1. THIS VALVE TABLE DOES NOT INCLUDE AT LEAST 16 VALVES THAT ARE PROVIDED WITH THE FILTER SKID. THE VALVES ON THE FILTER SKIDS ARE PROVIDED BY THE FILTER MANUFACTURER. VALVES ARE CONTROLLED BY LOCAL FILTER CONTROL PANELS INCLUDED WITH EACH FILTER SKID INCLUDING ELECTRIC SOLENOIDS TO ACTUATE AIR ACTUATORS WITHIN THE FILTER CONTROL PANELS.
2. FIELD ROUTE 1/2" TYPE L COPPER AIR LINE FROM MAIN 1" COMPRESSOR LINE TO EACH OF THE FIVE PNEUMATIC ACTUATORS ON VALVES BV-BWW 1, BV-BWW2, BV-RF-1, BV-SW-1, AND BV-SW-2.

SEH

REVISED

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2505 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187918
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2022

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 3	11/28/2022
2	ADDENDUM NO. 5	12/08/2022
3	ADDENDUM NO. 6	12/16/2022

PROCESS PLAN

01
P101

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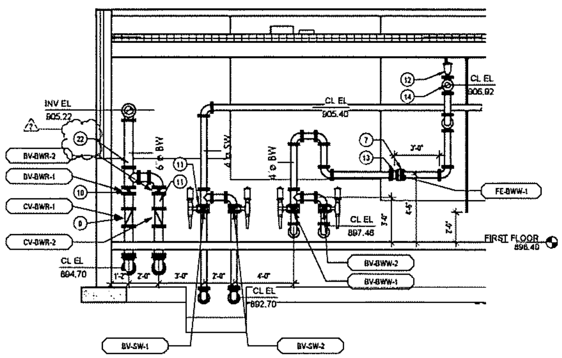

SECTION 1/P301
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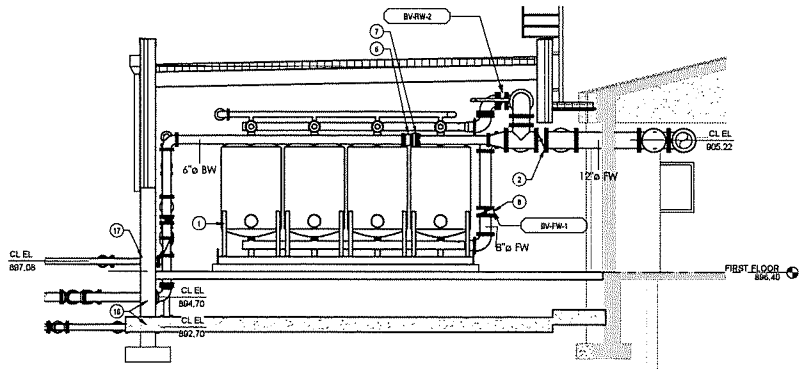

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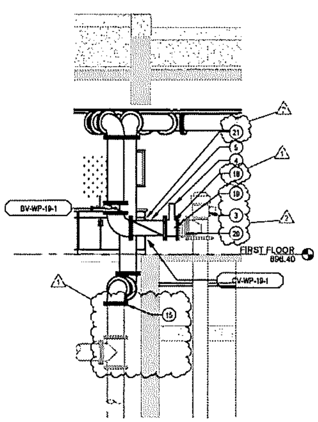

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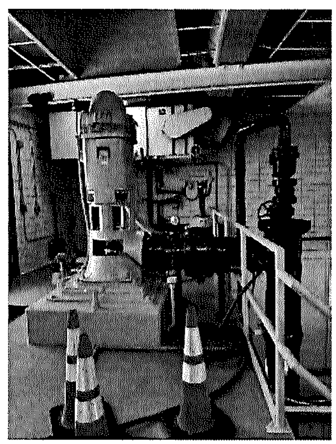

EXISTING WELL 19 WELLHEAD, MOTOR AND APPURTENANCES PHOTO FOR REFERENCE

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. REPLACE EXISTING WELL MOTOR. CONTRACTOR TO REMOVE EXISTING MOTOR PRIOR TO THE OWNER REMOVING THE DISCHARGE HEAD AND WELL PUMP FROM THE WELL. REFERENCE SPECIFICATION SECTION 33 20 31.
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE AND INSTALL AIR VACUUM VALVE - DISCHARGE FROM AIR-VACUUM VALVE SHALL BE METAL PIPE. REMOVE EXISTING PVC DISCHARGE AND ROUTE NEW METAL DISCHARGE TO SAME TERMINATION POINT AS EXISTING DISCHARGE. SEE PHOTO ON THIS PAGE AND SEE DETAIL D/OP504
5. INSTALL 12" CHECK VALVE
6. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
7. FLANGED COUPLING ADAPTER
8. 8" FILTER SHUTOFF BUTTERFLY VALVE w/ HANDWHEEL OPERATOR
9. 6" SWING CHECK VALVE
10. 6" PLUG VALVE w/ LEVER OPERATOR
11. 4" PNEUMATICALLY OPERATED BUTTERFLY VALVE - TYP. FOR BACKWASH WASTE AND SPRAY WASH PIPES
12. AIR AND VACUUM RELIEF VALVE
13. 4" BACKWASH WASTE FLOW METER
14. CONTRACTOR TO VERIFY ELEVATION AFTER FILTER EQUIPMENT INSTALLED
15. CONNECT TO EXISTING 12" WELDED STEEL WELLHOUSE PIPING - CONTRACTOR TO VERIFY EXISTING PIPE ID AND OD OF PIPE TO PROVIDE PROPER TRANSION PIECE TO NEW 12" FLANGED DUCTILE IRON PIPE
16. CONSTRUCT 12" SQUARE BLOCKOUT IN FOUNDATION TO PASS PIPE THROUGH
17. FLxMJ WALL PIPE
18. INSTALL PRESSURE GAUGE
19. INSTALL SAMPLE TAP IN SPOOL BEFORE CHECK VALVE. INSTALL TAP ABOVE EXISTING FUNNEL DRAIN AND/OR MODIFY PVC FUNNEL DRAIN TO BE DIRECTLY BELOW SAMPLE TAP. SEE PHOTO ON THIS PAGE.
20. NEW PIPING TO START AT EXISTING WELL HEAD EXPANSION JOINT
21. CONTRACTOR TO MODIFY EXISTING HAND RAIL IN THE AREA OF NEW CHECK VALVE TO ALLOW PROPER INSTALLATION AND FUNCTION OF THE CHECK VALVE
22. INSTALL SAMPLE TAP AND PRESSURE GAUGE

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Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

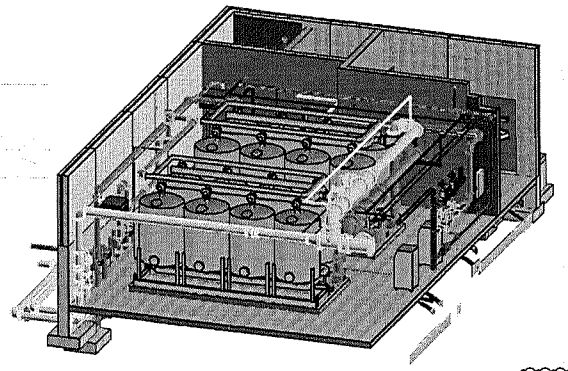
SEH Project	MADWU 167818
Checked By	MG
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

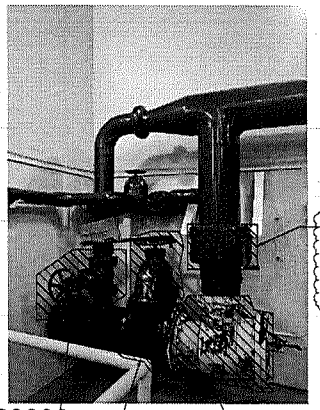
REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 5	11/28/2023
2	ADDENDUM NO. 6	12/7/2023

PROCESS SECTIONS

01
P301



1 P901 FILTER ISOMETRIC FOR REFERENCE ONLY
NOT TO SCALE



2 P901 RESERVIOR FILL VALVE
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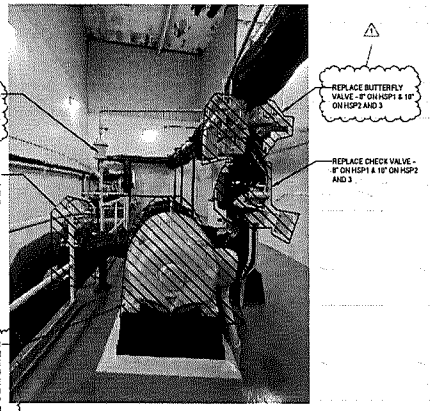
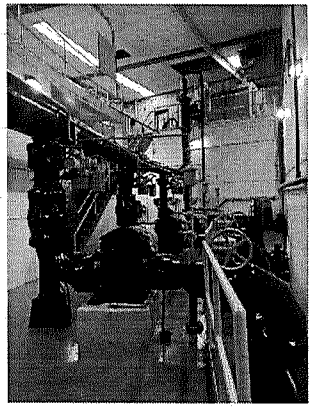


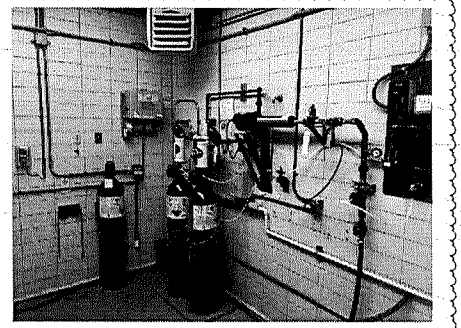
3 P901 HSP PUMP PHOTO - TYP. OF 3
NOT TO SCALE



SEE PHOTO 3B/P901 FOR TYPICAL REPLACEMENT NOTES

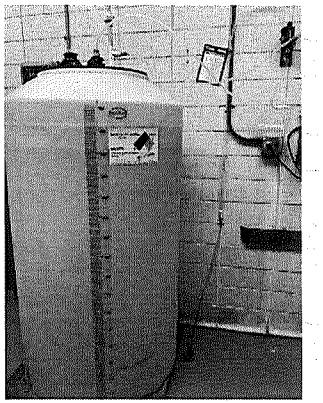
CONTRACTOR TO STRIP EXISTING INSULATION FROM PUMP SUCTION AND DISCHARGE TO DETERMINE ANY SIZE ADJUSTMENT OF PIPE CONNECTIONS TO THE NEW PUMPS PRIOR TO FINAL APPROVAL OF PUMP SHOP DRAWINGS - SEE SPECIFICATIONS FOR FURTHER CLARIFICATION

4 P901 THREE HSP'S PHOTO
NOT TO SCALE



REMOVE ALL EQUIPMENT, PIPING, VALVES, SCALES, TANKS, AND FIXED ITEMS AND APPURTENANCES AS DIRECTED BY THE ENGINEER OR OWNER. SALVAGE EQUIPMENT DESIGNATED BY OWNER TO OWNER

5 P901 EXISTING GAS CHLORINE REMOVAL PHOTO
NOT TO SCALE



REMOVE ALL EQUIPMENT, PIPING, VALVES, SCALES, TANKS, AND FIXED ITEMS AND APPURTENANCES AS DIRECTED BY THE ENGINEER OR OWNER. SALVAGE EQUIPMENT DESIGNATED BY WEINER TO OWNER

6 P901 EXISTING FLUORIDE EQUIPMENT REMOVAL
NOT TO SCALE

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Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2505 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187818
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM NO. 5	11/08/2023
2	ADDENDUM NO. 6	12/7/2023

PROCESS ISOMETRIC 3D VIEWS FOR REFERENCE ONLY

01

P901

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REMOVAL GENERAL NOTES

A. SEE SPECIFCATION SECTION 01 12 18 FOR WORK SEQUENCE DETAILS.

B. SEE SPECIFICATION SECTIONS 26 00 00 AND 26 05 01 FOR ADDITIONAL REMOVAL DETAILS.

C. COORDINATE ALL REMOVAL WORK WITH ALL OTHER CONTRACTORS.

D. ALL OUTAGES SHALL BE COORDINATED WITH OWNER, ENGINEER, AND GENERAL CONTRACTOR AT A MINIMUM OF 5 DAYS PRIOR TO OUTAGE.

E. ALL EXISTING EQUIPMENT TO REMAIN OPERATIONAL UNTIL NEW EQUIPMENT IS UP AND RUNNING.

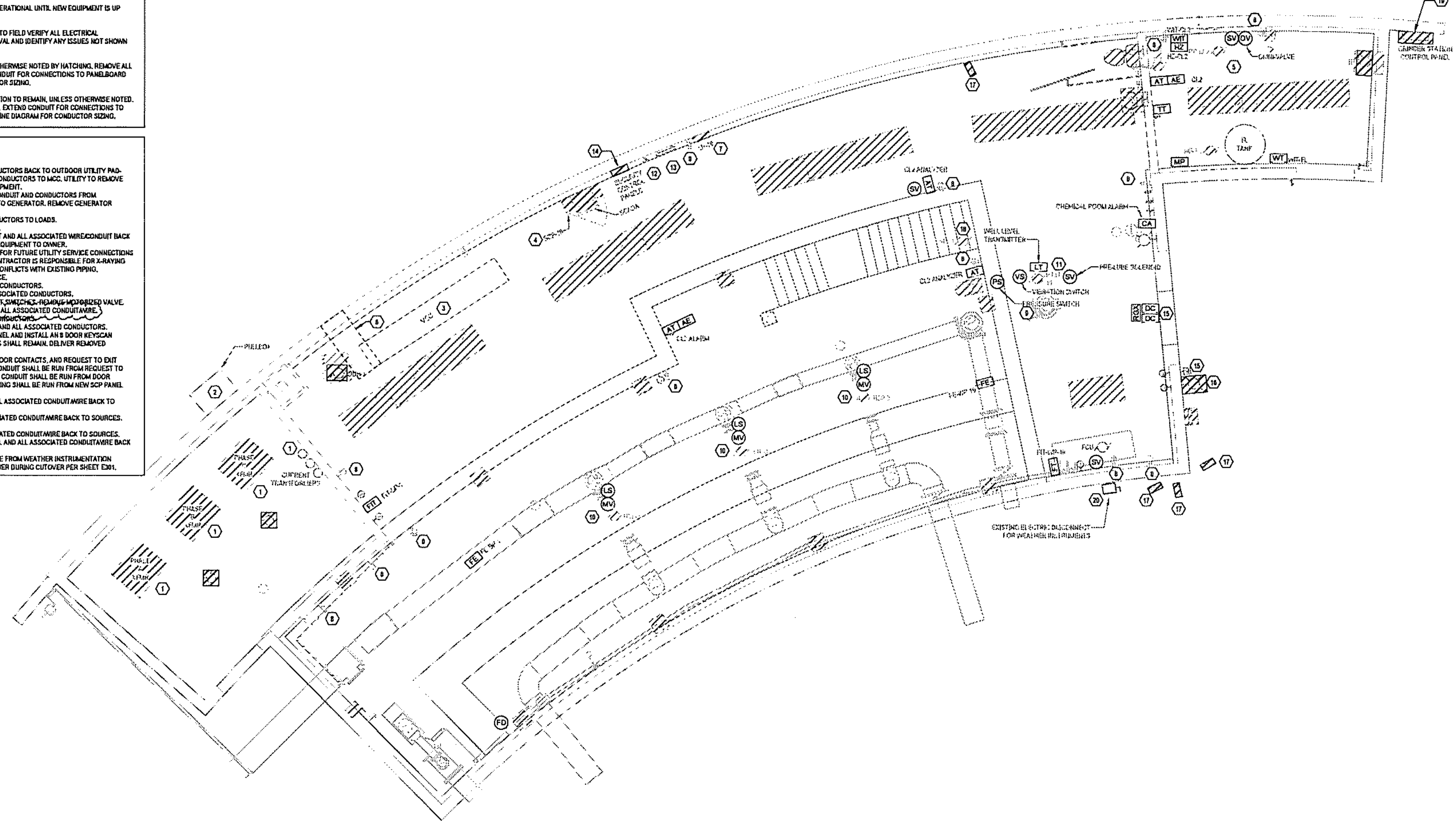
F. ELECTRICAL CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL ELECTRICAL EQUIPMENT LOCATIONS PRIOR TO REMOVAL AND IDENTIFY ANY ISSUES NOT SHOWN ON PLANS.

G. EXISTING LIGHTS TO REMAIN, UNLESS OTHERWISE NOTED BY HATCHING. REMOVE ALL ASSOCIATED CONDUCTORS. EXTEND CONDUIT FOR CONNECTIONS TO PANELBOARD LP-1 IF NEEDED. SEE E701 FOR CONDUCTOR SIZING.

H. EXISTING MEASUREMENT INSTRUMENTATION TO REMAIN, UNLESS OTHERWISE NOTED. REMOVE ALL ASSOCIATED CONDUCTORS. EXTEND CONDUIT FOR CONNECTIONS TO PANELBOARD LP-1 IF NEEDED. SEE ONE LINE DIAGRAM FOR CONDUCTOR SIZING.

KEYNOTES ⬡

1. REMOVE TRANSFORMER PRIMARY CONDUCTORS BACK TO OUTDOOR UTILITY PAD-MOUNT SWITCH. REMOVE SECONDARY CONDUCTORS TO MCC. UTILITY TO REMOVE TRANSFORMERS AND CT METERING EQUIPMENT.
2. REMOVE UNDERGROUND GENERATOR CONDUIT AND CONDUCTORS FROM CONNECTION AT TRANSFORMERS BACK TO GENERATOR. REMOVE GENERATOR PULLBOX.
3. REMOVE MCC AND ALL ASSOCIATE CONDUCTORS TO LOADS.
4. REMOVE SCADA CONTROL PANEL SCP-19.
5. REMOVE ALL CHEMICAL FEED EQUIPMENT AND ALL ASSOCIATED WIRE/CONDUIT BACK TO SOURCES. DELIVER CHEMICAL FEED EQUIPMENT TO OWNER.
6. SAW-CUT CONCRETE TO ALLOW ACCESS FOR FUTURE UTILITY SERVICE CONNECTIONS TO NEW MCC. WIDTH TO BE 24" WIDE. CONTRACTOR IS RESPONSIBLE FOR X-RAYING FLOOR BEFOREHAND TO CONFIRM ANY CONFLICTS WITH EXISTING PIPING.
7. REMOVE PANELBOARD LP-19 AND REPLACE.
8. REMOVE RECEPTACLE AND ASSOCIATED CONDUCTORS.
9. REMOVE PRESSURE SWITCH AND ALL ASSOCIATED CONDUCTORS.
10. ~~PUMP TO BE REPLACED ALONG WITH LIMIT SWITCHES. REMOVE MOTORIZED~~ VALVE.
11. WELL MOTOR TO BE REPLACED. REMOVE ALL ASSOCIATED CONDUIT/WIRE. (1)
12. ~~REMOVE DATA JACK AND ASSOCIATED CONDUCTORS.~~
13. REMOVE OLD ANALOG METERS/GUAGES AND ALL ASSOCIATED CONDUCTORS.
14. REMOVE EXISITING 4 DOOR KEYSCAN PANEL AND INSTALL AN 8 DOOR KEYSCAN PANEL. EXISTING POWER SUPPLY PANELS SHALL REMAIN. DELIVER REMOVED KEYSCAN PANEL TO OWNER.
15. DOOR ACCESS SYSTEM CARD READER, DOOR CONTACTS, AND REQUEST TO EXIT SENSOR TO REMAIN. NEW WIRING AND CONDUIT SHALL BE RUN FROM REQUEST TO EXIT TO CARD ACCESS. NEW WIRING AND CONDUIT SHALL BE RUN FROM DOOR CONTACTS TO NEW SCP PANEL. NEW WIRING SHALL BE RUN FROM NEW SCP PANEL BACK TO CARD ACCESS.
16. REMOVE CHLORINE ALARM LIGHT AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCE(S).
17. REMOVE EXISTING CAMERAS AND ASSOCIATED CONDUIT/WIRE BACK TO SOURCES. DELIVER CAMERAS TO OWNER.
18. REMOVE VACUUM PUMP AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCES.
19. REMOVE GRINDER PUMP CONTROL PANEL AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCES.
20. REMOVE CONDUIT/WIRE BACK TO SOURCE FROM WEATHER INSTRUMENTATION DISCONNECT. PROVIDE TEMPORARY POWER DURING CUTOVER PER SHEET E301.



1 E070 REMOVAL PLAN
1/4" = 1'-0"
0 4' 8' 12'

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SEH

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Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CGM
Drawn By	DDH
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #	12/08/2023

OVERALL REMOVAL PLAN

E070

LIGHTING GENERAL NOTES

A. ALL MOUNTING HEIGHTS ARE FOR LIGHTING FIXTURES ARE TO THE BOTTOM OF THE FIXTURE UNLESS OTHERWISE NOTED.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT LIGHT FIXTURE LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

D. ALL ROOM LIGHTING FIXTURES WITH EMERGENCY BATTERY PACKS SHALL BE SWITCHED WITH THE ROOM LIGHTING CIRCUIT. EMERGENCY BATTERY PACKS SHALL BE FED FROM AN UNSWITCHED LEG OF THE ROOM LIGHTING CIRCUIT.

E. EXIT FIXTURES SHALL BE FED FROM AN UNSWITCHED LEG OF THE ROOM LIGHTING CIRCUIT.

F. WIRE FOR CIRCUIT CONDUCTORS NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.

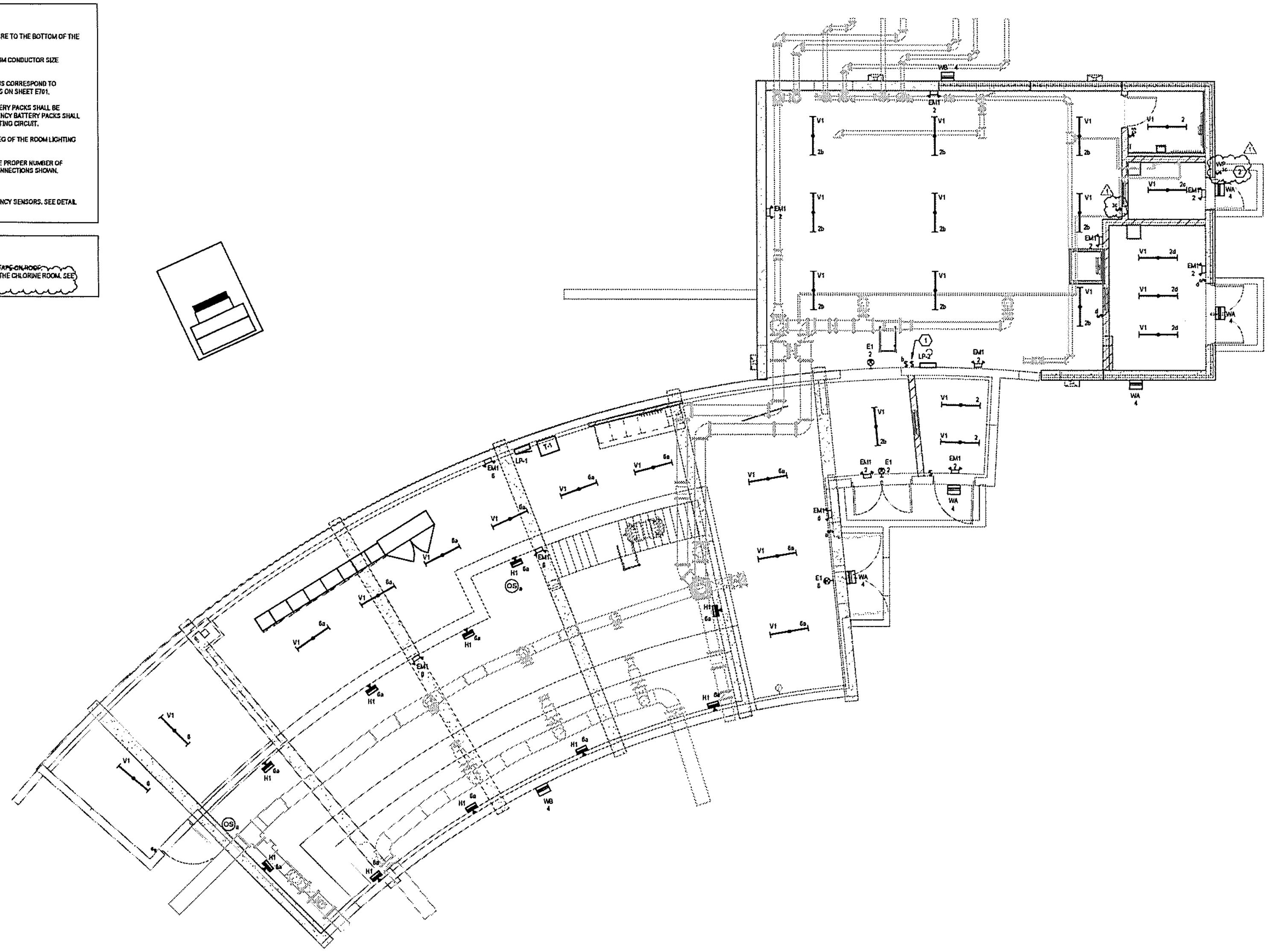
G. SEE LIGHT FIXTURE SCHEDULE ON SHEET E701.

H. INTERIOR LIGHTING SHALL BE INSTALLED WITH OCCUPANCY SENSORS. SEE DETAIL 1/DE03.

KEYNOTES

1. ~~PROVIDE SWITCH AND ON INDICATOR LIGHT FOR HEAT TAPE ON ROOF.~~
2. PROVIDE WEATHERPROOF 3-WAY SWITCH OUTSIDE OF THE CHLORINE ROOM. SEE DETAIL 7/E602.

1



2 E201 LIGHTING PLAN
3/16" = 1'-0"

12/8/2023 9:31:35 AM

SEH

REVISED

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CDW
Drawn By	DDH
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 6	12/06/2023

LIGHTING PLAN - WELLHOUSE 19

01

E201

POWER GENERAL NOTES

A. PROVIDE HOUSE KEEPING PADS FOR ALL FLOOR AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4" WIDER AND LONGER THAN EQUIPMENT TO BE PLACED ON IT, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT GENERAL RECEPTACLE, ELECTRICAL EQUIPMENT, AND MECHANICAL EQUIPMENT LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

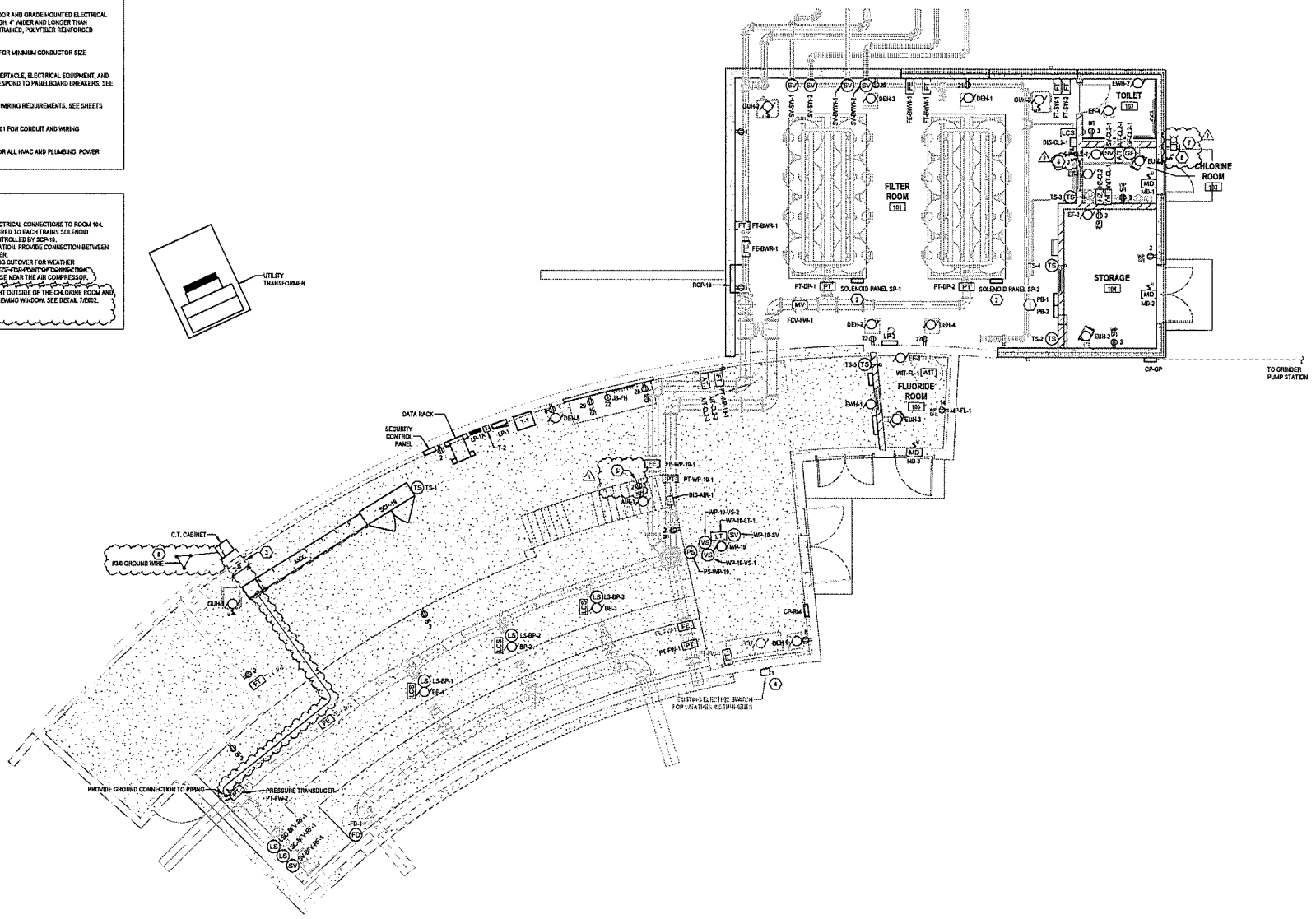
D. SEE ONE-LINE DIAGRAMS FOR CONDUIT AND WIRING REQUIREMENTS. SEE SHEETS E502, E503, AND E504.

E. SEE PANELBOARD SCHEDULES ON SHEET E701 FOR CONDUIT AND WIRING REQUIREMENTS.

F. SEE MECHANICAL PLANS AND SCHEDULES FOR ALL HVAC AND PLUMBING POWER REQUIREMENTS AND DETAILS.

KEYNOTES

1. PROVIDE TWO PULLBOXES FOR FUTURE ELECTRICAL CONNECTIONS TO ROOM 104.
2. FILTER TRAIN VALVE SOLENOIDS ARE PREWIRED TO EACH TRAINS SOLENOID TERMINATION PANEL. SOLENOIDS TO BE CONTROLLED BY SCP-19.
3. SEE DETAIL 6/E603 FOR DUCT BANK INSTALLATION. PROVIDE CONNECTION BETWEEN C.T. CABINET AND MCC MAIN CIRCUIT BREAKER.
4. PROVIDE TEMPORARY UTILITY POWER DURING CUTOVER FOR WEATHER PROTECTION. COORDINATE WITH CITY FOR POINT OF DISCONNECT FOR PERMANENT CONNECTION.
5. MOUNT RECEPTACLE UNDERNEATH STAIRCASE NEAR THE AIR COMPRESSOR.
6. PROVIDE 3-WAY KEYED SWITCH W/PILOT LIGHT OUTSIDE OF THE CHLORINE ROOM AND A 3-WAY SWITCH W/PILOT LIGHT NEAR THE VIEWING WINDOW. SEE DETAIL 7/E602.
7. SEE DETAIL 4/E602
8. SEE DETAIL 7/E603.



1 E301 POWER PLAN
3/16" = 1'-0"
0 4' 8' 12'

12/7/2023 12:19 AM

SEH

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Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2226 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CSW
Drawn By	DDH

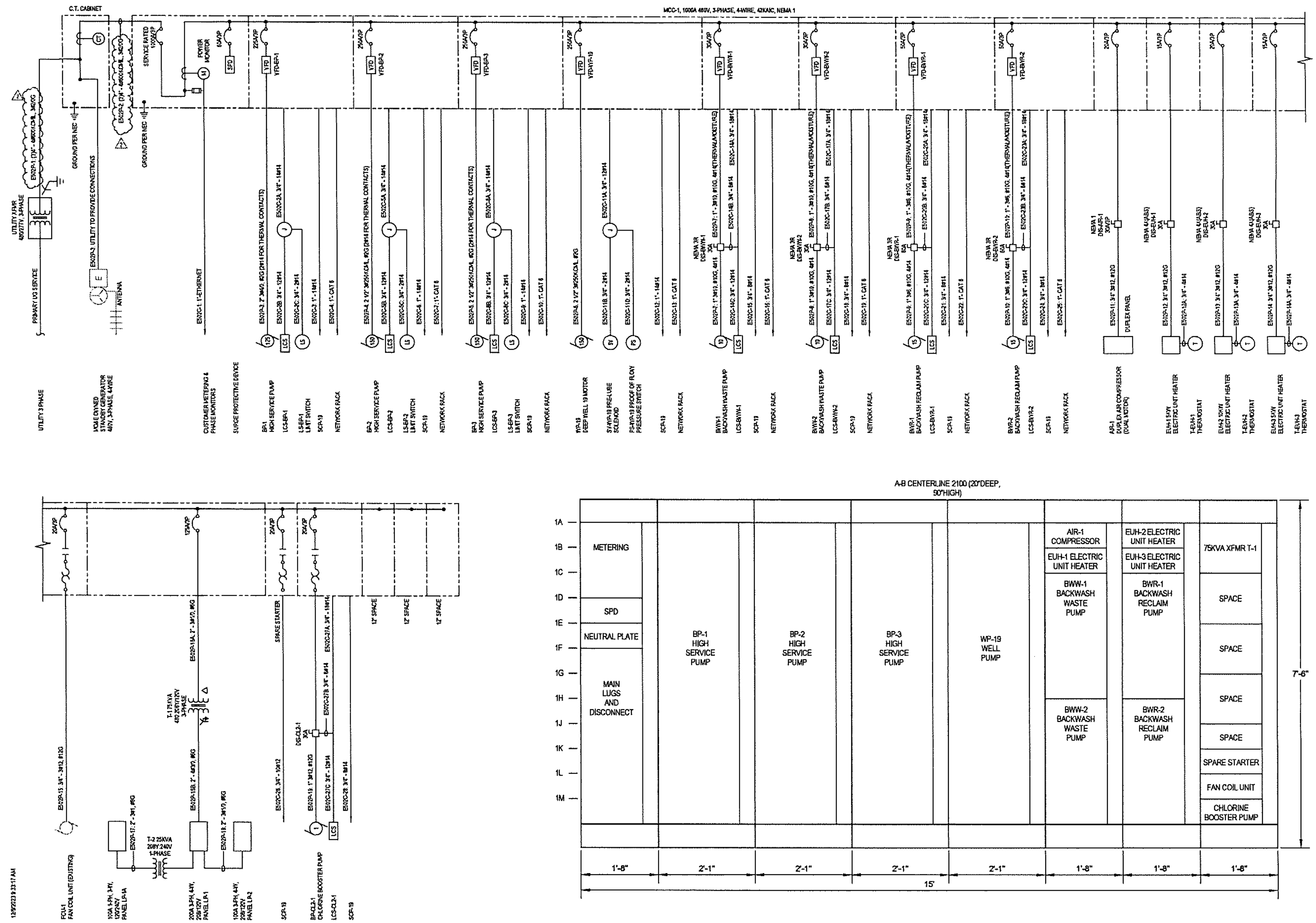
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 5	11/29/2023
2	ADDENDUM 6	12/08/2023

POWER PLAN - WELLHOUSE 19

01
E301



1 E502 MCC ONE-LINE DIAGRAM
NOT TO SCALE

2 E502 MCC ELEVATION
NOT TO SCALE

SEH

REVISED

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167818
Checked By CBW
Drawn By DCH

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

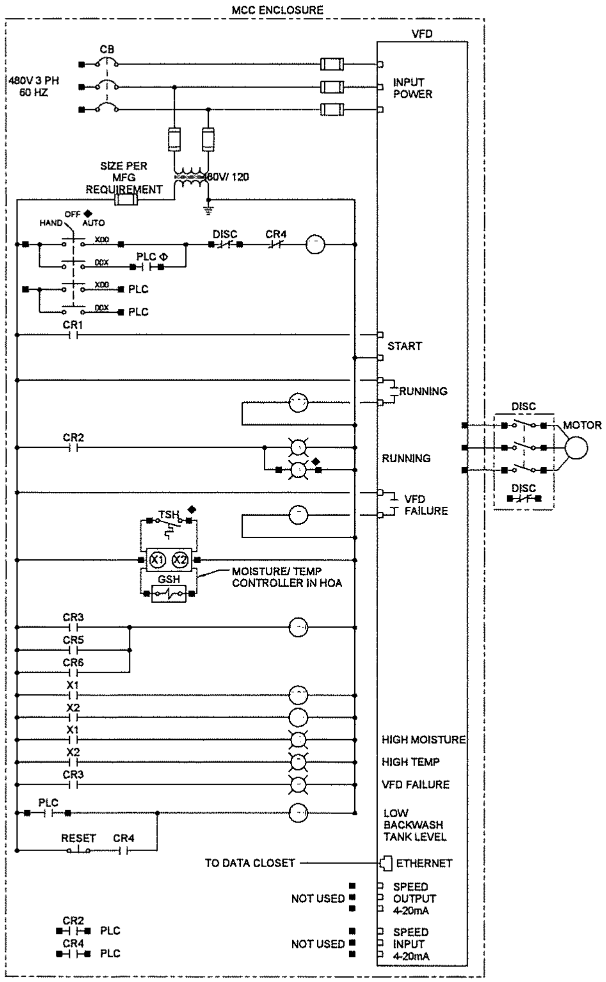
REV. #	DESCRIPTION	DATE
1	ADDENDUM 3	11/08/2023
2	ADDENDUM 4	12/06/2023

ONE-LINE DIAGRAM

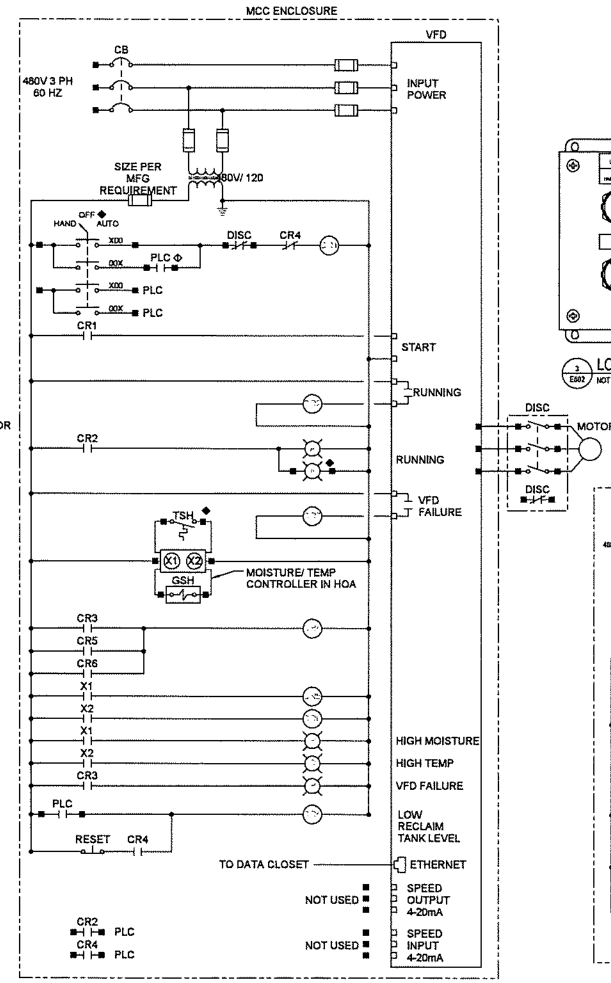
E502

SCHEMATIC SYMBOLS - LOCATIONS AND CONNECTIONS

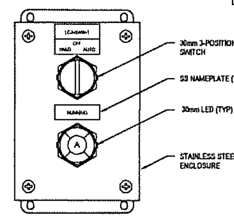
Symbol	Meaning
◆	DEVICE AT MOTOR
◇	DEVICE AT PLC
◇	DEVICE AT MFR CP
▪	CONNECTION POINT
■	EXTERNAL CONNECTION POINT



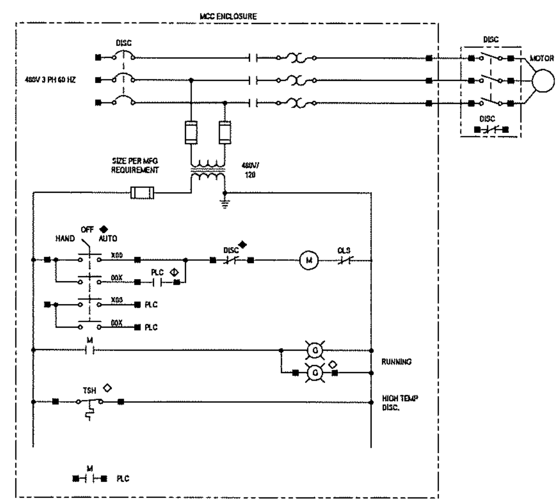
1 E602 BACKWASH WASTE PUMP SCHEMATIC BWW-1,2
NOT TO SCALE



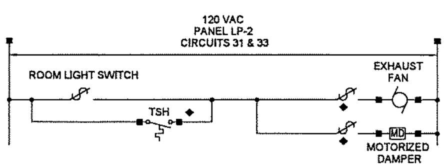
2 E602 RECLAIM PUMP SCHEMATIC BWR-1,2
NOT TO SCALE



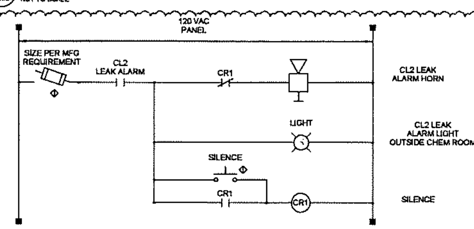
3 E602 LOCAL CONTROL STATION BWW-1,2 & BWR-1,2 & BP-CL2-1
NOT TO SCALE



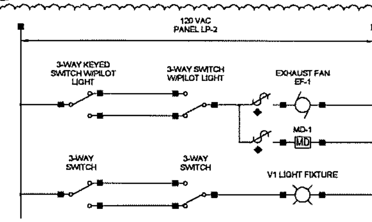
5 E602 CHLORINE BP, FCU, AND SPARE STARTER SCHEMATIC
NOT TO SCALE



6 E602 MOTORIZED DAMPER AND EXHAUST FAN SCHEMATIC
NOT TO SCALE



4 E602 CHLORINE ROOM LEAK ALARM SCHEMATIC
NOT TO SCALE



7 E602 CHLORINE ROOM FAN AND LIGHT SCHEMATIC
NOT TO SCALE

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Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project MADWU 167916
Checked By CBW
Drawn By DDH

Project Status BIDDING DOCUMENTS
Issue Date OCTOBER, 2022

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM #	12/06/2023

SCHEMATICS

E602

PANELBOARD: LP-1

LOCATION: Space 6
MOUNTING: RECESSED NEMA1
MAIN DEVICE: 200.0 A MAIN CB
BUS AMPS: 200 AMPS

VOLTAGE: 208Y/120 V. 3 ø 4 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		PHASE C kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 2#12, #12G	KEYSCAN POWER SUPPLY	20 A	1	1	0.0	0.0					2	1	20 A	RCPT: WELL 19 BLDG	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DATA RACK POWER SUPPLY	20 A	1	3			0.0	0.0			4	1	20 A	GUH-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	SCP-19	20 A	1	5					0.0	0.0	6	1	20 A	DEH-5	3/4" - 2#12, #12G
3/4" - 2#12, #12G	FT-FW-1, FT-FW-2	20 A	1	7	0.0	0.0					8	1	20 A	DEH-6	3/4" - 2#12, #12G
3/4" - 2#12, #12G	FT-WP-19-1	20 A	1	9			0.0	0.0			10	1	20 A	AIT-CL2-2	3/4" - 2#12, #12G
3/4" - 2#12, #12G	SECURITY CONTROL PANEL	20 A	1	11					0.0	0.0	12	1	20 A	AIT-CL2-3	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DATA RACK RECEPTACLE	20 A	1	13	0.0	0.0					14	1	20 A	RCPT: MP-FL-1	3/4" - 2#12, #12G
	SPARE	20 A	1	15			0.0	0.0			16	1	20 A	WIT-FL-1 FLUORIDE TANK SCALE	3/4" - 2#12, #12G
	SPARE	20 A	1	17					0.0	0.0	18	1	20 A	R-MXR RESERVOIR MIXER	3/4" - 2#12, #12G
	SPARE	20 A	1	19	0.0	0.0					20	1	20 A	RCPT: FUME HOOD COUNTERTOP	3/4" - 2#12, #12G
	SPARE	20 A	1	21			0.0	0.0			22	1	20 A	JB-FH FUME HOOD CONNECTION	3/4" - 2#12, #12G
	SPARE	20 A	1	23					0.0	0.0	24	1	20 A	SPARE	
	SPARE	20 A	1	25	0.0	0.0					26	1	20 A	SPARE	
	SPARE	20 A	1	27			0.0	0.0			28	1	20 A	SPARE	
	SPARE	20 A	1	29					0.0	0.0	30	1	20 A	SPARE	
	SPARE	20 A	1	31	0.0	0.0					32	1	20 A	SPARE	
1 1/4" - 2#1/0	LP-1A	150 A	2	33			0.0	0.0			34	1	20 A	SPARE	
				35					0.0	0.0	36	1	20 A	SPARE	
2" - 3#1/0, #6G	LP-2	100 A	3	37	0.0	0.0					38	1	20 A	SPARE	
				39			0.0	0.0			40	1	20 A	SPARE	
				41					0.0	0.0	42	1	20 A	SPARE	
		TOTAL LOAD:			0 kVA		0 kVA		0 kVA						
		TOTAL AMPS:			0 A		0.0 A		0 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
Other	0 VA	0.00%	0 VA		
Receptacle	0 VA	0.00%	0 VA	CONNECTED LOAD:	0 VA
				ESTIMATED DEMAND:	0 VA
				CONNECTED CURRENT:	0.0 A
				EST. DEMAND CURRENT:	0.0 A

NOTES:

PANELBOARD: LP-2

LOCATION:
MOUNTING: SURFACE NEMA1
MAIN DEVICE: 100.0 A MLO
BUS AMPS: 100 AMPS

VOLTAGE: 208Y/120 V. 3 ø 4 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		PHASE C kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 2#12, #12G	RCPT: FILTER ROOM	20 A	1	1	0.0	0.3					2	1	20 A	LTS: FILTER/CHEM ROOM	3/4" - 2#12, #12G
~~3/4" - 2#12, #12G~~	~~RCPT: UMO-CL2-TOILET~~	~~20 A~~	~~1~~	~~3~~			0.0	0.0			4	1	20 A	EXTERIOR LIGHTING	3/4" - 2#12, #12G
3/4" - 2#12, #12G	CHLORINE LEAK ALARM EQUIP.	20 A	1	5					0.0	0.9	6	1	20 A	LTS: PUMP ROOM	3/4" - 2#12, #12G
				7	1.5	0.0					8	1	20 A	SPARE	
3/4" - 3#12, #12G	EWH-1	20 A	3	9			1.5	0.0			10	1	20 A	FT-SW-1, FT-SW-2	3/4" - 2#12, #12G
				11					1.5	0.0	12	1	20 A	FT-BWR-1, FT-BWW-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EWH-2	20 A	2	13	1.1	0.0					14	1	20 A	SOLENOID PANEL 1	3/4" - 2#12, #12G
				15			1.1	0.0			16	1	20 A	SOLENOID PANEL 2	3/4" - 2#12, #12G
3/4" - 2#12, #12G	GUH-2	20 A	1	17					0.0	0.0	18	1	20 A	FCV-FW-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	GUH-3	20 A	1	19	0.0	0.0					20	1	20 A	POLE LIGHT AA1	3/4" - 2#10, #12G
3/4" - 2#12, #12G	DEH-1	20 A	1	21			0.0	0.0			22	1	20 A	POLE LIGHT AA2	3/4" - 2#10, #12G
3/4" - 2#12, #12G	DEH-2	20 A	1	23					0.0	0.0	24	1	20 A	WIT-CL2-1 SCALE	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DEH-3	20 A	1	25	0.0	0.0					26	1	20 A	GF-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DEH-4	20 A	1	27			0.0	0.0			28	1	20 A	HZ-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-1 AND MD-1	20 A	1	29					0.0	0.0	30	1	20 A	AIT-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-2 AND MD-2	20 A	1	31	0.0	0.0					32	1	20 A	SV-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-3 AND MD-3	20 A	1	33			0.0	0.0			34	1	20 A	SPARE	
3/4" - 2#12, #12G	EF-4	20 A	1	35					0.0	0.0	36	1	20 A	SPARE	
	SPARE	20 A	1	37	0.0	0.0					38	1	20 A	RCPT: BACKWASH TANKS	3/4" - 2#12, #12G
	SPARE	20 A	1	39			0.0	0.0			40	1	20 A	REMOTE SCADA PANEL RCP-19	3/4" - 2#12, #12G
	SPARE	20 A	1	41					0.0	0.0	42	1	20 A	FACP	3/4" - 2#12, #12G
		TOTAL LOAD:			3 kVA		3 kVA		2 kVA						
		TOTAL AMPS:			25 A		21.9 A		20 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
LITES	1284 VA	125.00%	1605 VA		
Receptacle	0 VA	0.00%	0 VA	CONNECTED LOAD:	1284 VA
				ESTIMATED DEMAND:	1605 VA
				CONNECTED CURRENT:	3.6 A
				EST. DEMAND CURRENT:	4.5 A

NOTES:

PANELBOARD: LP-1A

LOCATION: Space 6
MOUNTING: SURFACE NEMA 1
MAIN DEVICE: 100.0 A MCB
BUS AMPS: 100 AMPS

VOLTAGE: 120/240 V. 1 ø 3 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 3#10, #10G	GRINDER PUMPS	30 A	2	1	0.0	0.0			2	2	60 A	WEATHER INSTRUMENTATION	1" - 3#4, #10G
				3			0.0	0.0	4				
	SPACE	--	1	5	--	--			6	1	--	SPACE	
	SPACE	--	1	7			--	--	8	1	--	SPACE	
	SPACE	--	1	9	--	--			10	1	--	SPACE	
	SPACE	--	1	11			--	--	12	1	--	SPACE	
	SPACE	--	1	13	--	--			14	1	--	SPACE	
	SPACE	--	1	15			--	--	16	1	--	SPACE	
		TOTAL LOAD:			0 kVA		0 kVA						
		TOTAL AMPS:			0 A		0.0 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
				CONNECTED LOAD:	0 VA
				ESTIMATED DEMAND:	0 VA
				CONNECTED CURRENT:	0.0 A
				EST. DEMAND CURRENT:	0.0 A

NOTES:

FIXTURE SCHEDULE					
TYPE	FIXTURE DESCRIPTION	VOLTAGE	MOUNTING	CATALOG NUMBER (OR APPROVED EQUAL)	LUMENS/ WATTS
E1	THERMOPLASTIC EXIT, 1 OR 2 FACE, SELF DIAGNOSTIC DRY/DAMP LOCATIONS, SUPPORTS 6W OF REMOTE HEADS	120/277	SURFACE UNIVERSAL	LITHONIA LHQM LED R HO RO SD	3
EM1	EMERGENCY LIGHT, THERMOPLASTIC (2) 1.2W LED HEADS, SELF D. 70' SPACING, DAMP LOCATION, SUPPORTS 2.4W OF REMOTE	120/277	WALL/CEIL	LITHONIA ELM2L SDRT	2.4
H1	LED WALL PACK	MVOLT	WALL 12'-0" AFF	LITHONIA TWX2 LED P3 40K MVOLT DWHXD	6,250 39
V1	4' LED VAPORPROOF ACRYLIC LINEAL RIBBED FROSTED LENS, W/OCCUPANCY SENSOR	MVOLT	SURFACE/ SUSPENDED	LITHONIA FEM L48 3000LM [illegible] MD MVOLT 40K 80CRI SBGR10	2,870 18
WA	EXTERIOR LED W/90 DEG CUTOFF, PHOTOCELL MAX [illegible] MOUNTING	MVOLT	WALL	LITHONIA DSXW1 LED 20C 1000 40K TFTM MVOLT	3,200 26
WB	EXTERIOR LED W/90 DEG CUTOFF, PHOTOCELL, MOTION SENSOR 14' MOUNTING	MVOLT	WALL	LITHONIA DSXW1 LED 20C 1000 40K TFTM MVOLT PIR	6,000 47
AA1	LED W/90 DEG CUTOFF W/PC, 25' ROUND TAPPERED POLE W/ ARM	MVOLT	POLE	LITHONIA DSX1 LED P1 40K T3M MVOLT HS POLE = HOLOPHANE	12,592 102
AA2	LED W/90 DEG CUTOFF W/PC, 25' ROUND TAPPERED POLE W/ ARM	MVOLT	POLE	LITHONIA DSX1 LED P1 40K T4M MVOLT HS POLE = HOLOPHANE	12,582 102

NOTES:
1. FOR SUSPENDED FIXTURES PROVIDE AIRCRAFT CABLE, BRACKETS AND HARDWARE. CHAIN IS NOT APPROVED.
~~2. PROVIDE FIXTURES SHOWN OR APPROVED EQUALS.~~
2. FIXTURES BY JTH LIGHTING ALLIANCE ARE APPROVED; CONTACT IS TED MERZWICKI, PHONE 608-234-3496, EMAIL TEDM@JTHLIGHTING.COM

1 FIXTURE SCHEDULE
E701 NOT TO SCALE

SEH

REVISED

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167918
Checked By	CBW
Drawn By	DDH
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

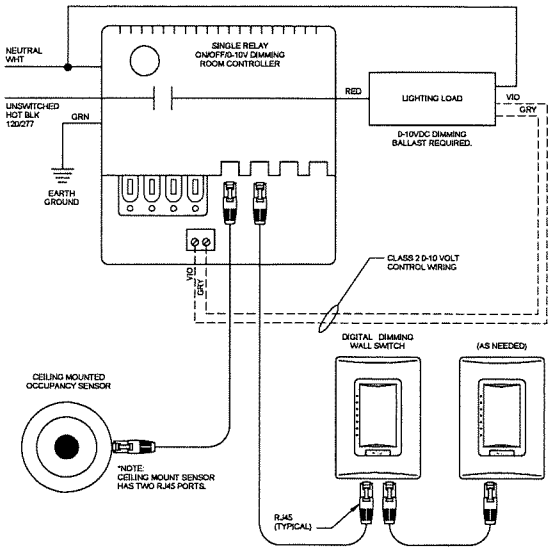
REVISION SCHEDULE

REV. #	DESCRIPTION	DATE
1	ADDENDUM 1	12/08/2023

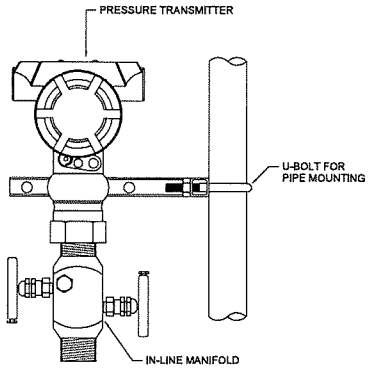
SCHEDULES

E701

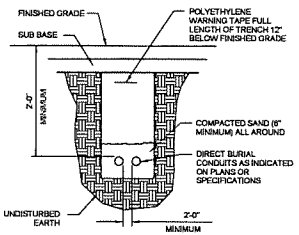
12/12/2023 9:34:05 AM



1 DE03 WATTSTOPPER DIAGRAM
NOT TO SCALE

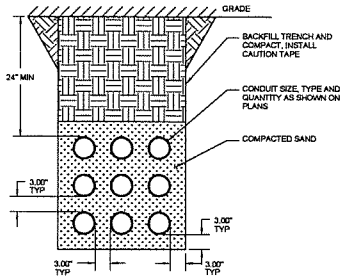


7 DE03 PRESSURE TRANSMITTER PIPE MOUNT
NOT TO SCALE

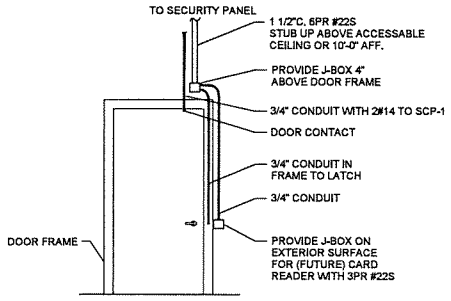


NOTES:
1. BACKFILL OF SELECT COMMON FILL COMPACTED IN LIFTS OF 6" (DEPTH VARIES)

5 DE03 DIRECT-BURIED CONDUIT
NOT TO SCALE

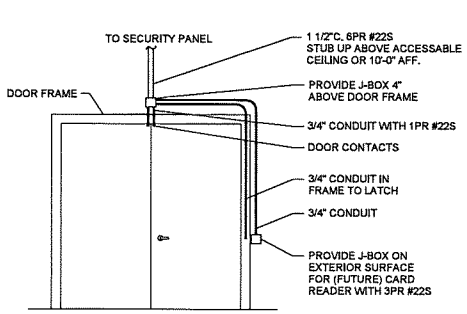


6 DE03 DUCT BANK
NOT TO SCALE



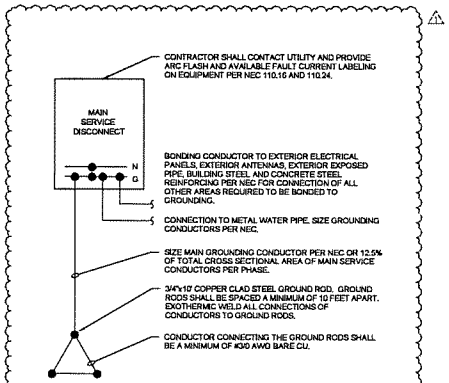
NOTES:
1. PROVIDE CONDUIT ON SECURED SIDE OF DOOR.
2. PROVIDE CONDUIT AND CONDUCTORS BACK TO SECURITY PANEL AND SUPERVISORY CONTROL PANEL.

3 DE03 SINGLE DOOR SECURITY ROUGH-IN
NOT TO SCALE



NOTES:
1. PROVIDE CONDUIT ON SECURED SIDE OF DOOR.
2. PROVIDE CONDUIT AND CONDUCTORS BACK TO SECURITY PANEL.

4 DE03 DOUBLE DOOR SECURITY ROUGH-IN
NOT TO SCALE



7 DE03 BONDING AND GROUNDING 3-ROD
NOT TO SCALE

10/5/2023 12:25:11 AM

SEH

Project Depot

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 137818
Checked By	CBW
Drawn By	DDH

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

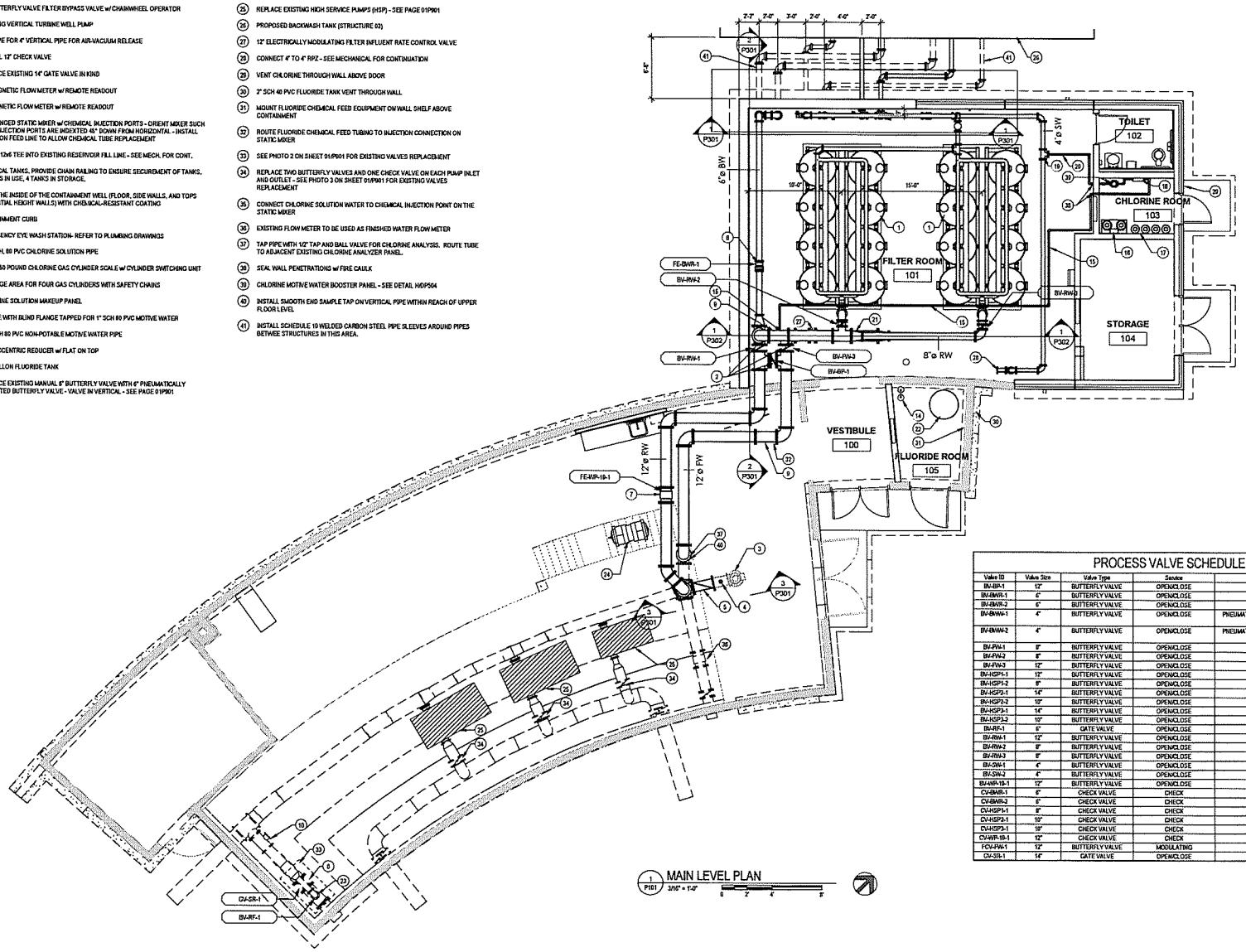
REV. #	DESCRIPTION	DATE
1	ADDENDUM 1	12/06/2023

DETAILS

DE03

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. REPLACE EXISTING 14" GATE VALVE IN KIND
7. 12" MAGNETIC FLOW METER w/ REMOTE READOUT
8. 8" MAGNETIC FLOW METER w/ REMOTE READOUT
9. 12" FLANGED STATIC MIXER w/ CHEMICAL INJECTION PORTS - ORIENT MIXER SUCH THAT INJECTION PORTS ARE INDEXTED 45° DOWN FROM HORIZONTAL - INSTALL VALVE ON FEED LINE TO ALLOW CHEMICAL TUBE REPLACEMENT
10. CUT IN 12x6 TEE INTO EXISTING RESERVOIR FILL LINE - SEE MECH. FOR CONT.
11. CHEMICAL TANKS. PROVIDE CHAIN RAILING TO ENSURE SECUREMENT OF TANKS. 2 TANKS IN USE, 4 TANKS IN STORAGE.
12. COAT THE INSIDE OF THE CONTAINMENT WELL (FLOOR, SIDE WALLS, AND TOPS OF PARTIAL HEIGHT WALLS) WITH CHEMICAL-RESISTANT COATING
13. CONTAINMENT CURB
14. EMERGENCY EYE WASH STATION- REFER TO PLUMBING DRAWINGS
15. 1.5" SCH, 80 PVC CHLORINE SOLUTION PIPE
16. DUAL 150 POUND CHLORINE GAS CYLINDER SCALE w/ CYLINDER SWITCHING UNIT
17. STORAGE AREA FOR FOUR GAS CYLINDERS WITH SAFETY CHAINS
18. CHLORINE SOLUTION MAKEUP PANEL
19. 4x4 TEE WITH BLIND FLANGE TAPPED FOR 1" SCH 80 PVC MOTIVE WATER
20. 1.5" SCH 80 PVC NON-POTABLE MOTIVE WATER PIPE
21. 12x8 ECCENTRIC REDUCER w/ FLAT ON TOP
22. 150 GALLON FLUORIDE TANK
23. REPLACE EXISTING MANUAL 8" BUTTERFLY VALVE WITH 6" PNEUMATICALLY OPERATED BUTTERFLY VALVE - VALVE IN VERTICAL - SEE PAGE 01P901
24. REPLACE EXISTING AIR COMPRESSOR AND DRYER LOCATED UNDER STAIRS
25. REPLACE EXISTING HIGH SERVICE PUMPS (HSP) - SEE PAGE 01P901
26. PROPOSED BACKWASH TANK (STRUCTURE 02)
27. 12" ELECTRICALLY MODULATING FILTER INFLUENT RATE CONTROL VALVE
28. CONNECT 4" TO 4" RPZ - SEE MECHANICAL FOR CONTINUATION
29. VENT CHLORINE THROUGH WALL ABOVE DOOR
30. 2" SCH 40 PVC FLUORIDE TANK VENT THROUGH WALL
31. MOUNT FLUORIDE CHEMICAL FEED EQUIPMENT ON WALL SHELF ABOVE CONTAINMENT
32. ROUTE FLUORIDE CHEMICAL FEED TUBING TO INJECTION CONNECTION ON STATIC MIXER
33. SEE PHOTO 2 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
34. REPLACE TWO BUTTERFLY VALVES AND ONE CHECK VALVE ON EACH PUMP INLET AND OUTLET - SEE PHOTO 3 ON SHEET 01/P901 FOR EXISTING VALVES REPLACEMENT
35. CONNECT CHLORINE SOLUTION WATER TO CHEMICAL INJECTION POINT ON THE STATIC MIXER
36. EXISTING FLOW METER TO BE USED AS FINISHED WATER FLOW METER
37. TAP PIPE WITH 1/2" TAP AND BALL VALVE FOR CHLORINE ANALYSIS. ROUTE TUBE TO ADJACENT EXISTING CHLORINE ANALYZER PANEL.
38. SEAL WALL PENETRATIONS w/ FIRE CAULK
39. CHLORINE MOTIVE WATER BOOSTER PANEL - SEE DETAIL H/SP504
40. INSTALL SMOOTH END SAMPLE TAP ON VERTICAL PIPE WITHIN REACH OF UPPER FLOOR LEVEL
41. INSTALL SCHEDULE 10 WELDED CARBON STEEL PIPE SLEEVES AROUND PIPES BETWEE STRUCTURES IN THIS AREA.



1 P101 MAIN LEVEL PLAN 3/16" = 1'-0"

PROCESS VALVE SCHEDULE

Valve ID	Valve Size	Valve Type	Service	Operator Type
BV-BR-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-BWR-1	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWR-2	6"	BUTTERFLY VALVE	OPEN/CLOSE	LEVER
BV-BWW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-BWW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR w/ HARD STOPS TO BE SET DURING STARTUP
BV-FW-1	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-FW-3	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-HSP1-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP1-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP2-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP2-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-HSP3-1	14"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-HSP3-2	10"	BUTTERFLY VALVE	OPEN/CLOSE	ELECTRIC ACTUATOR
BV-RF-1	6"	GATE VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-RW-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
BV-RW-2	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-RW-3	8"	BUTTERFLY VALVE	OPEN/CLOSE	HAND WHEEL
BV-SW-1	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-SW-2	4"	BUTTERFLY VALVE	OPEN/CLOSE	PNEUMATIC ACTUATOR
BV-WR-19-1	12"	BUTTERFLY VALVE	OPEN/CLOSE	CHAIN WHEEL
CV-BWR-1	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-BWR-2	6"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP1-1	8"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-HSP3-1	10"	CHECK VALVE	CHECK	DAMPENED SWING
CV-WR-19-1	12"	CHECK VALVE	CHECK	DAMPENED SWING
FCV-FW-1	12"	BUTTERFLY VALVE	MODULATING	ELECTRIC MODULATOR
GV-SR-1	14"	GATE VALVE	OPEN/CLOSE	HAND WHEEL

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2538 LAKE HENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187819
Checked By	MS
Drawn By	LAP

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2022

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

PROCESS PLAN

01
P101

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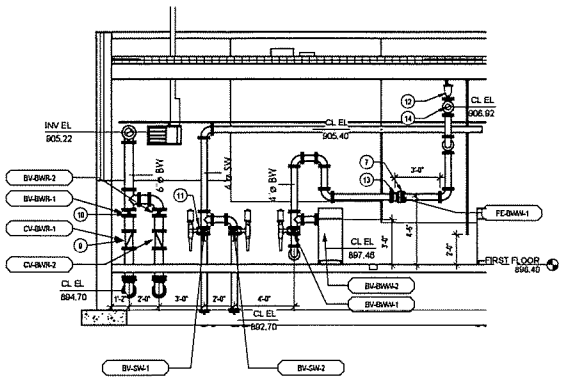
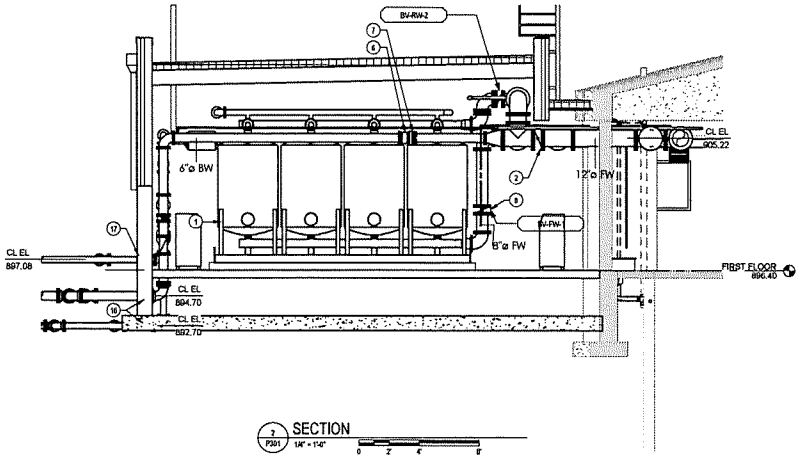
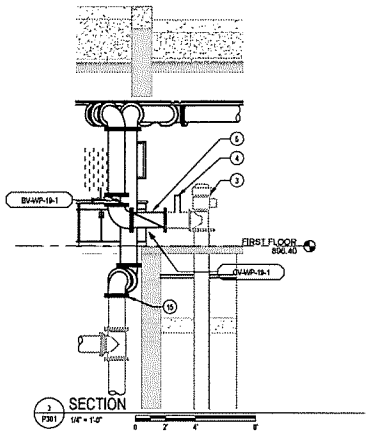


1 P301 SECTION 1/4" = 1'-0"



2 P301 SECTION 1/4" = 1'-0"



3 P301 SECTION 1/4" = 1'-0"

KEYNOTES

1. FILTER SKID
2. 12" BUTTERFLY VALVE FILTER BYPASS VALVE w/ CHAINWHEEL OPERATOR
3. EXISTING VERTICAL TURBINE WELL PUMP
4. TAP PIPE FOR 4" VERTICAL PIPE FOR AIR-VACUUM RELEASE
5. INSTALL 12" CHECK VALVE
6. 6" MAGNETIC FLOW METER w/ REMOTE READOUT
7. FLANGED COUPLING ADAPTER
8. 8" FILTER SHUTOFF BUTTERFLY VALVE w/ HANDWHEEL OPERATOR
9. 4" SWING CHECK VALVE
10. 6" PLUG VALVE w/ LEVER OPERATOR
11. 4" PNEUMATICALLY OPERATED BUTTERFLY VALVE - TYP. FOR BACKWASH WASTE AND SPRAY WASH PIPES
12. AIR AND VACUUM RELIEF VALVE
13. 4" BACKWASH WASTE FLOW METER
14. CONTRACTOR TO VERIFY ELEVATION AFTER FILTER EQUIPMENT INSTALLED
15. CONNECT TO EXISTING 12" WELDED STEEL WELLHOUSE PIPING
16. CONSTRUCT 12" SQUARE BLOCKOUT IN FOUNDATION TO PASS PIPE THROUGH
17. FLANJ WALL PIPE

10/10/2023 9:44:12 AM

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

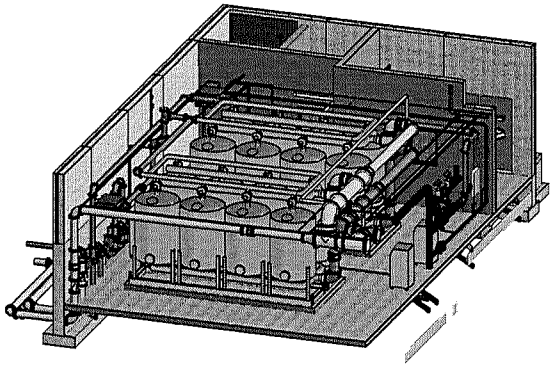
SEH Project	MADWU 167818
Checked By	MS
Drawn By	LAP
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

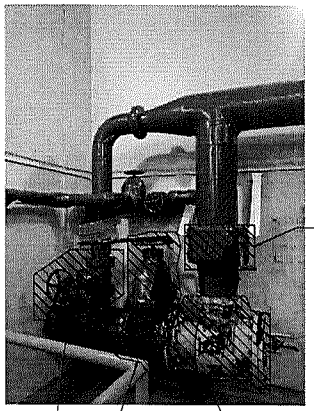
REV. #	DESCRIPTION	DATE

PROCESS SECTIONS

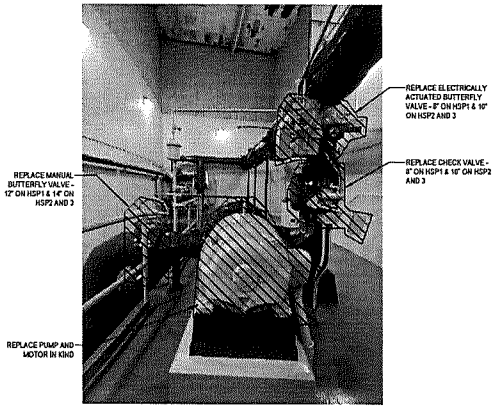
01
P301



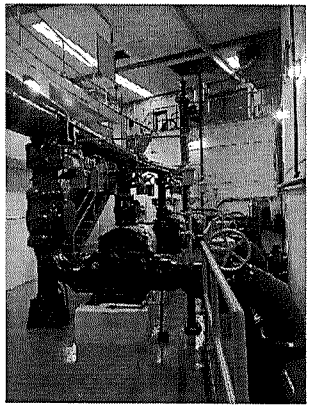
1 P901 FILTER ISOMETRIC FOR REFERENCE ONLY
NOT TO SCALE



2 P901 RESERVIOR FILL VALVE
NOT TO SCALE



3 P901 HSP PUMP PHOTO - TYP. OF 3
NOT TO SCALE



SEE PHOTO 3/01P901 FOR TYPICAL REPLACEMENT NOTES

4 P901 THREE HSP'S PHOTO
NOT TO SCALE

10/20/2023 8:45:42 AM

SEH

Project Owner
MADISON WATER UTILITY

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
WELLHOUSE 19
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187810
Checked By	MS
Drawn By	LAP

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

PROCESS ISOMETRIC 3D VIEWS FOR REFERENCE ONLY

01
P901

REMOVAL GENERAL NOTES

A. SEE SPECIFCATION SECTION 01 12 18 FOR WORK SEQUENCE DETAILS.

B. SEE SPECIFICATION SECTIONS 26 00 00 AND 26 05 01 FOR ADDITIONAL REMOVAL DETAILS.

C. COORDINATE ALL REMOVAL WORK WITH ALL OTHER CONTRACTORS.

D. ALL OUTAGES SHALL BE COORDINATED WITH OWNER, ENGINEER, AND GENERAL CONTRACTOR AT A MINIMUM OF 5 DAYS PRIOR TO OUTAGE.

E. ALL EXISTING EQUIPMENT TO REMAIN OPERATIONAL UNTIL NEW EQUIPMENT IS UP AND RUNNING.

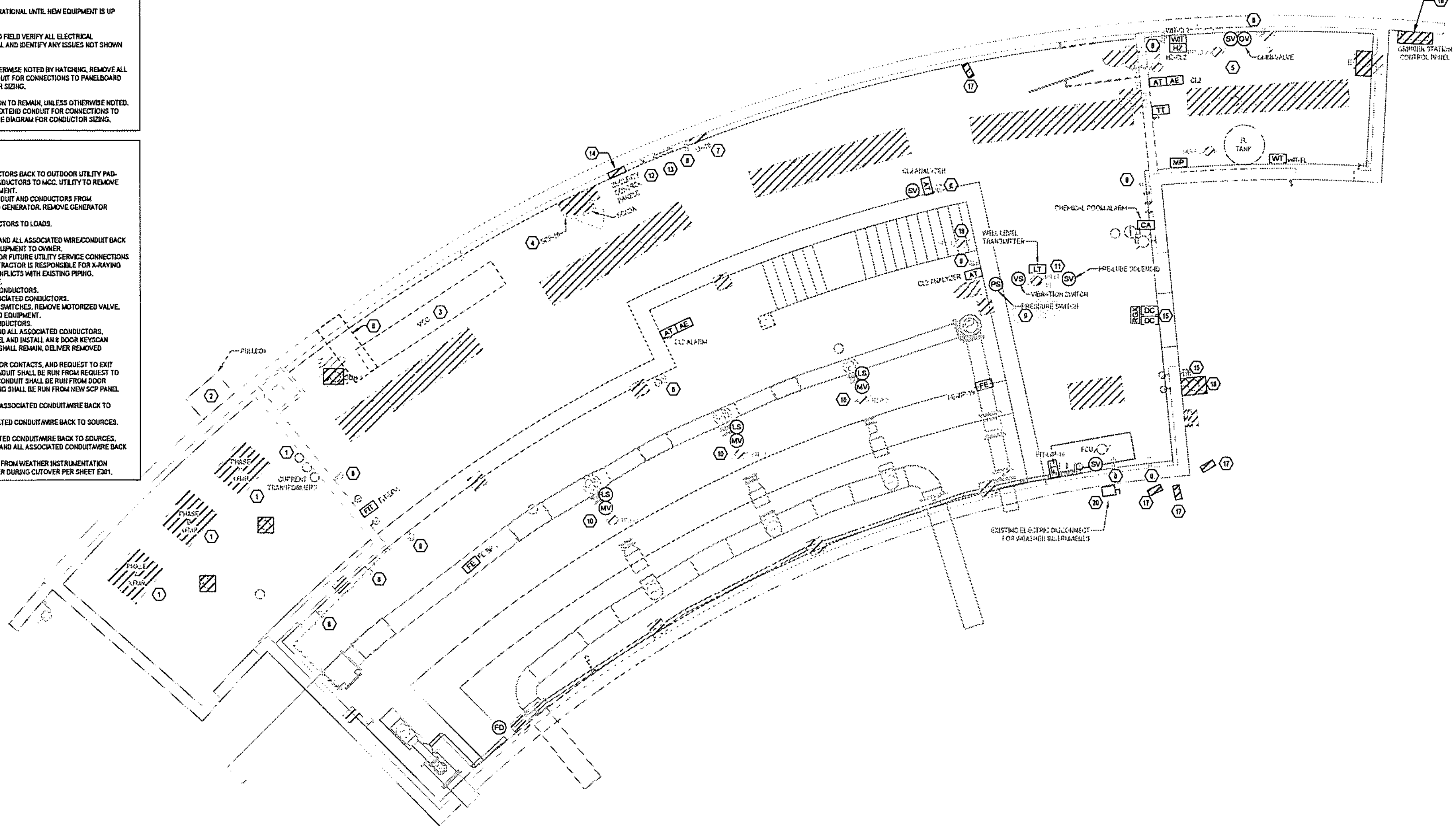
F. ELECTRICAL CONTRACTOR IS REQUIRED TO FIELD VERIFY ALL ELECTRICAL EQUIPMENT LOCATIONS PRIOR TO REMOVAL AND IDENTIFY ANY ISSUES NOT SHOWN ON PLANS.

G. EXISTING LIGHTS TO REMAIN, UNLESS OTHERWISE NOTED BY HATCHING. REMOVE ALL ASSOCIATED CONDUCTORS. EXTEND CONDUIT FOR CONNECTIONS TO PANELBOARD LP-1 IF NEEDED. SEE E701 FOR CONDUCTOR SIZING.

H. EXISTING MEASUREMENT INSTRUMENTATION TO REMAIN, UNLESS OTHERWISE NOTED. REMOVE ALL ASSOCIATED CONDUCTORS. EXTEND CONDUIT FOR CONNECTIONS TO PANELBOARD LP-1 IF NEEDED. SEE ONE LINE DIAGRAM FOR CONDUCTOR SIZING.

KEYNOTES ⬡

1. REMOVE TRANSFORMER PRIMARY CONDUCTORS BACK TO OUTDOOR UTILITY PAD-MOUNT SWITCH. REMOVE SECONDARY CONDUCTORS TO MCC. UTILITY TO REMOVE TRANSFORMERS AND CT METERING EQUIPMENT.
2. REMOVE UNDERGROUND GENERATOR CONDUIT AND CONDUCTORS FROM CONNECTION AT TRANSFORMERS BACK TO GENERATOR. REMOVE GENERATOR PULLBOX.
3. REMOVE MCC AND ALL ASSOCIATE CONDUCTORS TO LOADS.
4. REMOVE SCADA CONTROL PANEL SCP-19.
5. REMOVE ALL CHEMICAL FEED EQUIPMENT AND ALL ASSOCIATED WIRE/CONDUIT BACK TO SOURCES. DELIVER CHEMICAL FEED EQUIPMENT TO OWNER.
6. SAW-CUT CONCRETE TO ALLOW ACCESS FOR FUTURE UTILITY SERVICE CONNECTIONS TO NEW MCC. WIDTH TO BE 24" WIDE. CONTRACTOR IS RESPONSIBLE FOR X-RAYING FLOOR BEFOREHAND TO CONFIRM ANY CONFLICTS WITH EXISTING PIPING.
7. REMOVE PANELBOARD LP-19 AND REPLACE.
8. REMOVE RECEPTACLE AND ASSOCIATED CONDUCTORS.
9. REMOVE PRESSURE SWITCH AND ALL ASSOCIATED CONDUCTORS.
10. PUMP TO BE REPLACED ALONG WITH LIMIT SWITCHES. REMOVE MOTORIZED VALVE.
11. REPLACE WELL PUMP AND ALL ASSOCIATED EQUIPMENT.
12. REMOVE DATA JACK AND ASSOCIATED CONDUCTORS.
13. REMOVE OLD ANALOG METERS/GUAGES AND ALL ASSOCIATED CONDUCTORS.
14. REMOVE EXISITING 4 DOOR KEYSCAN PANEL AND INSTALL AN 8 DOOR KEYSCAN PANEL. EXISTING POWER SUPPLY PANELS SHALL REMAIN. DELIVER REMOVED KEYSCAN PANEL TO OWNER.
15. DOOR ACCESS SYSTEM CARD READER, DOOR CONTACTS, AND REQUEST TO EXIT SENSOR TO REMAIN. NEW WIRING AND CONDUIT SHALL BE RUN FROM REQUEST TO EXIT TO CARD ACCESS. NEW WIRING AND CONDUIT SHALL BE RUN FROM DOOR CONTACTS TO NEW SCP PANEL. NEW WIRING SHALL BE RUN FROM NEW SCP PANEL BACK TO CARD ACCESS.
16. REMOVE CHLORINE ALARM LIGHT AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCE(S).
17. REMOVE EXISTING CAMERAS AND ASSOCIATED CONDUIT/WIRE BACK TO SOURCES. DELIVER CAMERAS TO OWNER.
18. REMOVE VACUUM PUMP AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCES.
19. REMOVE GRINDER PUMP CONTROL PANEL AND ALL ASSOCIATED CONDUIT/WIRE BACK TO SOURCES.
20. REMOVE CONDUIT/WIRE BACK TO SOURCE FROM WEATHER INSTRUMENTATION DISCONNECT. PROVIDE TEMPORARY POWER DURING CUTOVER PER SHEET E301.



1 / E070 REMOVAL PLAN
1/4" = 1'-0"

0 4' 8' 12'

10/11/2023 11:45:36 AM

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: CBW
Drawn By: DDH

Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

OVERALL REMOVAL PLAN

01
E070

LIGHTING GENERAL NOTES

A. ALL MOUNTING HEIGHTS ARE FOR LIGHTING FIXTURES ARE TO THE BOTTOM OF THE FIXTURE UNLESS OTHERWISE NOTED.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT LIGHT FIXTURE LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

D. ALL ROOM LIGHTING FIXTURES WITH EMERGENCY BATTERY PACKS SHALL BE SWITCHED WITH THE ROOM LIGHTING CIRCUIT. EMERGENCY BATTERY PACKS SHALL BE FED FROM AN UNSWITCHED LEG OF THE ROOM LIGHTING CIRCUIT.

E. EXIT FIXTURES SHALL BE FED FROM AN UNSWITCHED LEG OF THE ROOM LIGHTING CIRCUIT.

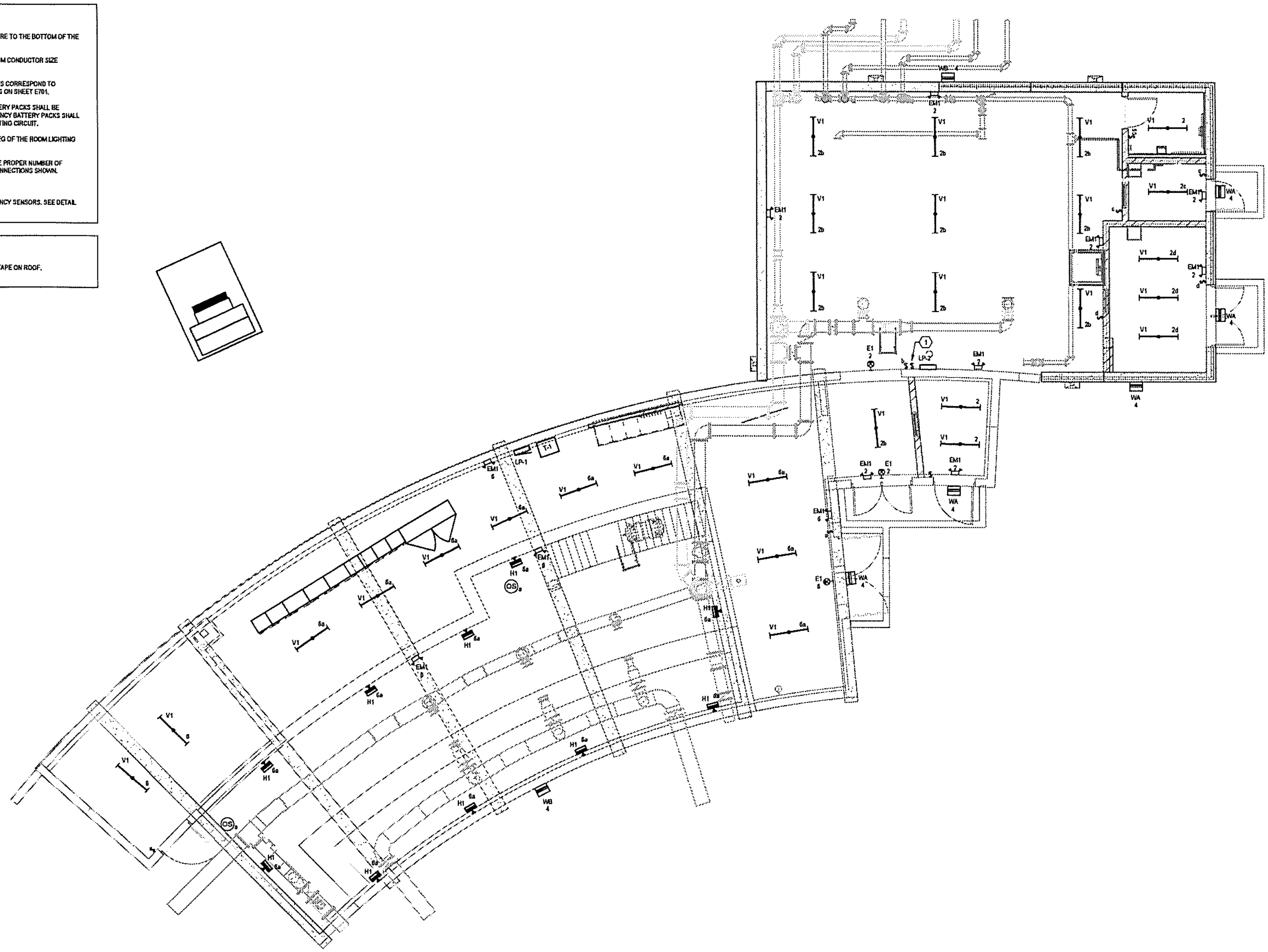
F. WIRE FOR CIRCUIT CONDUCTORS NOT SHOWN. PROVIDE PROPER NUMBER OF CONDUCTORS TO ACHIEVE CIRCUIT AND SWITCHING CONNECTIONS SHOWN.

G. SEE LIGHT FIXTURE SCHEDULE ON SHEET E701.

H. INTERIOR LIGHTING SHALL BE INSTALLED WITH OCCUPANCY SENSORS. SEE DETAIL 1/DE03.

KEYNOTES ⬡

1. PROVIDE SWITCH AND ON INDICATOR LIGHT FOR HEAT TAPE ON ROOF.



2 / E201 LIGHTING PLAN
3/16" = 1'-0"

10/11/2023 11:45:41 AM

SEH

ORIGINAL

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 167818
Checked By	CBW
Drawn By	DDH

Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

LIGHTING PLAN - WELLHOUSE 19

01
E201

POWER GENERAL NOTES

A. PROVIDE HOUSE KEEPING PADS FOR ALL FLOOR AND GRADE MOUNTED ELECTRICAL EQUIPMENT. MINIMUM REQUIREMENTS: 4" HIGH, 4" WIDER AND LONGER THAN EQUIPMENT TO BE PLACED ON IT, 4% AIR ENTRAINED, POLYFIBER REINFORCED CONCRETE.

B. REFER TO SPECIFICATION SECTION 26 05 19 FOR MINIMUM CONDUCTOR SIZE ADJUSTMENTS FOR VOLTAGE DROP.

C. CIRCUIT NUMBERS SHOWN AT GENERAL RECEPTACLE, ELECTRICAL EQUIPMENT, AND MECHANICAL EQUIPMENT LOCATIONS CORRESPOND TO PANELBOARD BREAKERS. SEE PANELBOARD SCHEDULES ON SHEET E701.

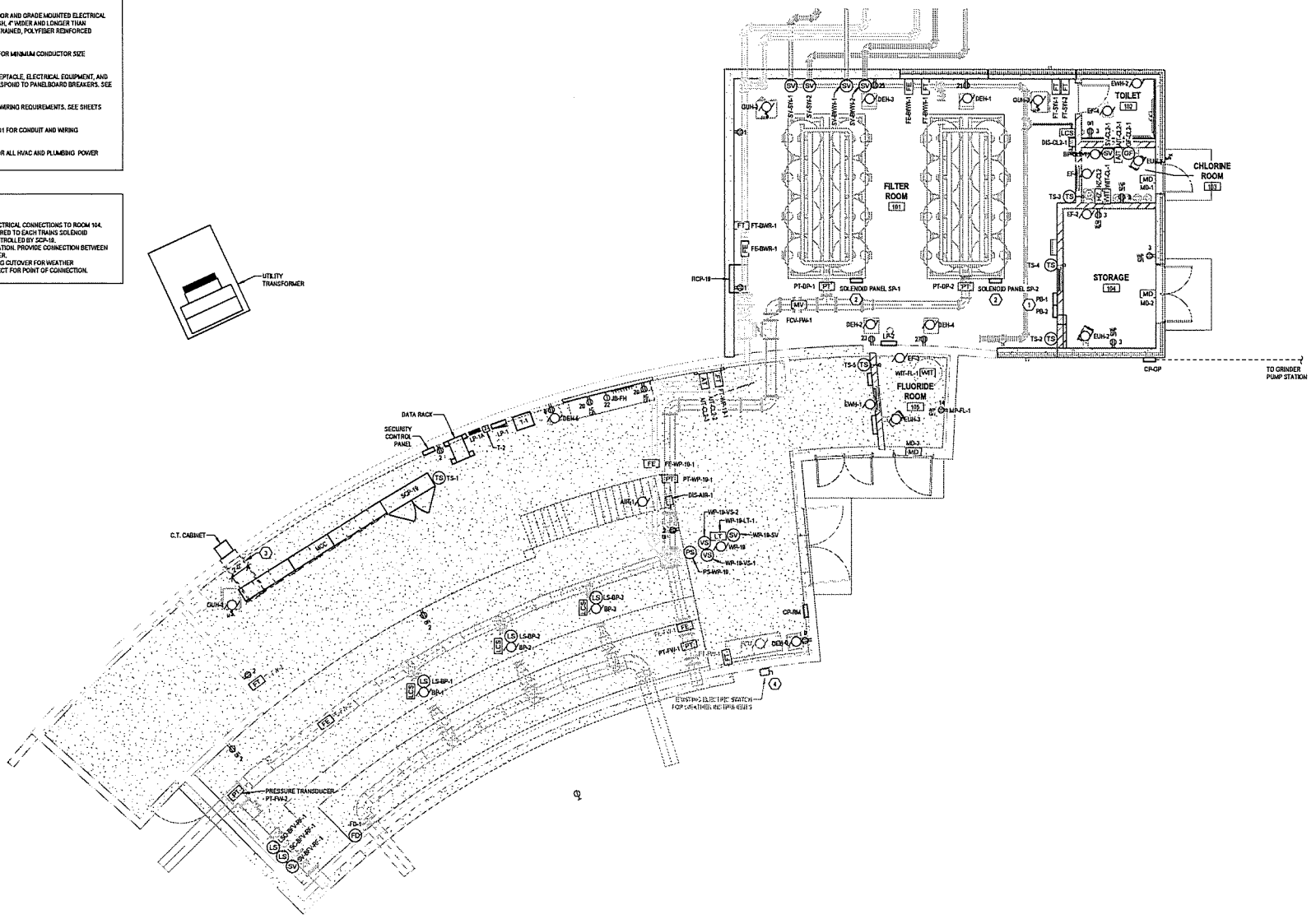
D. SEE ONE-LINE DIAGRAMS FOR CONDUIT AND WIRING REQUIREMENTS. SEE SHEETS E502, E503, AND E504.

E. SEE PANELBOARD SCHEDULES ON SHEET E701 FOR CONDUIT AND WIRING REQUIREMENTS.

F. SEE MECHANICAL PLANS AND SCHEDULES FOR ALL HVAC AND PLUMBING POWER REQUIREMENTS AND DETAILS.

KEYNOTES

1. PROVIDE TWO PULLBOXES FOR FUTURE ELECTRICAL CONNECTIONS TO ROOM 104.
2. FILTER TRAIN VALVE SOLENOIDS ARE PRE-WIRED TO EACH TRAINS SOLENOID TERMINATION PANEL. SOLENOIDS TO BE CONTROLLED BY SCP-19.
3. SEE DETAIL 6/E503 FOR DUCT BANK INSTALLATION. PROVIDE CONNECTION BETWEEN C.T. CABINET AND MCC MAIN CIRCUIT BREAKER.
4. PROVIDE TEMPORARY UTILITY POWER DURING CUTOVER FOR WEATHER INSTRUMENTATION. USE EXISTING DISCONNECT FOR POINT OF CONNECTION.



1 POWER PLAN
E301 3/16" = 1'-0"
0 4' 8' 12'

10/17/2023 11:46:46 AM

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

Project Owner

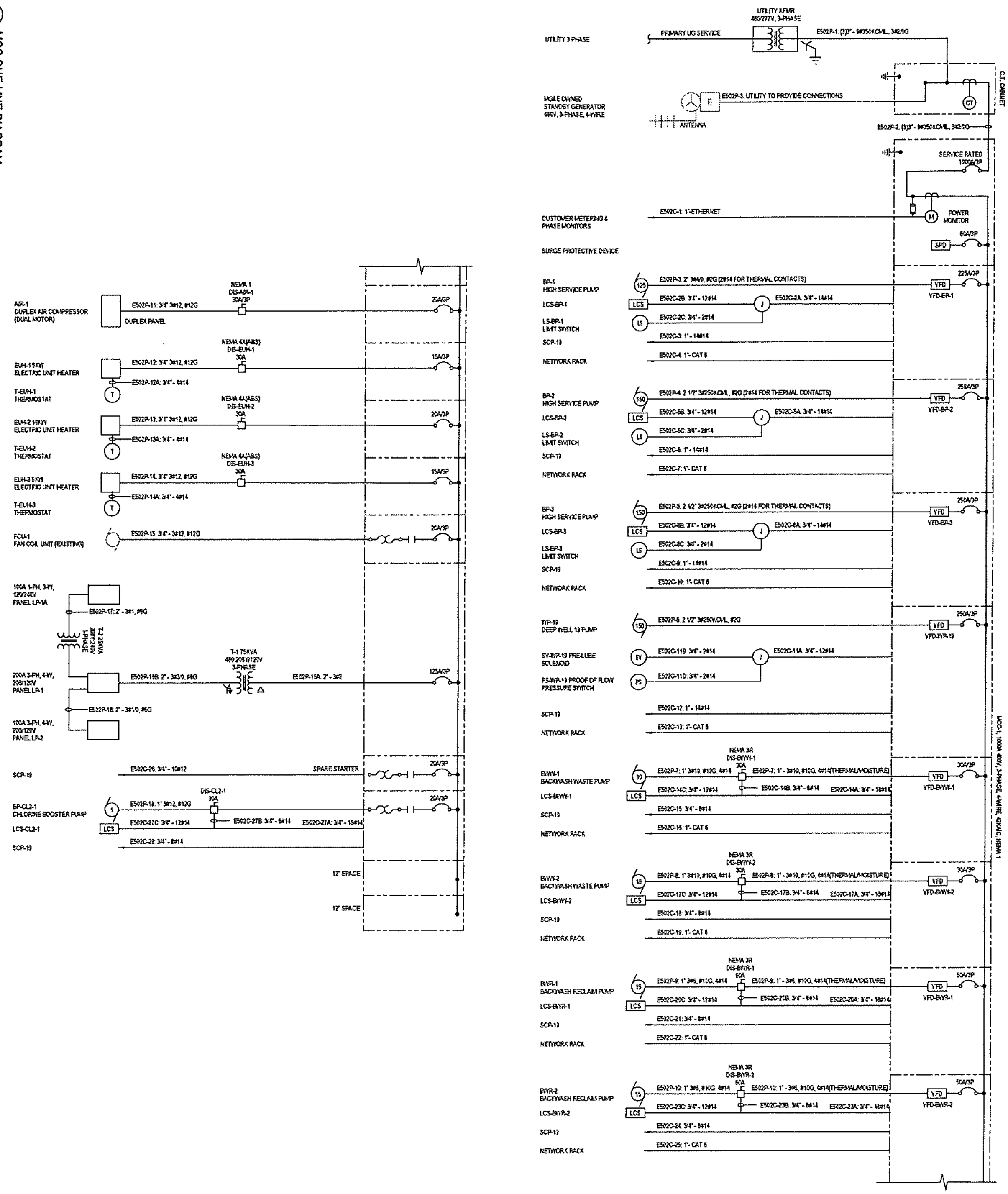
SEH Project	MADWU 167818
Checked By	CBM
Drawn By	DDH
Project Status	Issue Date
BIDDING DOCUMENTS	OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

POWER PLAN - WELLHOUSE 19

01
E301



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1 E502 MCC ONE-LINE DIAGRAM
NOT TO SCALE

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION

2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167918
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

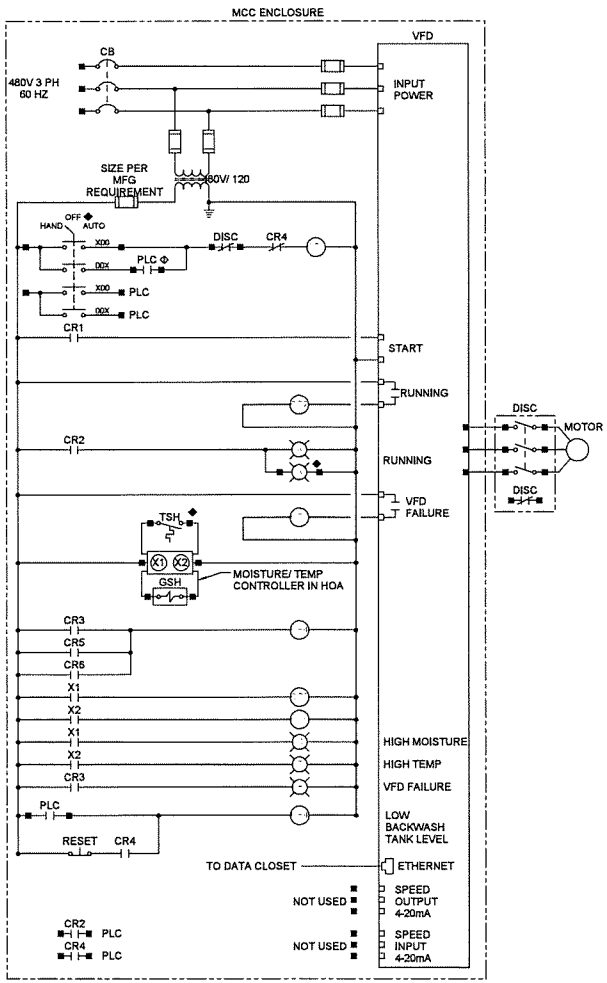
REVISION SCHEDULE
REV. # | DESCRIPTION | DATE

Project Owner

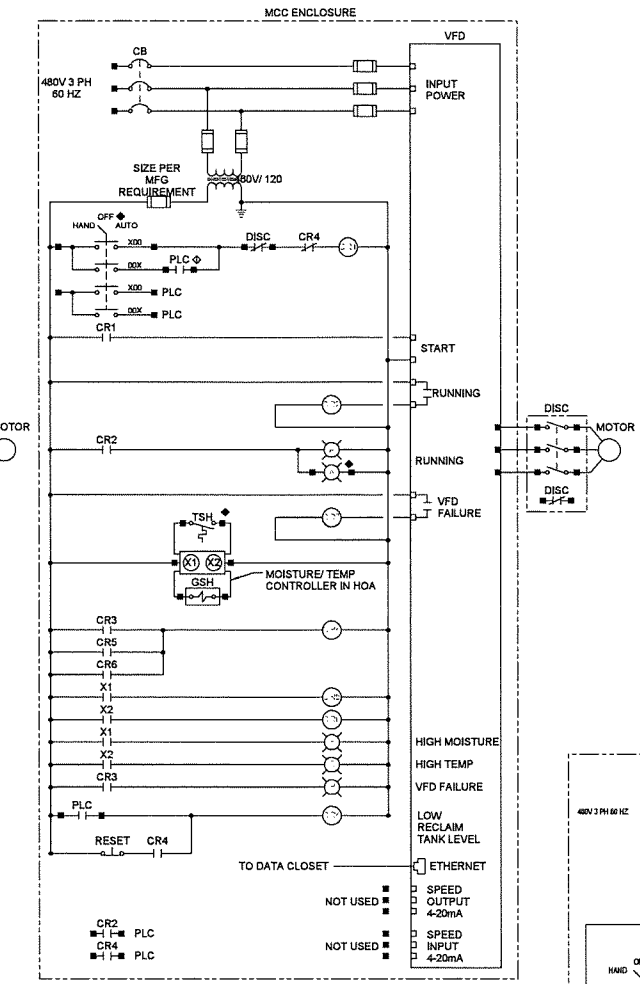
SEH

ONE-LINE DIAGRAM

01
E502

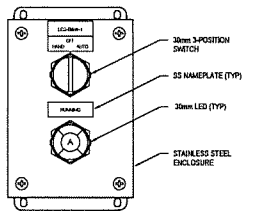


1 E602 BACKWASH WASTE PUMP SCHEMATIC BWW-1,2
NOT TO SCALE

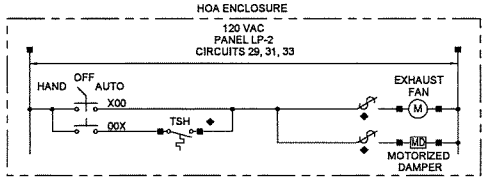


2 E602 RECLAIM PUMP SCHEMATIC BWR-1,2
NOT TO SCALE

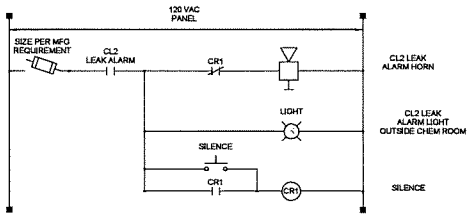
SCHEMATIC SYMBOLS - LOCATIONS AND CONNECTIONS	
◆	DEVICE AT MOTOR
◇	DEVICE AT PLC
◈	DEVICE AT MFR CP
•	CONNECTION POINT
■	EXTERNAL CONNECTION POINT



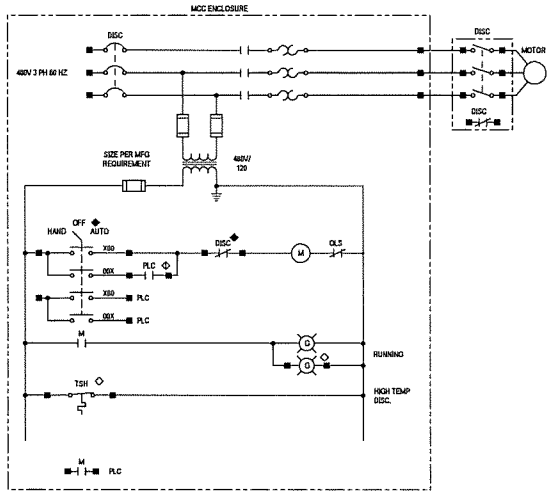
3 E602 LOCAL CONTROL STATION BWW-1,2 & BWR-1,2 & BP-CL2-1
NOT TO SCALE



4 E602 MOTORIZED DAMPER AND EXHAUST FAN SCHEMATIC
NOT TO SCALE



5 E602 CHLORINE ROOM LEAK ALARM SCHEMATIC
NOT TO SCALE



6 E602 CHLORINE BP, FCU, AND SPARE STARTER SCHEMATIC
NOT TO SCALE

SEH

OTTO INK

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project	MADWU 187818
Checked By	CDW
Drawn By	DDH
Project Status: BIDDING DOCUMENTS	Issue Date: OCTOBER, 2023

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

SCHEMATICS

01
E602

10/17/2023 11:45:2 AM

PANELBOARD: LP-1

LOCATION: Space 6
MOUNTING: RECESSED NEMA1
MAIN DEVICE: 200.0 A MAIN CB
BUS AMPS: 200 AMPS

VOLTAGE: 208Y/120 V, 3 ø 4 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		PHASE C kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 2#12, #12G	KEYSCAN POWER SUPPLY	20 A	1	1	0.0	0.0					2	1	20 A	RCPT: WELL 19 BLDG	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DATA RACK POWER SUPPLY	20 A	1	3			0.0	0.0			4	1	20 A	GUH-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	SCP-19	20 A	1	5					0.0	0.0	6	1	20 A	DEH-5	3/4" - 2#12, #12G
3/4" - 2#12, #12G	FT-FW-1, FT-FW-2	20 A	1	7	0.0	0.0					8	1	20 A	DEH-6	3/4" - 2#12, #12G
3/4" - 2#12, #12G	FT-WP-19-1	20 A	1	9			0.0	0.0			10	1	20 A	AIT-CL2-2	3/4" - 2#12, #12G
3/4" - 2#12, #12G	SECURITY CONTROL PANEL	20 A	1	11					0.0	0.0	12	1	20 A	AIT-CL2-3	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DATA RACK RECEPTACLE	20 A	1	13	0.0	0.0					14	1	20 A	RCPT: MP-FL-1	3/4" - 2#12, #12G
	SPARE	20 A	1	15			0.0	0.0			16	1	20 A	WIT-FL-1 FLUORIDE TANK SCALE	3/4" - 2#12, #12G
	SPARE	20 A	1	17					0.0	0.0	18	1	20 A	R-MXR RESERVOIR MIXER	3/4" - 2#12, #12G
	SPARE	20 A	1	19	0.0	0.0					20	1	20 A	RCPT: FUME HOOD COUNTERTOP	3/4" - 2#12, #12G
	SPARE	20 A	1	21			0.0	0.0			22	1	20 A	JB-FH FUME HOOD CONNECTION	3/4" - 2#12, #12G
	SPARE	20 A	1	23					0.0	0.0	24	1	20 A	SPARE	
	SPARE	20 A	1	25	0.0	0.0					26	1	20 A	SPARE	
	SPARE	20 A	1	27			0.0	0.0			28	1	20 A	SPARE	
	SPARE	20 A	1	29					0.0	0.0	30	1	20 A	SPARE	
	SPARE	20 A	1	31	0.0	0.0					32	1	20 A	SPARE	
1 1/4" - 2#1/0	LP-1A	150 A	2	33			0.0	0.0			34	1	20 A	SPARE	
				35					0.0	0.0	36	1	20 A	SPARE	
2" - 3#1/0, #6G	LP-2	100 A	3	37	0.0	0.0					38	1	20 A	SPARE	
				39			0.0	0.0			40	1	20 A	SPARE	
				41					0.0	0.0	42	1	20 A	SPARE	
		TOTAL LOAD:			0 kVA		0 kVA		0 kVA						
		TOTAL AMPS:			0 A		0.0 A		0 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
Other	0 VA	0.00%	0 VA		
Receptacle	0 VA	0.00%	0 VA	CONNECTED LOAD:	0 VA
				ESTIMATED DEMAND:	0 VA
				CONNECTED CURRENT:	0.0 A
				EST. DEMAND CURRENT:	0.0 A

NOTES:

PANELBOARD: LP-2

LOCATION:
MOUNTING: SURFACE NEMA1
MAIN DEVICE: 100.0 A MLO
BUS AMPS: 100 AMPS

VOLTAGE: 208Y/120 V, 3 ø 4 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		PHASE C kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 2#12, #12G	RCPT: FILTER ROOM	20 A	1	1	0.0	0.3					2	1	20 A	LTS: FILTER/CHEM ROOM	3/4" - 2#12, #12G
3/4" - 2#12, #12G	RCPT: HMO, CL2, TOILET	20 A	1	3			0.0	0.0			4	1	20 A	EXTERIOR LIGHTING	3/4" - 2#12, #12G
	SPARE	20 A	1	5					0.0	0.0	6	1	20 A	LTS: PUMP ROOM	3/4" - 2#12, #12G
3/4" - 3#12, #12G	EWH-1	20 A	3	7	1.5	0.0					8	1	20 A	SPARE	
				9			1.5	0.0			10	1	20 A	FT-SW-1, FT-SW-2	3/4" - 2#12, #12G
				11					1.5	0.0	12	1	20 A	FT-BWR-1, FT-BWW-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EWH-2	20 A	2	13	1.1	0.0					14	1	20 A	SOLENOID PANEL 1	3/4" - 2#12, #12G
				15			1.1	0.0			16	1	20 A	SOLENOID PANEL 2	3/4" - 2#12, #12G
3/4" - 2#12, #12G	GUH-2	20 A	1	17					0.0	0.0	18	1	20 A	FCV-FW-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	GUH-3	20 A	1	19	0.0	0.0					20	1	20 A	POLE LIGHT AA1	3/4" - 2#10, #12G
3/4" - 2#12, #12G	DEH-1	20 A	1	21			0.0	0.0			22	1	20 A	POLE LIGHT AA2	3/4" - 2#10, #12G
3/4" - 2#12, #12G	DEH-2	20 A	1	23					0.0	0.0	24	1	20 A	WIT-CL2-1 SCALE	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DEH-3	20 A	1	25	0.0	0.0					26	1	20 A	OF-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	DEH-4	20 A	1	27			0.0	0.0			28	1	20 A	HZ-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-1 AND MD-1	20 A	1	29					0.0	0.0	30	1	20 A	AIT-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-2 AND MD-2	20 A	1	31	0.0	0.0					32	1	20 A	SV-CL2-1	3/4" - 2#12, #12G
3/4" - 2#12, #12G	EF-3 AND MD-3	20 A	1	33			0.0	0.0			34	1	20 A	SPARE	
3/4" - 2#12, #12G	EF-4	20 A	1	35					0.0	0.0	36	1	20 A	SPARE	
	SPARE	20 A	1	37	0.0	0.0					38	1	20 A	RCPT: BACKWASH TANKS	3/4" - 2#12, #12G
	SPARE	20 A	1	39			0.0	0.0			40	1	20 A	REMOTE SCADA PANEL RCP-19	3/4" - 2#12, #12G
	SPARE	20 A	1	41					0.0	0.0	42	1	20 A	FACP	3/4" - 2#12, #12G
		TOTAL LOAD:			3 kVA		3 kVA		2 kVA						
		TOTAL AMPS:			25 A		21.9 A		20 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
LITES	1284 VA	125.00%	1605 VA		
Receptacle	0 VA	0.00%	0 VA	CONNECTED LOAD:	1284 VA
				ESTIMATED DEMAND:	1605 VA
				CONNECTED CURRENT:	3.6 A
				EST. DEMAND CURRENT:	4.5 A

NOTES:

PANELBOARD: LP-1A

LOCATION: Space 6
MOUNTING: SURFACE NEMA 1
MAIN DEVICE: 100.0 A MCB
BUS AMPS: 100 AMPS

VOLTAGE: 120/240 V, 1 ø 3 W.
A.I.C. RATING: 10,000 AMPS SYMMETRICAL
SPECIAL:

CONDUIT/ WIRE	LOAD DESCRIPTION	BKR	P	CKT	PHASE A kVA		PHASE B kVA		CKT	P	BKR	LOAD DESCRIPTION	CONDUIT/ WIRE
3/4" - 3#10, #10G	GRINDER PUMPS	30 A	2	1	0.0	0.0			2	2	60 A	WEATHER INSTRUMENTATION	1" - 3#4, #10G
				3			0.0	0.0	4				
3/4" - 3#12, #12G	CP-GP GRINDER CONTROL PANEL	20 A	1	5	0.0	--			6	1	--	SPACE	
	SPACE	--	1	7			--	--	8	1	--	SPACE	
	SPACE	--	1	9	--	--			10	1	--	SPACE	
	SPACE	--	1	11			--	--	12	1	--	SPACE	
	SPACE	--	1	13	--	--			14	1	--	SPACE	
	SPACE	--	1	15			--	--	16	1	--	SPACE	
		TOTAL LOAD:			0 kVA		0 kVA						
		TOTAL AMPS:			0 A		0.0 A						

LOAD CLASSIFICATION	CONNECTED	DEMAND	ESTIMATED	PANEL TOTALS	
				CONNECTED LOAD:	0 VA
				ESTIMATED DEMAND:	0 VA
				CONNECTED CURRENT:	0.0 A
				EST. DEMAND CURRENT:	0.0 A

NOTES:

FIXTURE SCHEDULE					
TYPE	FIXTURE DESCRIPTION	VOLTAGE	MOUNTING	CATALOG NUMBER (OR APPROVED EQUAL)	LUMENS/ WATTS
C1	THERMOPLASTIC EXIT, 1 OR 2 FACE, SELF DIAGNOSTIC DRY DAMP LOCATIONS (SUPPORTS [illegible] OF REMOTE HEADS)	120/277	SURFACE UNIVERSAL	LITHONIA LHQM LED R HO RO SD	3
EM1	EMERGENCY LIGHT, THERMOPLASTIC (2) 1.2W LED HEADS, SELF D. 35' SPACING, DAMP LOCATION, SUPPORTS 2.4W OF REMOTE	120/277	WALL/CEIL	LITHONIA ELM2L SDRT	2.4
H1	LED WALL PACK	MVOLT	WALL 12'-0" AFF	LITHONIA TWX2 LED P3 40K MVOLT DWHXD	[illegible]
V1	4' LED VAPORPROOF ACRYLIC LINEAL PRISMED FROSTED LENS, W/OCCUPANCY SENSOR	MVOLT	SURFACE/ SUSPENDED	LITHONIA FEM L48 3000LM IMAFL MD MVOLT 40K 80CRI [illegible]	[illegible]
WP	EXTERIOR LED W/90 DEG CUTOFF, PHOTOCELL [illegible]	MVOLT	WALL	LITHONIA DSXW1 LED 20C 1000 40K TFTM MVOLT	[illegible]
WO	EXTERIOR LED W/90 DEG CUTOFF, PHOTOCELL, MOTION SENSOR [illegible]	MVOLT	WALL	LITHONIA DSXW1 LED 20C 1000 40K TFTM MVOLT PIR	6,061 47
AA1	LED W/90 DEG CUTOFF W/PC, 25' ROUND TAPPERED POLE W/ ARM	MVOLT	POLE	LITHONIA DSX1 LED P1 40K T4M MVOLT HS POLE +HOLOPHANE	12,082 102
AA2	LED W/90 DEG CUTOFF W/PC, 25' ROUND TAPPERED POLE W/ ARM	MVOLT	POLE	LITHONIA DSX1 LED P1 40K T4M MVOLT HS POLE +HOLOPHANE	12,082 102

NOTES:
1. FOR SUSPENDED FIXTURES PROVIDE AIRCRAFT CABLE, BRACKETS AND HARDWARE. CHAIN IS NOT APPROVED.
2. PROVIDE FIXTURES SHOWN OR APPROVED EQUALS.

1 / E701 FIXTURE SCHEDULE
NOT TO SCALE

12/1/2023 12:49:37 PM

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

SEH Project: MADWU 167818
Checked By: CBW
Drawn By: DOH

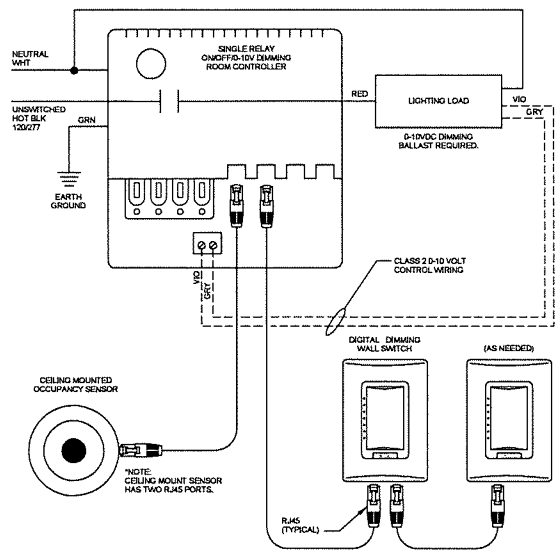
Project Status: BIDDING DOCUMENTS
Issue Date: OCTOBER, 2023

REVISION SCHEDULE

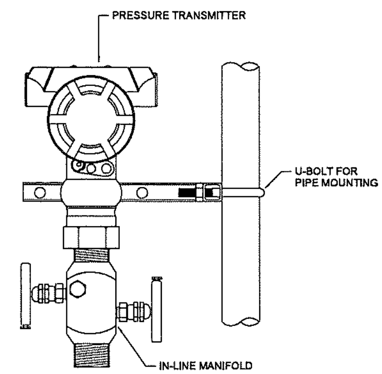
REV. #	DESCRIPTION	DATE

SCHEDULES

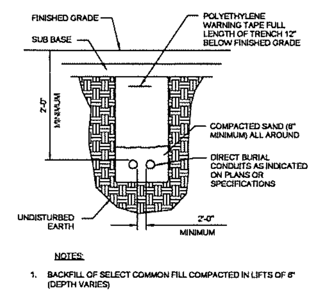
01
E701



1 DE03 WATTSTOPPER DIAGRAM
NOT TO SCALE

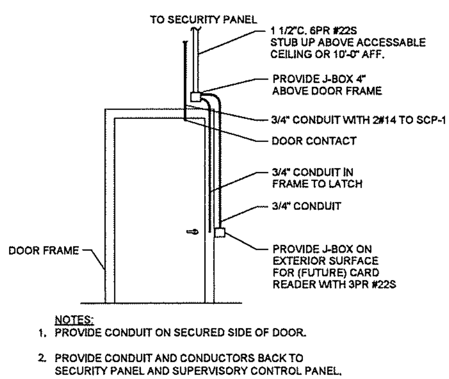


2 DE03 PRESSURE TRANSMITTER PIPE MOUNT
NOT TO SCALE



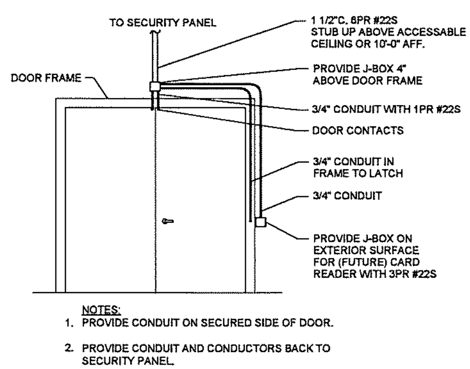
NOTES:
1. BACKFILL OF SELECT COMMON FILL COMPACTED IN LIFTS OF 6" (DEPTH VARIES)

5 DE03 DIRECT-BURIED CONDUIT
NOT TO SCALE



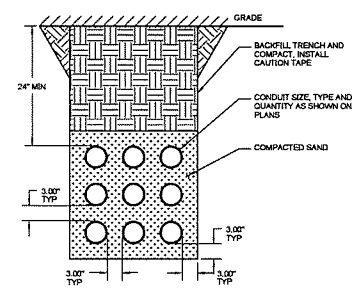
NOTES:
1. PROVIDE CONDUIT ON SECURED SIDE OF DOOR.
2. PROVIDE CONDUIT AND CONDUCTORS BACK TO SECURITY PANEL AND SUPERVISORY CONTROL PANEL.

3 DE03 SINGLE DOOR SECURITY ROUGH-IN
NOT TO SCALE



NOTES:
1. PROVIDE CONDUIT ON SECURED SIDE OF DOOR.
2. PROVIDE CONDUIT AND CONDUCTORS BACK TO SECURITY PANEL.

4 DE03 DOUBLE DOOR SECURITY ROUGH-IN
NOT TO SCALE



6 DE03 DUCT BANK
NOT TO SCALE

SEH

Project Owner

CITY OF MADISON WATER UTILITY
UNIT WELL 19 TREATMENT SYSTEM ADDITION
2526 LAKE MENDOTA DRIVE
MADISON, WISCONSIN

Project Status
BIDDING DOCUMENTS

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

DETAILS

DE03

ADDENDUM 1

SECTION E: BIDDERS ACKNOWLEDGEMENT

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

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 Joe Daniels Construction Co., Inc. (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of Wisconsin a partnership consisting of _____; an individual trading as _____; of the City of Madison State of Wisconsin; 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.

Samuel J. Daniels
SIGNATURE Samuel J. Daniels

President
TITLE, IF ANY

Sworn and subscribed to before me this
14th day of December, 20 23

Keea I. Sainsbury
(Notary Public or other officer authorized to administer oaths)

KEEA I. SAINSBURY NOTARY PUBLIC STATE OF WISCONSIN

My Commission Expires 07/17/2024

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

Section E: Bidder's Acknowledgement

This section is a required document for the bid to be considered complete. There are two methods for completing the Bidder Acknowledgement Report. Method one: The report can be downloaded, completed, and uploaded to this site to be included with your electronic bid. Method two: The report can be downloaded from the site and submitted by hand to the City of Madison. Either method of submission requires that the Bidder Acknowledgement Report be received by the bid due date.

Please select the method of submission below. The form is in the section below to download and upload to the site or download and submit by hand.

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

Method of Submittal for Bidder Acknowledgement (click in box below to choose) *

I will turn in Bidder Acknowledgement Downloadable Document by hand.

The bidder acknowledges receipt of the following addenda to the contract for the above designated project. Please check the appropriate box for each addendum reviewed. If no addenda have been issued, then no boxes are required to be checked.

Any addenda issues after 12:00 P.M. on the Wednesday proceeding the bid due date shall include a provision extending the bid due date.

Addendum Acknowledgement

Acknowledge each Addenda reviewed by checking the appropriate checkboxes below.

☑ **Addendum 1**

*

☑ **Addendum 2**

*

☑ **Addendum 3**

*

☑ **Addendum 4**

*

☑ **Addendum 5**

*

☑ **Addendum 6**

*

Section F: Best Value Contracting (BVC) Fillable Online Form

Best Value Contracting

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

Trucking & Landscaping

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

ADDENDUM 1

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

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: Joe Daniels Construction Co., Inc.

Address: 919 Applegate Road, Madison, WI 53713

Telephone Number: 608/271-4800 Fax Number: 608/271-4570

Contact Person/Title: Sam Daniels - President

Prime Bidder Certification

I, Samuel J. Daniels (Name), President (Title) of

Joe Daniels Construction Co., Inc. (Company) certify that the information

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

Witness' Signature

Bidder's Signature

12/14/2023
Date

ADDENDUM 1

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

Small Business Enterprise Compliance Report

Summary Sheet

SBE Subcontractors Who Are NOT Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
Mobile Glass	glass/glazing	.58 %
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
Subtotal SBE who are NOT suppliers:		.58 %

SBE Subcontractors Who Are Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%

Subtotal Contractors who are suppliers: -0- % x 0.6 = -0- % (discounted to 60%)

Total Percentage of SBE Utilization: .58 %.

UNIT WELL 19 TREATMENT SYSTEM ADDITION

CONTRACT NO. 9289
DATE: 12/14/23

		Joe Daniels Construction Co., Inc.	
Item	Quantity	Price	Extension
Section B: Proposal Page			
1 - Construction of Unit Well 19 Treatment System Addition - LS	1.00	$7,344,825.00	$7,344,825.00
Section B: Alternate Bid No. 1			
2 - ALTERNATE BID #1: Construction of Unit Well 19 Roof Remediation - LS	1.00	$195,600.00	$195,600.00
2 Items - Total	Totals		$7,540,425.00

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

Principal Engineer 1
Christina M. Bachmann, P.E.
Mark D. Moder, P.E.
James M. Wolfe, P.E.

Facilities & Sustainability
Bryan Cooper, Principal Architect

Land Information & Official Map Manager
Eric T. Pederson, P.S.

Financial Manager
Steven B. Danner-Rivers

BIENNIAL BID BOND

Joe Daniels Construction Co., Inc.
(a corporation of the State of WI)
(individual), (partnership), (hereinafter referred to as the "Principal") and
The Cincinnati Insurance Company
a corporation of the State of Ohio (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 1/1/2022 through 12/31/2023.

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

Joe Daniels Construction Co., Inc.
COMPANY NAME AFFIX SEAL

November 11, 2021
DATE

By: _____
SIGNATURE AND TITLE

Samuel J. Daniels - Corporate Secretary

SURETY

The Cincinnati Insurance Company
COMPANY NAME AFFIX SEAL

November 11, 2021
DATE

By: _____
SIGNATURE AND TITLE

Kathryn A. Weidner, Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the Surety in Wisconsin under National Provider No. 6497333 for the year 2021 and appointed as attorney in fact with authority to execute this bid bond, which power of attorney has not been revoked.

November 11. 2021
DATE

_____
AGENT SIGNATURE

740 Regent Streey
ADDRESS

Madison, WI 53715
CITY, STATE AND ZIP CODE

262-446-6036
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.

THE CINCINNATI INSURANCE COMPANY
THE CINCINNATI CASUALTY COMPANY

Fairfield, Ohio

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That THE CINCINNATI INSURANCE COMPANY and THE CINCINNATI CASUALTY COMPANY, corporations organized under the laws of the State of Ohio, and having their principal offices in the City of Fairfield, Ohio (herein collectively called the "Companies"), do hereby constitute and appoint

Patrick A. McKenna; Judith A. Walker; Brooke L. Parker; Elizabeth Mosca; David Zenobi; Kathryn A. Weldner and/or Jay A. Zahn

of Madison, Wisconsin their true and legal Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and deliver on behalf of the Companies as Surety, any and all bonds, policies, undertakings or other like instruments, as follows: Any such obligations in the United States, up to Thirty Million and No/100 Dollars ($30,000,000.00).

This appointment is made under and by authority of the following resolutions adopted by the Boards of Directors of The Cincinnati Insurance Company and The Cincinnati Casualty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the President or any Vice President be hereby authorized, and empowered to appoint Attorneys-in-Fact of the Company to execute any and all bonds, policies, undertakings, or other like instruments on behalf of the Corporation, and may authorize any officer or any such Attorney-in-Fact to affix the corporate seal; and may with or without cause modify or revoke any such appointment or authority. Any such writings so executed by such Attorneys-in-Fact shall be binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company.

RESOLVED, that the signature of the President or a Vice President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Secretary and the Seal of the Company may be affixed by facsimile to any certificate of any such power and any such power of certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certified by certificate so executed and sealed shall, with respect to any bond or undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS WHEREOF, the Companies have caused these presents to be sealed with their corporate seals, duly attested by their President or a Senior Vice President this 19th day of December, 2018.

THE CINCINNATI INSURANCE COMPANY
THE CINCINNATI CASUALTY COMPANY

STATE OF OHIO)SS:
COUNTY OF BUTLER)

On this 19th day of December, 2018 before me came the above-named President or Vice President of The Cincinnati Insurance Company and The Cincinnati Casualty Company, to me personally known to be the officer described herein, and acknowledged that the seals affixed to the preceding instrument are the corporate seals of said Companies and the corporate seals and the signature of the officer were duly affixed and subscribed to said instrument by the authority and direction of said corporations.

Keith Collett, Attorney at Law
Notary Public – State of Ohio
My commission has no expiration date.
Section 147.03 O.R.C.

I, the undersigned Secretary or Assistant Secretary of The Cincinnati Insurance Company and The Cincinnati Casualty Company, hereby certify that the above is the Original Power of Attorney issued by said Companies, and do hereby further certify that the said Power of Attorney is still in full force and effect.

Given under my hand and seal of said Companies at Fairfield, Ohio, this 3rd day of January , 2022 .

SECTION H: AGREEMENT

THIS AGREEMENT made this 31st day of January in the year Two Thousand and Twenty-Four between **JOE DANIELS CONSTRUCTION CO., INC.** hereinafter called the Contractor, and the City of Madison, a Wisconsin municipal corporation, hereinafter called the City.

WHEREAS, the Common Council of the City of Madison ("Council") under the provisions of a resolution adopted on **JANUARY 23, 2024**, and by virtue of authority vested in the Council, has awarded to the Contractor the work of performing certain public construction.

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

1. **Scope of Work.** The Contractor shall perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and Agreement; perform all items of work covered or stipulated in the Proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

2. **Completion 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 and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.

3. **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 **SEVEN MILLION FIVE HUNDRED FORTY THOUSAND FOUR HUNDRED TWENTY-FIVE AND NO/100** (**$7,540,425.00**) Dollars being the amount bid by such Contractor and which was awarded as provided by law.

4. **A. Non-Discrimination.** During the term of this Agreement the Contractor agrees not to 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, arrest 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.

   B. Affirmative Action. 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 and deadlines, shall be provided to the City by the opening date of advertisement and with sufficient time for the City to notify candidates and make a timely referral. The Contractor agrees to interview

and consider candidates referred by the Affirmative Action Division, or an organization designated by the 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 original 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.

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.

7. **Choice of Law and Forum Selection.** This Contract shall be governed by and construed, interpreted and enforced in accordance with the laws of the State of Wisconsin. The parties agree, for any claim or suit or other dispute relating to this Contract that cannot be mutually resolved, the venue shall be a court of competent jurisdiction within the State of Wisconsin and the parties agree to submit themselves to the jurisdiction of said court, to the exclusion of any other judicial district that may have jurisdiction over such a dispute according to any law.

8. **Counterparts, Electronic Signature and Delivery.** This Contract may be signed in counterparts, each of which shall be taken together as a whole to comprise a single document. Signatures on this Contract may be exchanged between the parties by facsimile, electronic scanned copy (.pdf) or similar technology and shall be as valid as original; and this Contract may be converted into electronic format and signed or given effect with one or more electronic signature(s) if the electronic signature(s) meets all requirements of Wis. Stat. ch. 137 or other applicable Wisconsin or Federal law. Executed copies or counterparts of this Contract may be delivered by facsimile or email and upon receipt will be deemed original and binding upon the parties hereto, whether or not a hard copy is also delivered. Copies of this Contract, fully executed, shall be as valid as an original.

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO.9289

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused this contract to be executed by its Mayor and City Clerk on the dates written below.

Countersigned:

Keea I. Sainsbury 1-24-24
Witness Keea I. Sainsbury Date

Keea I. Sainsbury 1-24-24
Witness Keea I. Sainsbury Date

JOE DANIELS CONSTRUCTION CO., INC.
Company Name

1-24-24
President Samuel J. Daniels Date

1-24-24
Secretary Joseph A. Daniels Date

CITY OF MADISON

Satya Rhodes-Conway, Mayor — 01/31/2024
Date

Maribeth Witzel-Behl, City Clerk — 1/29/2024
Date

Provisions have been made to pay the liability that will accrue under this contract.

David P. Schmiedicke, Finance Director — 1/30/2024
Date

Approved as to form:

Michael Haas, City Attorney — 1/31/2024
Date

Execution of this Agreement by City was authorized by Resolution Enactment No. RES - 24-00048, ID No. 81415, adopted by the Common Council of the City of Madison on Jan. 23, 2024.

BOND NO. 3296887

SECTION I: PAYMENT AND PERFORMANCE BOND

LET ALL KNOW BY THESE DOCUMENTS PRESENTED, that we **JOE DANIELS CONSTRUCTION CO., INC.** as principal, and The Cincinnati Insurance Company Company of Cincinnati, Ohio as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of **SEVEN MILLION FIVE HUNDRED FORTY THOUSAND FOUR HUNDRED TWENTY-FIVE AND NO/100** (**$7,540,425.00**) 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:

UNIT WELL 19 TREATMENT SYSTEM ADDITION
CONTRACT NO. 9289

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 24th day of January 2024

Countersigned:

Witness Keea I. Sainsbury

Secretary Joseph A. Daniels

JOE DANIELS CONSTRUCTION CO.,
Company Name (Principal)

President Samuel J. Daniels Seal no seal

The Cincinnati Insurance Company
Surety Seal

☐ Salary Employee ☒ Commission

By
Attorney-in-Fact - Patrick A. McKenna

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Producer Number 650765 for the year 2024, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

January 24, 2024
Date

Agent Signature - Patrick A. McKenna

The foregoing Bond has been approved as to form:

1/31/2024
Date

Michael Haas
City Attorney

THE CINCINNATI INSURANCE COMPANY
THE CINCINNATI CASUALTY COMPANY

Fairfield, Ohio

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That THE CINCINNATI INSURANCE COMPANY and THE CINCINNATI CASUALTY COMPANY, corporations organized under the laws of the State of Ohio, and having their principal offices in the City of Fairfield, Ohio (herein collectively called the "Companies"), do hereby constitute and appoint

Patrick A. McKenna; Judith A. Walker; Brooke L. Parker; David Zenobi; Kathryn A. Weidner; Jay A. Zahn; Jenny L. Hirth and/or Lynn E. Potter

of Madison, Wisconsin
their true and legal Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and deliver on behalf of the Companies as Surety, any and all bonds, policies, undertakings or other like instruments, as follows:

Any such obligations in the United States, up to
Thirty Million and No/100 Dollars ($30,000,000.00).

This appointment is made under and by authority of the following resolutions adopted by the Boards of Directors of The Cincinnati Insurance Company and The Cincinnati Casualty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the President or any Senior Vice President be hereby authorized, and empowered to appoint Attorneys-in-Fact of the Company to execute any and all bonds, policies, undertakings, or other like instruments on behalf of the Corporation, and may authorize any officer or any such Attorney-in-Fact to affix the corporate seal; and may with or without cause modify or revoke any such appointment or authority. Any such writings so executed by such Attorneys-in-Fact shall be binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company.

RESOLVED, that the signature of the President or any Senior Vice President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Secretary or Assistant Vice-President and the Seal of the Company may be affixed by facsimile to any certificate of any such power and any such power of certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certified by certificate so executed and sealed shall, with respect to any bond or undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS WHEREOF, the Companies have caused these presents to be sealed with their corporate seals, duly attested by their President or any Senior Vice President this 16th day of March, 2021.

THE CINCINNATI INSURANCE COMPANY
THE CINCINNATI CASUALTY COMPANY

Stephen A. Ventre

STATE OF OHIO)SS:
COUNTY OF BUTLER)

On this 16th day of March, 2021 before me came the above-named President or Senior Vice President of The Cincinnati Insurance Company and The Cincinnati Casualty Company, to me personally known to be the officer described herein, and acknowledged that the seals affixed to the preceding instrument are the corporate seals of said Companies and the corporate seals and the signature of the officer were duly affixed and subscribed to said instrument by the authority and direction of said corporations.

Keith Collett, Attorney at Law
Notary Public – State of Ohio
My commission has no expiration date.
Section 147.03 O.R.C.

I, the undersigned Secretary or Assistant Vice-President of The Cincinnati Insurance Company and The Cincinnati Casualty Company, hereby certify that the above is the Original Power of Attorney issued by said Companies, and do hereby further certify that the said Power of Attorney is still in full force and effect.

Given under my hand and seal of said Companies at Fairfield, Ohio, this 24th day of January , 2024 .

BN-1457 (3/21)