MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON
P.O. BOX 897
EFFINGHAM, ILLINOIS 62401
PHONE: 217/347-7262 or 217/342-3456
TOLL FREE: 800/677-2714
FAX: 217/342-3433
EMAIL: mgengineers@mgengineers.com

LETTER OF TRANSMITTAL

DATE	JOB NO.
MAY 8, 2026	22228

ATTENTION:

RE:
W2E, INC.
P.O. BOX 122
GRAYVILLE, IL 62844

ADDENDUM #2

TO:
ALL PLAN HOLDERS

WE ARE SENDING:

- [X] **ATTACHED**
- [ ] **UNDER SEPARATE COVER VIA** _____:
- [ ] SPECIFICATIONS
- [ ] SHOP DRAWINGS
- [ ] OTHER:
- [ ] PLANS
- [ ] CHANGE ORDERS
- [X] ADDENDUM #2
- [ ] PRINTS
- [ ] LETTERS

COPIES	DATE	NO	DESCRIPTION
1	5/8/2026		W2E Water Treatment Plant, Edwards/White County, IL
			ADDENDUM #2

THESE ARE BEING SENT:

- [ ] FOR YOUR APPROVAL
- [X] FOR YOUR USE
- [ ] FOR YOUR REVIEW
- [ ] FOR YOUR COMMENTS
- [ ] FOR YOUR SIGNATURE
- [ ] AS REQUESTED
- [ ] APPROVED AS NOTED
- [ ] APPROVED AS SUBMITTED
- [ ] APPROVED AS CHANGED
- [ ] REJECTED AS NOTED
- [ ] REJECTED AS CHANGED
- [ ] RETURNED FOR CORRECTIONS
- [ ] RESUBMIT ___ COPIES FOR APPROVAL
- [ ] SUBMIT __ COPIES FOR DISTRIBUTION
- [ ] RENEW ___ COPIES FOR _____
- [X] FOR BIDS DUE:

May 18, 2026 at 1:30 p.m.

323 W 3rd St., P.O. Box 160,
Mt. Carmel, IL 62863

NOTES:

COPY TO:

SIGNATURE
Rex A. Gower, P.E.

bf

Milano & Grunloh Engineers, LLC
engineering | surveying

OWNERS
LEE R. BECKMAN, P.E., P.L.S.
DOUGLAS C. GRUNLOH, P.L.S.

LICENSEES
REX A. GOWER, P.E.

ADDENDUM #2
W2E, INC.
WATER TREATMENT PLANT
EDWARDS/WHITE COUNTY, IL
MAY 8, 2026

All plan holders of the plans and specifications for "W2E Water Treatment Plant Project, Edwards/White County, IL" shall include this Addendum #2 as part of the plans and specifications for the project and shall take into account that this Addendum #2 revises and amends the original plans and specifications.

ITEM #1 – BID PACKAGE
See enclosed bid package to aid in bid submission.

ITEM #2 – INSURANCE REQUIREMENTS
See enclosed Article 6 for insurance requirements for the project.

ITEM #3 – REVISED PLAN SHEETS
Replace Civil Plan Sheets:

3 – Hydraulic Profile
6 – Site
11 – Drying Beds
14 – Aerator-Headtank
17 – Claricone
18 – Recarb
19 – Filter
21 – Clearwell Profile
24 – Controls ID
26 – Power ID
29 – Valve ID
31 – Underground Piping Schedule
33 – Piping Plan
34 – UG Piping Plan
36 – HT Influent Profile
39 – Claricone Eff – Recarb Inf Plan
40 – Claricone Eff – Recarb Inf Profile
41 – Claricone Slurry Plan
42 – Claricone Slurry Profile
49 – Backwash Effluent Plan
50 – Backwash Effluent Profile
51 – Filter Air Scour Plan
53 – Pump Piping Plan
54 – Transfer Pump Piping
55 – Backwash Pump Piping
57 – GST Plan
58 - 1 MG Tank
59 – Sample Points
61 – Miscellaneous Details
72 – Well Connections
77 – Waste Discharge

Replace all Photovoltaic Plan Sheets (attached)

Milano & Grunloh Engineers, LLC
engineering | surveying

OWNERS
LEE R. BECKMAN, P.E., P.L.S.
DOUGLAS C. GRUNLOH, P.L.S.

LICENSEES
REX A. GOWER, P.E.

ITEM #4 – TECHNICAL SPECIFICATIONS

Add Technical Specification:

Section 46 51 11 – Induced Draft Aerator

Replace Technical Specifications:

Section 33 05 05 - Buried Pipe Installation
Section 33 12 16 – Tapping Sleeves and Valves
Section 33 16 33 - Prestressed Concrete Water Storage Tanks
Section 40 05 57 - Actuators for Process Valves and Gates
Section 40 05 64 - Valves for Actuator Control
Section 40 97 00 - Variable Frequency Drive
Section 41 14 23 - Bulk Bag-Handling Batching Equipment
Section 43 10 00 – Recarbonation Tank
Section 46 43 53 - Solids Contact Clarifier
Section 46 61 17 - Air Scour Equipment
Section 46 61 26 - High Rate Sand Filters

ITEM #5 – GEOTECHNICAL REPORT

Include the attached geotechnical report with contract documents.

ITEM #6 – STORMWATER POLLUTION PREVENTION PLAN

Include the attached SWPPP with contract documents.

ITEM #7 – REQUEST FOR INFORMATION

Included are all RFI's received to date.

Prepared By:
MILANO & GRUNLOH ENGINEERS, LLC
May 8, 2026
Job #22228

BID PACKAGE FOR
W2E INC. WATER TREATMENT PLANT
CITIES OF ALBION & GRAYVILLE
EDWARDS & WHITE COUNTIES, IL

FOR BID OPENING ON
MONDAY, MAY 18, 2026 AT 1:30 P.M.

PLEASE SUBMIT TO:
HAMPTON, LENZINI, AND RENWICK, INC.
P.O. BOX 160
MT. CARMEL, IL 62863

INFORMATION FOR BIDDERS

BIDS will be received by **Hampton, Lenzini, and Renwick, Inc.**

(herein called the "OWNER"), at **P.O. Box 160, Mt. Carmel, IL 62863**

until **May 5th, 2026** , and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to **Hampton, Lenzini, and Renwick, Inc.**

at **P.O. Box 160, Mt. Carmel, IL 62863** . Each sealed envelope containing a BID must be plainly marked on the outside as BID for **W2E Water Treatment Plant**

and the envelope should bear on the outside the name of the BIDDER, his/her address, his/her license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to **Hampton, Lenzini, and Renwick, Inc., P.O. Box 160, Mt. Carmel, IL 62863** .

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

Any BID may be modified or withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information that is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him or her from fulfilling any of the conditions of the contract.

A BID bond payable to the OWNER must accompany each BID for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

Any contract entered into by the loan recipient and any sub-agreement hereunder, shall provide that representatives of the Agency will have access to the work whenever it is in preparation or progress and that the contractor or subcontractor will provide proper facilities for such access and inspection. Such contract or sub-agreement must also provide that the Agency or any authorized representative shall have access to any books, documents, papers, and records of the contractor or subcontractor, which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The necessary Agreement and BOND forms shall accompany the NOTICE OF AWARD. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his or her or her option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his or her signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR might terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he or she deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the low, responsive, responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout, including the Employment of Illinois Workers on Public Works Act (30 ILCS 570) and the Davis-Bacon Wage Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor.

BIDDERS will comply with the federal Build America, Buy America Act (BABA) which is included in the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 and specifies that all iron, steel, manufactured products, and construction materials used in the project are produced in the United States.

BIDDER shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Each BIDDER shall supply a list of all subcontractors that submitted proposals and if requested by the OWNER all major material suppliers.

The ENGINEER is: Lee R. Beckman, P.E., P.L.S., Milano & Grunloh Engineers, LLC.

His/her address is: 114 W Washington Avenue, Effingham, IL 62401.

BID FORM OR PROPOSAL

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____* to W2E, Inc. (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for:
Construction of a 2.16 MGD lime softening water treatment plant consisting of a head tank with aerator, two (2) claricone upflow clarifiers, one (1) recarbonation tank, three (3) filters, clearwell, ground storage tank, chemical feeds, lime drying beds, SCADA, pre-engineered metal building and appurtenances. The project also includes the construction of watermain, a well, and offsite renovations regarding SCADA.

in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within 450 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages the sum of $500 for each consecutive calendar day thereafter.

BIDDER certifies that all iron, steel, manufactured products, and construction materials used in the project for the construction, alteration, maintenance, or repair of a public water system (PWS) are produced in the United States in compliance with the federal Build America, Buy America Act, Pub. L. No. 117-58 §§ 70901-52.

* **Insert "a corporation", "a partnership", or "an individual" as applicable.**

I. By submission of the bid, each bidder certifies, and in the case of a joint bid each party to the joint bid certifies, as to his or her own organization, that in connection with the bid:

   i. The prices in the bid have been arrived at independently, without consultation, communication, or agreement with any other bidder or with any competitor, for the purpose of restricting competition, as to any matter relating to the prices;

   ii. Unless otherwise required by law, the prices quoted in the bid have not knowingly been directly or indirectly disclosed to any other bidder or to any competitor prior to opening; and

   iii. No attempt has been made or will be made by the bidder to induce any other person or firm to submit or withhold a bid for the purpose of restricting competition;

II. Each person signing the bid shall certify that:

   i. He or she is the person in the bidder's organization responsible for the decision as to the prices being bid and that he or she has not participated, and will not participate, in any action contrary to (I)(i) through (I)(iii) above; or

   ii. He or she is not the person in the bidder's organization responsible for the decision as to the prices being bid, but that he or she has been authorized to act as agent certifying that the persons determining the prices have not participated, and will not participate, in any action contrary to (I)(i) through (I)(iii) above, and as their bidder's agent shall so certify. He or she shall also certify that he or she has not participated, and will not participate, in any action contrary to (I)(i) through (I)(iii) above.

BIDDER acknowledges receipt of the following ADDENDUM (Where applicable): _____

DAVIS-BACON WAGE ACT CLAUSES

BIDDER certifies that wages paid in connection with the PROJECT shall be paid at prevailing rates not less than those prevailing under the Davis-Bacon Wage Act. Bidder further certifies that the provisions contained in the following clauses will be exercised in the performance of any contract resulting from this BID and are made a part of the CONTRACT DOCUMENTS thereto by their inclusion in the BID as follows:

1. *Minimum wages*:

   i. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, https://sam.gov/.

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

      (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
      (2) The classification is utilized in the area by the construction industry; and
      (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

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

   (C) In the even the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub-recipient do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), Illinois EPA shall refer the questions,

including the views of all interested parties and the recommendation of the sub-recipient, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise Illinois EPA or will notify Illinois EPA within the 30-day period that additional time is necessary.

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

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

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

2. *Withholding.* The sub-recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the sub-recipient may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. *Payrolls and basic records.*

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

ii. (A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the sub-recipient. Such documentation shall be available upon request of Illinois EPA or USEPA. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.*, the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is

available for this purpose from the Wage and Hour Division Website, [https://beta.dol.gov/forms-posters/forms/wh-347-davis-bacon-and-related-acts-weekly-certified-payroll-form]. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the sub-recipient, for transmission to the Illinois EPA, USEPA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sub-recipient.

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

(1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

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

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

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

4. *Apprentices and trainees*

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

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

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

iii. *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of CFR part 30.

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

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

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

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

9. *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the

procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. *Certification of eligibility.*

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

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

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

Contract Provision for Contracts in Excess of $100,000 - clauses (1) through (4) shall be inserted in full in any contract in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act.

Contract Work Hours and Safety Standards Act

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

2. *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanics, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $25 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

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

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

The following shall be inserted into any contract subject only to the Contract Work Hours and Safety Standards Act.

The contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the USEPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

*******INSERT APPLICABLE CURRENT DAVIS-BACON WAGE RATES HERE*******

"General Decision Number: IL20260016 01/02/2026

Superseded General Decision Number: IL20250016

State: Illinois

Construction Types: Heavy and Highway

Counties: Alexander, Clay, Crawford, Edwards, Effingham, Fayette, Franklin, Gallatin, Hamilton, Hardin, Jackson, Jasper, Jefferson, Johnson, Lawrence, Marion, Massac, Perry, Pope, Pulaski, Randolph, Richland, Saline, Union, Wabash, Wayne, White and Williamson Counties in Illinois.

CRAWFORD, EFFINGHAM & JASPER COUNTIES:

HEAVY CONSTRUCTION PROJECTS (including Sewer & Water Line Construction & Drainage Projects) & HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects, and railroad construction; bascule, suspension & spandrel arch bridges; bridges designed for commercial navigation; bridges involving marine construction, other major bridges).

Modification Number	Publication Date
0	01/02/2026

CARP0243-007 05/15/2020

CRAWFORD, EFFINGHAM, and JASPER COUNTIES

	Rates	Fringes
CARPENTER	$ 33.54	27.97
PILEDRIVERMAN	$ 33.54	27.97

CARP0634-002 05/01/2021

CLAY, EDWARDS, FAYETTE, LAWRENCE, MARION, RICHLAND, and WABASH COUNTIES

	Rates	Fringes
CARPENTER	$ 39.02	18.90

CARP0636-001 05/01/2021

HAMILTON, JEFFERSON, WAYNE, and WHITE COUNTIES

	Rates	Fringes
CARPENTER	$ 39.02	18.90

DIVERS (receive 1 1/2 times carpenter rate plus fringes and $25 per day for equipment)

CARP0640-005 05/01/2021

ALEXANDER, FRANKLIN, HARDIN, MASSAC, JACKSON, PERRY, POPE, JOHNSON, GALLATIN, PULASKI, SALINE, UNION, and WILLIAMSON COUNTIES

	Rates	Fringes
CARPENTER	$ 38.52	18.90

DIVERS (Receive 1 1/2 times Carpenter's rate plus fringe benefits and $25.00 per day for equipment)

CARP0662-001 05/01/2021

RANDOLPH COUNTY

	Rates	Fringes
CARPENTER	$ 41.36	18.90

ELEC0016-002 06/01/2025

WABASH COUNTY

	Rates	Fringes
ELECTRICIAN	$ 46.14	21.67

ELEC0051-004 01/01/2024

FAYETTE COUNTY (North of Avena, Bear Grove, Sefton, and Sharon TWPS)

	Rates	Fringes
Line Construction		
Groundman/Equipment Operator (All crawler type equipment larger than D-4, 15 ton crane or larger)	$ 52.63	32.5%+7.25
Groundman/Truck Driver	$ 39.92	32.5%+7.25
Lineman and Substation Technician	$ 58.58	32.5%+7.25

ELEC0146-004 06/01/2022

EFFINGHAM (Banner, Bishop, Douglas, Liberty, Lucas, Moccasin, St. Francis, Summit, & Teulopolis TWPS), AND FAYETTE (Hurricane, S. Hurricane, Ramsey, Bowling Green, Carson, & Loudon TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 41.00	20.68

ELEC0309-004 09/01/2025

RANDOLPH COUNTY (Red Bud Twp)

	Rates	Fringes
ELECTRICIAN	$ 52.41	52.01%+3.01

ELEC0309-009 01/06/2025

RANDOLPH COUNTY (Red Bud Township)

	Rates	Fringes
LINE CONSTRUCTION		
Cable Splicer; Lineman Welder	$ 63.79	42.15%
Groundman Equipment Operator	$ 56.38	44.75%
Groundman Truck Driver	$ 46.03	44.75%
Groundman	$ 42.10	44.75%
Lineman	$ 64.83	44.75%

ELEC0702-001 01/01/2025

ALEXANDER, CLAY, EDWARDS, EFFINGHAM (Excluding Banner, Bishop, Douglas, Liberty, Lucas, Moccasin, St. Francis, Summit and Teulopolis TWPS), FAYETTE (Excluding Hurricane, S. Hurricane, Ramsey, Bowling Green, Carson and Loudon TWPS), FRANKLIN, GALLATIN, HAMILTON, HARDIN, JACKSON, JEFFERSON, JOHNSON, MARION, MASSAC, PERRY, POPE, PULASKI, SALINE, UNION, WAYNE, WHITE, AND WILLIAMSON COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 52.14	29.14

ELEC0702-002 01/06/2025

ALEXANDER, CLAY, CRAWFORD, EDWARDS, EFFINGHAM, FRANKLIN, FAYETTE (Excludes portion North Avena), GALLATIN, HAMILTON, HARDIN, JACKSON, JASPER, JEFFERSON, JOHNSON, LAWRENCE, MARION, MASSAC, PERRY, POPE, PULASKI, RANDOLPH (Except Red Bud Twps), RICHLAND, SALINE, UNION, WABASH, WAYNE, WHITE, AND WILLIAMSON COUNTIES;
CLARK, COLES (Southern Half), CUMBERLAND, MOULTRIE (Whitley TWP), and SHELBY (Except West of Holland, Prairie, Richland, & Windsor TWPS) COUNTIES;
BOND (Eastern Half), and WASHINGTON (OKAWVILLE & VENDY TWPS) COUNTIES

	Rates	Fringes
Line Construction		
Groundman - Class A	$ 38.18	29%+8.85
Groundman - Equipment Operator Class II (all other equipment)	$ 46.49	29%+8.85
Heavy - Equipment Operator Class I (all crawler type equipment D-4 and larger)	$ 52.13	29%+8.85
Lineman	$ 65.52	29%+8.85

ELEC0702-016 09/01/2024

BUILDING

ALEXANDER, BOND (Eastside), CLAY, CLINTON (Eastside), EDWARDS, EFFINGHAM (Southwestern side), FAYETTE (Southside), FRANKLIN, GALLATIN, HAMILTON, HARDIN, JACKSON, JEFFERSON, JOHNSON, MARION, MASSAC, PULASKI, PERRY, POPE, RANDOLPH (Southeastern side), SALINE, UNION, WASHINGTON (Southeastern side), WAYNE, WHITE, and WILLIAMSON COUNTIES

	Rates	Fringes
ELECTRICAL LOW VOLTAGE WIRING INSTALLER	$ 38.44	19.37

Installation, service and maintenance of low-voltage systems which utilizes the transmission and/or transference of voice, sound, vision, or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background/foreground music, intercom and telephone interconnect, field programming, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school, intercom and sound burglar alarms and low voltage master clock systems.

ELEC0725-004 10/01/2025

CRAWFORD, JASPER, LAWRENCE, AND RICHLAND COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 45.00	26.70

ENGI0318-001 04/01/2025

ALEXANDER, FRANKLIN, GALLATIN, HAMILTON, HARDIN, JACKSON, JOHNSON, MASSAC, POPE, PULASKI, SALINE, UNION, WHITE, AND WILLIAMSON COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Class A	$ 40.13	32.00+a
Class B	$ 38.23	32.00+a
Class C	$ 30.83	32.00+a
River		
Class 1	$ 40.23	32.00+a
Class 2	$ 36.78	32.00+a

Class A: All Off Road Material Hauling Equipment, All Terrain Crane, Articulated Dump, Asphalt Machine Spreader, Asphalt Plant Assistant Operator, Asphalt Plant Operator, Asphalt Widener, Assistant Operator on Rotomills, Autograder, Automatic Slipform Pavers, Backend Man on Asphalt Machine, Backhoes, Barrel Grappler Devices (All), Blacksmith, Blade Operators (All), Boat Operators (all) Bridges, Boat Pilots requiring certification and/or licensing, Dams & Waterways, Boilers, Boom or Winch Cat, Boom or Winch Type Trucks, Boring Machines-Horizontal, Clamshell, Orange Peel Operator, Concrete Breaker, Concrete Groover, Concrete Grinder, Concrete Curb Machine, Concrete Finish Machine or Spreader Operator, Concrete Mixer Paver, Concrete Pump Truck, Concrete Plant Operator, Concrete Wheel Saw Operators, Cranes(All) Truck/Track/Rubber, Crane (Overhead) Operator, Derrick Guy or Derrick Trucks, Ditching Machines (All), Dozer Operators, Dragline or Shovel Operators, Dredge Booster Pump, Dredge Engineman, Dredge Operator/Leverman, Drill Cat w/Compressor Mounted, Drilling or Boring Machine Rotary-Self-Propelled, Endloaders (All) Track/Rubber Elevating Grader, Flexplane, Forklifts/Tele-Handlers (All), Geothermal Well Drilling,

GPS on machines already under the jurisdiction of Local 318, Gradall; Greasers, Heavy Equipment Robotics Operator, Hi-Lift, Hoists, Hosting Engine, Horizontal Directional Drill Operator, Incinerators (Haz-Mat only), Laser Screed, Locomotive/Operator, Master Mechanic, Mixers 21 cu. ft. or over, Motor Patrol, Pile driver operator, Pulls & Scrapers, Power Pac & Controls (Pile Driving), Pug mill, Pulverizer or Tillers, Push Cats, Quad Trac, Rotomills, Rotating Cab Forklifts, Rubber Tired Farm Tractor with Attachments over 1/2 yd., Self-Propelled Chip Spreader, Self-Propelled Roller w/Attachments, Shot Blaster/Bridge Deck, Shuttle Buggie, Side booms, Skid loader (Skid steers), Skimmer Scoop, Spyder Crane, Stationary Rock Slinger, Trackhoe and all attachments, Trench Machine Opeator, Tuggers, Ultra High Pressure Water Jet Cutting Machine, Vacuum, Vacuum Blasting Machine Operator, Vac Jet, Welders, Well or Caisson Drills, Well Point Pumps-2 or more, Wood Chipper w/Tractor.

Class B: Oilers classified as Assistant Operators, Air Track Drill/Compressor, All Machines used to Sweep, Clean, Broom or remove debris or snow, Any type tractor pulling Roller or Disc, Automatic Bins or Scales w/Compressor or Generator, Bulk Cement Plant w/Separate Compressor, Concrete Curb Machine requiring Electronics, Concrete Plant Assistant Operators, Concrete or Pump crete Pumps, Deck Hand on Boats, Dredge Assistant Operator/Mate, Power Broom, Self-Propelled Roller/Compactor, Straw Mulcher Blower, Stump Cutter Machine, Two Air Compressors (220 CFM or over), Two Air Track Drills. Air Compressor w/valve driving piling, Assistant operator (where required refer to article vii section 9), Elevator Operator, Form Grader, Man Lift (scissor lift) when lifting materials, Pildriver activating air or hydraulic valve regardless of location, Rubber-tired farm type tractor w/Blade/Bulldozer/Auger/Hi-lift of 1/2 yard or less, Self-propelled concrete saw, Self-propelled robotics roller in use two continuous hours or more shall be manned by an operating engineer, Self-propelled vibrator, Truck crane assistant operator, Two Conveyors.

Class C: Air Compressor (220 CFM or over) one, Air Track Drill one, Automatic Bin, Belt Drag Machine, Bulk Cement Plant w/built-in compressor running off same motor or electric motor, fireman or switchman, Mechanic in permanent shops without separate signed Collective Bargaining Agreements (Nov. 1 through March 31), Mechanical plasterer applicator, Pipe Tract Jack, Power Broom, Self-propelled from tamper, Trac-Air, Mixers - less than 21 cu.ft., Mortar Mixer w/ski or pump, Mud Jacks, one well point pump, Wood Chipper.
One Operating Engineer may operate or maintain any combination of the following pieces of equipment, not to exceed four (4), which shall be within reasonable distance; such combination may include the equipment in this classification: Air Compressor (under 220 CFM) Four, Light Plants, Generators, Pumps, Conveyors, Motor Driven Heaters (2), Welding Machines, Ulmac or Equal Spreader

River Class 1: All Off Road Material Hauling Equipment, All Terrain Crane, All Power Boat Operators, Articulated Dump, Asphalt Machine Spreader, Asphalt Plant Operator, Asphalt Widener, Autograder, Automatic Slipform Pavers, Backhoes, Barrel Grappler Devices (All), Blacksmith, Blade Operators (All), Boat Pilots requiring certification and or licensing, Boat Operators (all) Bridges, Dams & Waterways,

Boilers, Boom or Winch Cat, Boom or Winch Type Trucks, Boring Machines-Horizontal, Clamshell, Orange Peel Operator, Concrete Breaker, Concrete Curb Machine, Concrete Finish Machine or Spreader Operator, Concrete Mixer Paver, Concrete Pump Truck, Concrete Plant Operator, Concrete Wheel Saw Operators, Cranes(All) Truck/Track/Rubber, Crane (Overhead) Operator, Derrick Guy or Derrick Trucks, Ditching Machines (All), Dozer Operators, Dragline or Shovel Operators, Dredge Booster Pump, Dredge Engineman, Dredge Operator/Leverman, Drill Cat w/Compressor Mounted, Drilling or Boring Machine Rotary-Self-Propelled, Endloaders (All) Track/Rubber Elevating Grader, Flexplane, Forklifts/Tele-Handlers (All), Geothermal Well Drilling, GPS on machines already under the jurisdiction of Local 318, Gradall; Greasers, Heavy Equipment Robotics Operator, Hi-Lift, Hoists, Hosting Engine, Horizontal Directional Drill Operator, Incinerators (Haz-Mat only), Laser Screed, Locomotive/Operator, Master Mechanic, Mixers 21 cu. ft. or over, Motor Patrol, Piledriver operator, Pulls & Scrapers, Power Pac & Controls (PileDriving), Pug mill, Pulverizer or Tillers, Push Cats, Quad Trac, Rotating Cab Forklifts, Rotomills, Rubber Tired Farm Tractor with Attachments over 1/2 yd., Self-Propelled Chip Spreader, Self-Propelled Roller w/Attachments, Shuttle Buggie, Side booms, Skid loader (Skidsteers), Skimmer Scoop, Spyder Cranes, Trackhoe and all attachments, Trench Machine Opeator, Tuggers, Ultra High Pressure Water Jet Cutting Machine, Vacuum, Vacuum Blasting Machine Operator, Vac Jet, Welders, Well or Caisson Drills, Well Point Pumps-2 or more, Wood Chipper w/Tractor.

River Class 2: Assistant Operators required on All terrain cherry picker w/over 40 ton lifting capacity, Crane, Deckhand on all rivers, lakes, and tributaries, Dinky or standard locomotive, Ditching machine (80 h.p. and over), Dragline, Dredge, Gradall, Guy Derrick, Assitant operators or firman on crane, Piledriver, Shovel, Trenching Machine, Truck Crane.

Footnote A - Hazardous Waste Premium: Level (A)-receive $3.00 above rate; Level (B)-receive $2.00 above rate; Level (C)-receive $1.50 above rate; Level (D)-receive $1.00 above rate.

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FAYETTE, JEFFERSON, MARION, PERRY, and RANDOLPH COUNTIES

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 01	$ 47.20	39.10
Group 02	$ 46.07	39.10
Group 03	$ 41.59	39.10
Group 04	$ 41.65	39.10
Group 05	$ 41.65	39.10
Group 06	$ 49.75	39.10
Group 07	$ 45.30	34.95
Group 08	$ 45.60	34.95
Group 09	$ 48.20	39.10
Group 10	$ 46.75	34.95
Group 11	$ 49.20	39.10
Group 12	$ 50.20	39.10

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Cranes, Draglines, Shovels, Skimmer Scoops, Clamshells or Derrick Boats, Pile Drivers, Crane-Type Backhoes, Asphalt Plant Operators, Concrete Plant Operators, Dredges, Asphalt Spreading Machines, Screws on Asphalt Spreading Machines, All Locomotives, Cable Ways or Tower Machines, Hoists, Hydraulic Backhoes, Ditching Machines, or Backfiller, Cherrypickers, overhead Cranes, Roller, Steam or Gas, Concrete Pavers, Excavator Concrete Breakers, Concrete Pumps, Bulk Cement Plants, Cement Pumps, DerrickType Drills, Boat Operators, Motor Graders or Pushcats, Scoops or Toumapulls, Bulldozers, Endloaders or Fork Lifts, Power Blade or Elevating Graders, Winch Cats, Boom or Winch Trucks or Boom Tractors, Pipe Wrapping or Painting Machines, Asphalt Plant Engineer, Journeyman Lubricating Engineer, Drills (other than derrick type), Mud Jacks, or Well Drilling Machines, Boring Machines or Track Jacks, Mixers, Conveyors (two), Air Compressors (two) Water Pumps, regardless of size (two), Welding Machines (two), Siphons or Jets (two), Winch Head or Apparatuses (two), Light Plants (two), Waterblasters (two), all Tractors, regardless of size (straight tractor only), Fireman on Stationary Boilers, Automatic Elevators, Form Grading Machines, Finishing Machines, Power Sub-Grader or Ribbon Machines, Longitudinal Floats, Distributor Operators on Trucks, Winch Heads or Apparatuses (one), Mobil Track air and heaters (two to five), Heavy Equipment Greaser, Relief Operator, Assistant Master Mechanic and Heavy Duty Mechanic, concrete saws of all types and sizes with their attachments, gobhoppers, excavators all sizes, the repair, greasing, and fueling of all diesel hammers, the operation, set-up and cleaning ofbidwells, concrete placement booms, the alterations, repair of all barges, water blasters of all sizes and their clutches, mobile lifts, hydraulic jacks where used for hoisting, diesel or gas powered flashing sings used for traffic control, micro pavers, log skiders, iceolators used on and off of pipeline, condor cranes, drill rigs of all sizes, bow boats, survey boats, ross carriers, bob-cats and all their attachments, skid steer loaders and all their attachments, creter crane, direct drive electric motors the bolting and unbolting the adjusting and shimming, (dewateringjobs, whirley crane, conveyor belts) etc., batch plants (all sizes), roto mills, conveyors systems of any size and any configuration, hydroseeders and strawblowers all sizes, operation, repair, service of all vibratory hammers, all power pacs and their controls regardless of location, curtains or brush burning machines, stump cutter machines, grout machines regardless of size, Nail launchers when mounted on a machine or self-propelled, con-cover machines, Goldhofer and similar S.P.M.T. (self-propelled modular transpmiers) heavy transport units and all Operators (except those listed below).

Group 2: Assistant Operators

GROUP 3: Air Compressor One; Water Pump regardless of size One; Welding Machine One; 1-Bag Mixer One; Conveyor One; Siphon or Jet; Light Plant One; Heater One; Immobile Track Air One

GROUP 4: Firemen on Whirlies and Asphalt Spreader Oiler; Heavy Equipment Oilers; Truck Cranes; Monigans; Large over 65 tons capacity; Concrete Plant OIler and Black Top Plant

Oiler

GROUP 5: Oilers

GROUP 6: Operators on equipment with Booms, including Jibs, 100 ft and over, but less than 150 ft

GROUP 7: Operators on equipment with Booms, including Jibs, 150 ft and over, but less than 200 ft

GROUP 8: Operators on equipment with Boomns, including Jibs, 200 ft and over; Tower Cranes, and Whirley Cranes

GROUP 9: Certified crane Operators, Below 17.5 tons, when requested by the Contractor or required by the Owner.

GROUP 10: Certified crane Operators 17.5 tons and above, when requested by the Contractor or required by the Owner.

GROUP 11: Master Mechanic

GROUP 12: Licensed Boat Pilot

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INCLUDING BUILDING CONSTRUCTION ON HEAVY INDUSTRIAL SITES & HEAVY CONSTRUCTION EXCEPT DREDGING AND RIVER WORK

FAYETTE, JEFFERSON, MARION, PERRY, and RANDOLPH COUNTIES

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 01	$ 42.45	34.95
Group 02	$ 41.32	34.95
Group 03	$ 36.84	34.95
Group 04	$ 43.45	34.95
Group 05	$ 44.45	34.95
Group 06	$ 45.00	34.95
Group 07	$ 45.30	34.95
Group 08	$ 45.60	34.95
Group 09	$ 46.25	34.95
Group 10	$ 46.75	34.95
Group 11	$ 44.45	34.95
Group 12	$ 45.45	34.95

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Cranes, Draglines, Shovels, Skimmer Scoops, Clamshells or Derrick Boats, Pile Drivers, Crane-Type Backhoes, Asphalt Plant Operators, Concrete Plant Operators, Dredges, Asphalt Spreading Machines, Screws on Asphalt Spreading Machines, All Locomotives, Cable Ways or Tower Machines, Hoists, Hydraulic Backhoes, Ditching Machines, or Backfiller, Cherrypickers, overhead Cranes, Roller, Steam or Gas, Concrete Pavers, Excavator Concrete Breakers, Concrete Pumps, Bulk Cement Plants, Cement Pumps, Derrick-Type Drills, Boat Operators, Motor Graders or Pushcats, Scoops or Tournapulls, Bulldozers, Endloaders or Fork Lifts, Power Blade or Elevating Graders, Winch Cats, Boom or Winch Trucks or Boom Tractors, Pipe Wrapping or Painting Machines, Asphalt Plant Engineer, Journeyman Lubricating Engineer, Drills (other than derrick type), Mud

Jacks, or Well Drilling Machines, Boring Machines or Track Jacks, Mixers, Conveyors (two), Air Compressors (two) Water Pumps, regardless of size (two), Welding Machines (two), Siphons or Jets (two), Winch Head or Apparatuses (two), Light Plants (two), Waterblasters (two), all Tractors, regardless of size (straight tractor only), Fireman on Stationary Boilers, Automatic Elevators, Form Grading Machines, Finishing Machines, Power Sub-Grader or Ribbon Machines, Longitudinal Floats, Distributor Operators on Trucks, Winch Heads or Apparatuses (one), Mobil Track air and heaters (two to five), Heavy Equipment Greaser, Relief Operator, Assistant Master Mechanic and Heavy Duty Mechanic, concrete saws of all types and sizes with their attachments, gob-hoppers, excavators all sizes, the repair, greasing, and fueling of all diesel hammers, the operation, set-up and cleaning of bidwells, concrete placement booms, the alterations, repair of all barges, water blasters of all sizes and their clutches, mobile lifts, hydraulic jacks where used for hoisting, diesel or gas powered flashing signs used for traffic control, micro pavers, log skiders, iceolators used on and off of pipeline, condor cranes, drill rigs of all sizes, bow boats, survey boats, ross carriers, bob-cats and all their attachments, skid steer loaders and all their attachments, creter crane, direct drive electric motors the bolting and unbolting the adjusting and shimming, (dewateringjobs, whirley crane, conveyor belts) etc., batch plants (all sizes), roto mills, conveyors systems of any size and any configuration, hydroseeders and straw-blowers all sizes, operation, repair, service of all vibratory hammers, all power pacs and their controls regardless of location, curtains or brush burning machines, stump cutter machines, grout machines regardless of size, Nail Launchers when mounted on a machine or self-propelled, con-cover machines, Goldhofer and similar S.P.M.T. (self-propelled modular transporters) heavy transport units and all Operators (except those listed below).

GROUP 2: Assistant Operators

GROUP 3: Air Compressors (one), Water Pumps, regardless of size (one), Water-blasters (one), Welding Machine (one), Mixers (one bag), Conveyor (one), Siphon or Jet (one), Light Plant (one), Heater (one), Immobile Track Air (one), and Self-Propelled Walk Behind Rollers.

GROUP 4: Fireman on Whirlies and Heavy Equipment Oilers, Truck Cranes, Dredges, Monigans, Large Cranes - (Over 65-ton rated capacity) Concrete Plant Oiler, Blacktop Plant oiler and Creter Crane Oiler (when required), barge tenders, oilers on drill rigs used for caisson or for pile driving.

GROUP 5: Oilers

GROUP 6: Operators on equipment with Booms, including Jibs, 100 ft and over, but less than 150 ft

GROUP 7: Operators on equipment with Booms, including Jibs, 150 ft and over, but less than 200 ft

GROUP 8: Operators on equipment with Boomns, including Jibs, 200 ft and over; Tower Cranes, and Whirley Cranes

GROUP 9: Certified crane Operators, Below 17.5 Tons, when

requested by the Contractor or required by the Owner

GROUP 10: Ce1iified crane Operators 17.5 Tons and above, when requested by the Contractor or required by the Owner

GROUP 11: Master Mechanic

GROUP 12: Licensed Boat Pilot

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CLAY, CRAWFORD, EDWARDS, EFFINGHAM, JASPER, LAWRENCE, RICHLAND, WABASH, and WAYNE COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 45.15	26.00
GROUP 2	$ 30.05	26.00

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Power Cranes, Draglines, Derricks, Shovels, Gradalls, Mechanics, Tractor Highlift, Tournadozer, Concrete Mixers with Skip, Tournamixer, Two-Drum Machine, One-Drum Hoist with Tower or Boom, Cableways, Tower Machines, Motor Patrol, Boom Tractor, Boom or Winch Truck, Winch or Hydraulic Boom Truck, Truck Crane, Tournapull, Tractor Operating Scoops, Bulldozer, Push Tractor, Asphalt Planer, Finishing Machine on Asphalt, Large Rollers on Earth, Rollers on Asphalt Mix, Ross Carrier or Similar Machine, Gravel Processing Machine, Asphalt Plant Engineer, Paver Operator, Farm Tractor with Half Yard Bucket and/or Backhoe Attachments, Dredge Engineer, or Dredge Operator, Central Mix Plant Engineer, CMI or Similar Type Machine, Truck or Skid Mounted Concrete Pump, Tower Crane, Engine or Rock Crusher Plant, Concrete Plant Engineer, Ditching Machine with Dual Attachment, Tractor Mounted Loaders, Cherry Picker, Hydro Crane, Standard or Dinkey Locomotives, Scoopmobiles, Euclid Loader, Soil Cement Machine, Back Filler, Elevating Machine, Power Blade, Drilling Machines Including Well Testing, Caissons, Shaft or Any Similar Type Drilling Machines, Motor Driven Paint Machine, Pipe Cleaning Machine, Pipe Wrapping Machine, Pipe Bending Machine, Apsco Paver, Boring Machine, (Equipment Greased), Barber- Greene Loaders, Formless Paver, (Well Point System), Concrete Spreader, Hydra Ax, Span Saw and Similar types, Marine Scoops, Brush Mulcher, Brush Burner, Mesh Placer, Tree Mover, Helicopter Crew (3), Piledriver - Skid or Crawler, Stump Remover, Root Rake, Tug Boat Operator, Refrigerating Machine, Freezing Operator, Chair Cart-Self Propelled, Hydra Seeder, Straw Blower, Power Sub Grader, Bull Float, Finishing Machine, Self-Propelled Pavement Breaker (Backhoe Attached), Lull (or Similar Type Machine), Two Air Compressors, Compressors Hooked in Manifold, Overhead Crane, Chip Spreader, Mud Cat, Sull-Air Fork Lifts (Except When Used For Landscaping Work), Soil Stabilazer (Seaman Tiller, Bo Mag, Rago Gator and Similar Types or Equipment), Tube Float, Spray Machine, Curing Machine, Concrete or Asphalt Milling Machine, Snooper Truck Operator.

GROUP 2: Concrete Mixers Without Skips, Rock Crusher, Ditching Machine Under 6', Curbing Machine, one Drum

Machines without Tower or Boom, Air Tugger, Self-Propelled Concrete Saw, Machine- Mounted Post Hole Digger, Two to Four Generators, Water Pumps, or Welding Machines, within 400 ft, Air Compressor 600 cu. ft. and Under, Rollers on Aggregate and Seal Coat Surfaces, Fork Lifts (When Used For Landscaping Work, Concrete and Blacktop Curb Machine, Farm Tractor with less than Half Yard Bucket, One Water Pump, Oilers, Air Valves or Steam Valves, One Welding Machine, Truck Jack, Mud Jack, Gunnite Machine, House Elevators when used for Hoisting Material, Engine Tenders, Wagon Drill, Flex Plane, Conveyor, Siphons and Pulsometer, Switchman, Fireman on Paint Pots, Fireman on Asphalt Plants, Distributor Operators on Trucks, Tampers, Self- Propelled Power Broom, Striping Machine (Motor Driven), Form Tamper, Bulk Cement Plant Equipment Greaser, Deck Hands, Truck Crane Oiler_Driver, Cement Blimps, Form Grader, Temporary Heat, Throttle Valve, Farm Tractor, Super Sucker (and Similar Type of Equipment).

IRON0022-009 06/01/2025

CLAY, CRAWFORD, EFFINGHAM COUNTY (Remainder), JASPER, LAWRENCE, and RICHLAND COUNTIES

	Rates	Fringes
IRONWORKER	$ 38.00	26.39

IRON0046-007 05/01/2024

EFFINGHAM (Excluding Dexter & East thereof) AND FAYETTE (Avenue & North thereof) COUNTIES

	Rates	Fringes
IRONWORKER	$ 37.60	32.94

IRON0103-005 08/01/2024

CLAY (Louisville & South thereof), EDWARDS, FRANKLIN (Northeast corner), GALLATIN, HAMILTON, JEFFERSON (East of Mt. Vernon), LAWRENCE (Southern Half including Lawrenceville), MARION (Southeast), RICHLAND (Southern Half), SALINE (Northeastern 1/3), WABASH, WAYNE, and WHITE COUNTIES

	Rates	Fringes
IRONWORKER	$ 35.34	26.40

IRON0392-002 08/01/2024

FAYETTE (Southern Half below Brownstown), JACKSON (Remainder), JEFFERSON (Mount Vernon & area West thereof), MARION, PERRY, and RANDOLPH COUNTIES

	Rates	Fringes
IRONWORKER	$ 41.65	31.18

IRON0782-005 08/01/2025

ALEXANDER, FRANKLIN, GALLATIN, HARDIN, JACKSON (Except Ava and Elkville TWPS), JOHNSON, MASSAC, PERRY, POPE, PULASKI, SALINE (Except vicinity of El Dorado and area Northeast thereof), UNION, and WILLIAMSON COUNTIES

	Rates	Fringes
IRONWORKER	$ 37.66	32.10

LABO0459-002 08/01/2024

RANDOLPH COUNTY

	Rates	Fringes
LABORERS		
Group 1	$ 34.14	30.59
Group 2	$ 34.64	30.59
Group 3	$ 35.64	30.59

LABORER CLASSIFICATIONS:

GROUP 1 - General Laborer

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker

GROUP 3 - Dynamite Man

LABO0773-002 04/01/2024

ALEXANDER, FRANKLIN, GALLATIN, HARDIN, JACKSON, JOHNSON, MASSAC, PERRY, POPE, PULASKI, SALINE, UNION, AND WILLIAMSON COUNTIES

	Rates	Fringes
LABORER	$ 32.75	27.64

LABO1197-001 04/01/2024

CLAY, CRAWFORD, EDWARDS, EFFINGHAM, FAYETTE, HAMILTON, JASPER, JEFFERSON, LAWRENCE, MARION, RICHLAND, WABASH, WAYNE, AND WHITE COUNTIES

	Rates	Fringes
LABORER	$ 32.75	27.64

PAIN0032-006 09/01/2021

ALEXANDER, FRANKLIN, GALLATIN, HARDIN, JACKSON, JOHNSON, PERRY, POPE, PULASKI, RANDOLPH, SALINE, UNION, and WILLIAMSON COUNTIES

	Rates	Fringes
PAINTER		
Bridges, Dams	$ 35.51	18.78
Journeyman	$ 33.21	18.78

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0058-006 05/01/2017

FAYETTE COUNTY

	Rates	Fringes
PAINTER (Bridge)	$ 32.45	17.12

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

PAIN0124-002 09/01/2021

CLAY, HAMILTON, JEFFERSON, MARION, and WAYNE COUNTIES

	Rates	Fringes
PAINTER		
Journeyman	$ 26.50	19.01
Taping (All Kinds)	$ 27.30	19.01

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

Journeyman work on Bridges, Grain Elevators, Water, Radio & Television Towers, Stacks, Waste Water Plants, and Water Treatment Plants - $3.10 Premium

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PAIN0156-008 04/01/2020

EDWARDS, WABASH, AND WHITE COUNTIES

	Rates	Fringes
PAINTER		
Brush & Roller of Mastics, Creosote, Kwinch Koate, and Coal Tar Epoxy	$ 28.60	17.63+A
Brush, Roller and Paperhanger	$ 27.60	17.63+A
Drywall Finishers and Plasterers	$ 27.85	17.63+A
Spray of Mastics, Creosotes, Kwinch Koate, and Coal Tar Epoxy	$ 29.60	17.63+A
Spray, Sandblast, Power Tools, Waterblast, and Steam Cleaning	$ 28.60	17.63+A

FOOTNOTE A:
All Structures over 40? $0.75/ hour above base wage
All Structures over 75? $1.50 hour above base wage
All Structures over 100? $2.50/ hour above base wage

PAIN0500-004 06/01/2023

MASSAC COUNTY

	Rates	Fringes
PAINTER		
Bridges & Dams - Blast &		

Spray	$ 31.00	15.40
Bridges & Dams - Brush & Roll	$ 30.00	15.40
Industrial - Blast & Spray	$ 26.25	15.40
Industrial - Brush & Roll	$ 25.25	15.40

Spray, Sandblasting and water blast units with 3500 PSI receive a $.50 per hour premimum.

All work forty feet and above receive a $1.00 per hour premimum.

PAIN1705-003 05/01/2017

CRAWFORD, EFFINGHAM, JASPER, LAWRENCE, and RICHLAND COUNTIES

	Rates	Fringes
PAINTER		
Blasting, Spraying & Pressure Washing	$ 28.30	20.07
Brush & Roller and Wall Covering Drywall Preparing	$ 27.30	20.07

Epoxy or Toxic-Lead-Based Paint Work-$1.00 Premimum

Brush & Roller work over 30' above ground or floor level - $0.80 Premium

Brush & Roller work over 100' above ground or floor level - $1.80 Premium

Blasting, Spraying & Pressure work over 30' above ground level - $2.30 Premium

Blasting, Spraying & Pressure work over 100' above ground level - $3.30 Premium

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PLAS0143-010 04/01/2017

ALEXANDER, FRANKLIN, GALLATIN, HARDIN, JACKSON, JOHNSON, MASSAC, PERRY, POPE, PULASKI, RANDOLPH, SALINE, UNION, AND WILLIAMSON COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 29.11	16.09

PLAS0143-011 04/01/2016

CLAY, CRAWFORD, EDWARDS, EFFINGHAM, FAYETTE, HAMILTON, JASPER, JEFFERSON, LAWRENCE, MARION, RICHLAND, WABASH, WAYNE, and WHITE Counties

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 29.22	16.31

TEAM0026-006 05/01/2025

EFFINGHAM and JASPER COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 45.29	25.42
Group 2	$ 45.88	25.42
Group 3	$ 46.15	25.42
Group 4	$ 46.54	25.42
Group 5	$ 47.64	25.42

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0050-004 05/01/2025

CLAY, FAYETTE, JEFFERSON, MARION, RANDOLPH, and WAYNE COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 45.35	25.72
Group 2	$ 45.93	25.72
Group 3	$ 46.25	25.72
Group 4	$ 46.60	25.72
Group 5	$ 47.71	25.72

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated

dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0135-009 05/01/2025

CRAWFORD, EDWARDS, LAWRENCE, RICHLAND, and WABASH COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 38.55	16.11+a
Group 2	$ 38.97	16.11+a
Group 3	$ 39.18	16.11+a
Group 4	$ 39.44	16.11+a
Group 5	$ 39.44	16.11+a

FOOTNOTE: A. $46.20 per day

CLASSIFICATIONS:

Group 1 - Drivers on 2 axle truckshauling less than 9 ton; Air compressor and welding machines and brooms, including those pulled by separate units; Truck Driver Helpers; Warehouse employees; Mechanic helpers; Greasers and tiremen; fork lifts up to 6,000 pounds capacity

Group 2 - 2 or 3 axle trucks hauling more than 9 ton but hauling less than 16 ton; A-frame winch trucks; Hydrolift trucks; Vactor trucks or similar equipment when used for transportation purposes; Fork lifts over 6,000 pound capacity; Winch trucks; 4 axle combination units; In the event the Employer desires to use ticket writers that classification shall come under Group II

Group 3 - 2, 3, or 4 axle trucks hauling 16 ton or more; Drivers on water pulls; Articulated Dump Trucks; Mechanics and working forepersons; 5 axle or more combination units

Group 4 - Low Boy; Oil Distributors

Group 5 - Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0347-001 05/01/2025

GALLATIN COUNTY

	Rates	Fringes
TRUCK DRIVER		
Group 1	$ 43.28	27.56
Group 2	$ 43.86	27.56
Group 3	$ 44.15	27.56
Group 4	$ 44.53	27.56
Group 5	$ 45.61	27.56

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air

compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hualing more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combiation units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

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

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

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after

award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

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

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal

number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

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

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

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

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

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

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via

email to dba.reconsideration@dol.gov or by mail to:

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

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

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

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

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END OF GENERAL DECISION
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BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BID SCHEDULE

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

CONTRACT 1

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1.	PROVIDE AND INSTALL HEAD TANK	1	EA		
2.	PROVIDE AND INSTALL AERATOR	1	EA		
3.	PROVIDE AND INSTALL CLARICONES	2	EA		
4.	PROVIDE AND INSTALL RECARBONATION TANK	1	EA		
5.	PROVIDE AND INSTALL ALL PROCESS PIPING, VALVES, FITTINGS AND RELATED APPURTENANCES	1	LS		
6.	PROVIDE AND INSTALL AIR SCOUR BLOWER AND ALL RELATED PIPING	1	EA		
7.	PROVIDE AND INSTALL LIME SILO AND LIME FEED EQUIPMENT	1	EA		
8.	PROVIDE AND INSTALL BULK BAG HANDLER AND SODA ASH FEED SYSTEM	1	EA		
9.	PROVIDE AND INSTALL CARBON DIOXIDE GAS FEED SYSTEM	1	LS		
10.	PROVIDE AND INSTALL ALL CHEMICAL FEED SYSTEMS	1	LS		
11.	ALBION DISTRIBUTION PUMPS AND APPURTENANCES	2	EA		
12.	GRAYVILLE DISTRIBUTION PUMPS AND APPURTENANCES	2	EA		
13.	TRANSFER PUMPS AND APPURTENANCES	2	EA		
14.	BACKWASH PUMPS AND APPURTENANCES	2	EA		
15.	SCADA, COMPLETE	1	LS		
16.	ELECTRICAL, COMPLETE	1	LS		
17.	STANDBY GENERATOR	1	EA		
18.	DOMESTIC WASTE LIFT STATION	1	EA		
19.	EXCAVATION	1	LS		
20.	FOUNDATIONS	1	LS		
21.	PRE-ENGINEERED METAL BUILDING, SHELL	1	LS		
22.	YARD PIPING, 8" DIP	27	LF		
23.	YARD PIPING, 12" DIP	904	LF		
24.	YARD PIPING, 16" DIP	93	LF		
25.	YARD PIPING, 18" DIP	393	LF		
26.	DISTRIBUTION VALVE, MECHANICAL JOINT, 12"	2	EA		
27.	DISTRIBUTION VALVE, MECHANICAL JOINT, 16"	2	EA		
28.	DISTRIBUTION VALVE, MECHANICAL JOINT, 18"	1	EA		

29.	CONNECT TO EXISTING, TAPPING SLEEVE AND VALVE	5	EA		
30.	PCC PAVEMENT 8" W/ WELDED WIRE FABRIC	6108	SY		
31.	SEEDING AND MULCHING	2	AC		
32.	LANDSCAPING	1	LS		
33.	FENCING	1	LS		
34.	ALL REMAINING ITEMS RELATED TO CONTRACT 1 OF W2E WATER TREATMENT PLANT NOT COVERED UNDER OTHER BID ITEMS OR CONTRACTS	1	LS		
	CONTRACT 1 BASE BID				

CONTRACT 2

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
35.	PROVIDE AND INSTALL FILTERS WITH UNDERDRAINS, MEDIA	3	EA		
	CONTRACT 2 BASE BID				

***CONTRACT 3**

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
36.	PROVIDE AND INSTALL (1) - 1 MG WELDED STEEL GROUND STORAGE TANK	1	EA	X	X
	CONTRACT 3 BASE BID				X

***CONTRACT 3 ALTERNATE**

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
3A.	PRESTRESSED CONCRETE 1 MG GST. THIS WILL REPLACE THE BID PRICE FOR CONTRACT 3, ITEM #38: "PROVIDE AND INSTALL (1) – 1 MG WELDED STEEL GROUND STORAGE TANK."	1	EA	X	X
	CONTRACT 3 ALTERNATE 3A				X

***CONTRACT 4**

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
37.	CONSTRUCT LIME DRYING BEDS WITH ALL RELATED PIPING AND VALVES	1	LS	X	X
38.	EFFLUENT METERING STRUCTURE W/ REQUIRED MONITORING DEVICES	1	LS	X	X
39.	MANHOLE, 4' DIAMETER	2	EA	X	X
40.	12" SDR 26 EFFLUENT DISCHARGE PIPING	835	LF	X	X
41.	AGGREGATE BASE COURSE, TYPE B	606	SY	X	X
42.	AGGREGATE BASE COURSE, TYPE A	606	SY	X	X
	CONTRACT 4 BASE BID				X

***CONTRACT 5**

NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
43.	INSTALL SCADA AND TELEMETRY AT ALL REMOTE LOCATIONS	1	LS	X	X
44.	10" C900 PVC RAW WATER MAIN	3110	LF	X	X
45.	12" C900 PVC FINISHED WATER MAIN	2525	LF	X	X
46.	CONNECT TO EXISTING	4	EA	X	X
	CONTRACT 5 BASE BID				X

Bidder is currently certified as an MBE or WBE under EPA's DBE Program? YES ☐ NO ☐

****ITEMS IN RED (CONTRACT 3, 3A, 4, & 5) WILL BE BID AT A LATER DATE. THESE ITEMS ARE INCLUDED FOR YOUR REFERENCE ONLY AT THIS TIME.***

Bids will be awarded to the lowest responsible bidder in the best financial interest of the owner.

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of thirty (30) calendar days after the scheduled closing time for receiving bids.

Respectfully submitted:

Signature	**Date**
Title	**Address**
Telephone Number	**Email Address**

(SEAL – if BID is by a corporation)

Attest: _____

BID BOND

KNOW ALL MEN AND WOMEN BY THESE PRESENTS, that we, the undersigned,
_____ as Principal,
and _____ as Surety,
are hereby held and firmly bound unto _____
as OWNER in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____ , 20 _____ .

The Condition of the above obligation is such that whereas the Principal has submitted to _____
a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the
_____
_____
_____
_____
NOW, THEREFORE,

1. If said BID shall be rejected, or
2. If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

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, the day and year first set forth above.

_____ (L.S.)
Principal

_____
Surety

By: _____

IMPORTANT-Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to state assisted construction contracts and related subcontracts exceeding $10,000.)

The state assisted construction contractor certifies that he or she does not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The state assisted construction contractor certifies further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The state assisted construction contractor agrees that a breach of this certification is a violation of 44 Ill. Admin. Code 750, Appendix A – Equal Employment Opportunity Clause; 35 Ill. Admin. Code 360.304 – Equal Opportunity (for state assisted construction grants); and Illinois Procurement Code (30 ILCS 500), which incorporates IDHR nondiscrimination obligations.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated based on race, creed, color, or national origin, because of habit, local custom or otherwise. The state assisted construction contractor agrees that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions indicated above and that they will retain such certification in their files.

_____ _____

Signature **Date**

_____

Name and Title of Signatory (Please type)

_____

Firm Name (Please type)

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS NONDISCRIMINATION IN EMPLOYMENT

To: _____
(Name of union or organization of workers)

The undersigned currently holds contract(s) with _____
(Name of applicant)
involving funds or credit of the Illinois State or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contracts(s) or subcontract(s) and in accordance with Illinois Human Rights Act (IHRA), the Illinois Procurement Code, Illinois Business Enterprise Program (BEP), the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

HIRING, PLACEMENT, UPGRADING, TRANSFER OR DEMOTION, RECRUITMENT, ADVERTISING, OR SOLICITATION FOR EMPLOYMENT, TRAINING DURING EMPLOYMENT, RATES OF PAY OR OTHER FORMS OF COMPENSATION, SELECTION FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR TERMINATION.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

Name of Organization: _____

Signature: _____

Name & Title of Signatory: _____

Date: _____

Project Number

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SPRINGFIELD, ILLINOIS

CERTIFICATION REGARDING
DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

In accordance with federal Executive Order 12549, the prospective participant to the best of its knowledge and belief that it and its principles:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any State department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

(c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award.

(Typed Name & Title of Authorized Representative)

(Signature of Authorized Representative) **(Date)**

☐ I am unable to certify the above statements. My explanation is attached.

CONSTRUCTION CONTRACTS OF LOAN RECIPIENT AND OTHER SECTIONS FROM "PROCEDURES FOR ISSUING LOANS FROM THE PUBLIC WATER SUPPLY LOAN PROGRAM"

SECTION 662.420(b)(2) CHANGE ORDERS

A) When the loan recipient authorizes the contractor to add, delete, or revise the work within the general scope of the contract documents, or authorizes an adjustment in the contract price or contract time, the loan recipient shall submit a change order to the Agency.

B) For each change order, the loan recipient shall submit to the Agency for approval the following documentation:

i) one copy of the fully executed change order signed by the loan recipient, construction engineer, and the contractor; and

ii) a description of any changes, with justification for the changes.

C) Prior approval by the Agency of a change order is required when a change order results in:

i) alterations in design scope that require a modification to a construction permit; or

ii) an increase in the amount of loan funds needed to complete the project.

D) Failure to give timely notice of proposed project changes or action by the loan recipient that is not consistent with the Agency's determination on those changes may result in disallowance of loan participation for costs incurred that are attributable to the change.

SECTION 662.620(f) REQUIRED CONSTRUCTION CONTRACT PROVISIONS

Each construction contract shall include the following provisions:

1) Audit; access to records:

A) The contractor shall maintain books, records, documents, and other evidence directly pertinent to performance on loan work in accordance with Generally Accepted Accounting Principles (GAAP). The contractor shall also maintain the financial information and data used by the contractor in the preparation or support of any cost submissions required under Section 662.420 (b)(2) of the loan rules and a copy of the cost summary submitted to the owner. The Illinois Auditor General, the owner, the Agency, or any of their authorized representatives shall have access to the books, records, papers, documents, and other evidence for purposes of inspection, audit, examination, excerpts, transcriptions, and copying. The contractor shall provide facilities for access and inspection.

B) For a formally advertised, competitively awarded, fixed price contract, the contractor shall include access to records as required by subsection (a)(1)(A) for all negotiated change orders and contract amendments in excess of $25,000 that affect the contract price. In the case of all other prime contracts, the contractor shall agree to include access to records required by subsection (a)(1)(A) in all contracts and all tier subcontracts or change orders in excess of $25,000 that are directly related to project performance.

C) Audits shall be in accordance with auditing standards generally accepted in the United States.

D) The contractor shall agree to the disclosure of all information and reports resulting from access to records required by subsection (a)(1)(A). When the audit concerns the contractor, the auditing agency shall afford the contractor an opportunity for an audit exit conference and an opportunity to comment on the pertinent portions of the draft audit report. The final audit report shall include the written comments, if any, of the audited parties.

E) The records required by subsection (a)(1)(A) shall be maintained and made available during performance of the work under the loan agreement and for 3 years after the date of the final loan audit. In addition, records that relate to any dispute or litigation or the settlement of claims arising out of any performance, costs or items to which an audit exception has been taken, shall be maintained and made available for 3 years after resolution of the dispute, appeal, litigation, claim or exception.

F) The right of access will generally be exercised with respect to financial records under:

i) Negotiated prime contracts;

ii) Negotiated change orders or contract amendments in excess of $25,000 affecting the price of any formally advertised, competitively awarded, fixed price contract; and

iii) Subcontracts or purchase orders under any contract other than a formally advertised, competitively awarded, fixed price contract.

G) The right of access will generally not be exercised with respect to a prime contract, subcontract, or purchase order awarded after effective price competition. In any event, the right of access shall be exercised under any type of contract or subcontract:

i) With respect to records pertaining directly to contract performance, excluding any financial records of the contractor; and

ii) If there is any indication that fraud, gross abuse, or corrupt practices may be involved in the award or performance of the contract or subcontract.

2) Covenant against contingent fees.

The contractor shall warrant that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warranty, the owner shall have the right to annul the contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

3) Wage provisions.

The Contractor shall pay prevailing wages in accordance with the Davis-Bacon Act (40 USC 3141 through 3148) as defined by the U.S. Department of Labor.

4) Disadvantaged business enterprise requirements.

The contractor shall provide evidence that the contractor has taken affirmative steps in accordance with 40 CFR 33 to assure that disadvantaged business enterprises are used when possible as sources of supplies, equipment, construction, and services, consistent with the provisions of the Agency's Operating Agreement with USEPA.

5) Debarment and suspension provisions.

The contract shall require the successful bidders to submit a Certificate Regarding Debarment, Suspension and Other Responsibility Matters Form showing compliance with federal Executive Order 12549.

6) Nonsegregated facilities provisions

The contractor shall be required to submit a Certification of Nonsegregated Facilities on forms provided by the Agency.

7) Build America Buy America

   If applicable, the contractor shall be required to comply with the requirements of the BABA Act.

8) American Iron and Steel

   The contractor shall be required to use American Iron and Steel, if required by USEPA for that fiscal year.

9) A clause that provides:

   "No contractor or subcontractor shall discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor or subcontractor shall carry out applicable requirements of 40 CFR 33 in the award and administration of contracts awarded under the PWSLP. Failure by the contractor or subcontractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies."

SECTION 662.620(g) SUBCONTRACTS UNDER CONSTRUCTION CONTRACTS

The award or execution of all subcontracts by a prime contractor and the procurement and negotiation procedures used by the prime contractor shall comply with:

1) All applicable provisions of federal, State and local law;

2) All provisions of this Part 662 regarding fraud and other unlawful or corrupt practices;

3) All provisions of this Part 662 with respect to access to facilities, records and audit of records; and

4) All provisions of subsection 662.620(f)(5) that require a Certification Regarding Debarment, Suspension, and Other Responsibility Matters.

SECTION 662.620(h) CONTRACTOR BANKRUPTCY

In the event of a contractor bankruptcy, the loan recipient shall notify the Agency and shall keep the Agency advised of any negotiations with the bonding company, including any proposed settlement. The Agency may participate in those negotiations and will advise the loan recipient of the impact of any proposed settlement to the loan agreement. The loan recipient shall be responsible for assuring that every appropriate procedure and incidental legal requirement is observed in advertising for bids and re-awarding a construction contract.

SECTION 662.620(i) ACCESS

Every contract entered by the loan recipient for construction work, and every subagreement, shall provide the Agency representatives with access to the work. The contractor or subcontractor shall provide facilities for such access and inspection.

SECTION 662.640(c) REMEDIES

All claims, counter-claims, disputes and other matters in question between the recipient and the contractor arising out of, or relating to, a subagreement or its breach shall be decided by arbitration if the parties agree, or in a court of competent jurisdiction within the State.

BIDDER CERTIFICATION

In Compliance with Article 33E-11 to the

"Criminal Code of 2012"

I _____ , do hereby certify that:
(Name)

1. I am _____ of the _____
(Position) (Firm)
and have authority to execute this certification on behalf of the firm
2. This firm is not barred from bidding on this contract due to a either a Bid-rigging or Bid Rotating violation as set forth in Article 33E-11 to the "Illinois Criminal Code of 2012 [720 ILCS 5/33E-11]."

Name of Firm: _____

Signature: _____

Title: _____

Date: _____

Corporate Seal (where appropriate)

On this _____ day of _____ 20 _____ , before me appeared
(Day Number) (Month) (Year)

_____ to me personally known, who,
(Name)

being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by

_____ to execute the affidavit and did so as
(Name of Firm)

his or her free act and deed.

Notary Public: _____ **Commission Expires:** _____

Notary Seal:

SPECIFICATIONS FOR DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

NAME OF LOAN RECIPIENT: W2E, Inc.

1) DISADVANTAGED BUSINESS ENTERPRISE POLICY

A) It is the policy of the State of Illinois to award a fair share of sub-agreements to disadvantaged businesses (DBEs). In complying with this requirement, contractors are required to take affirmative steps to assure that disadvantaged businesses are used when possible as sources of supplies, equipment, construction, and services as explained herein.

B) These specifications define the terms, conditions, and requirements of the State Revolving Fund Loan Program, and the (Name of Loan Recipient) W2E, Inc.'s policy and procedures for complying with these requirements.

C) As required by the award conditions of USEPA's Assistance Agreement with Illinois EPA, the fair share percentages are 5% for MBEs and 12% for WBEs.

2) PRE-CONTRACT AWARD OBLIGATIONS

A) All bidders are required to advertise subcontracting opportunities and to negotiate with disadvantaged businesses prior to bid opening. Failure to document such affirmative efforts shall be deemed, relative to disadvantaged business compliance, non-responsive.

B) To establish a bid as responsible, the bidder will be required to document the proposed utilization of disadvantaged businesses with letters of intent signed by the bidder and by the disadvantaged business listed in the bid. The documentation requirements are outlined in Section III of this document.

C) (Name of Loan Recipient) W2E, Inc.'s disadvantaged business policy clearly intends for bidders to contact and encourage the participation of disadvantaged businesses prior to bid opening. Affirmative efforts (the written record of conscientious and honest communications between the bidder and disadvantaged business) must be initiated and completed by the bidder prior to bid opening. All bidders must document compliance with the requirements of the disadvantaged business policy.

3) EVALUATION OF DISADVANTAGED BUSINESS UTILIZATION AND AFFIRMATION EFFORTS

A) As a prerequisite to demonstrate compliance with the (Name of Loan Recipient) W2E, Inc.'s disadvantaged business policy, ALL bidders shall provide the following with its bid:

i) Completed and signed certification from the bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services, in the performance of this contract.

OR

ii) "Certification of publication," or adequate proof of publication, including an actual copy of the newspaper advertisement from a daily newspaper**. The advertisement must run one day at least (16) days prior to bid opening.** An example advertisement follows this section.

Bidders may publish the advertisement in an established, online bidder's clearinghouse such as the "Dodge Report (http://construction.com/dodge/)". If an online advertisement is placed with the "Dodge Report" or an equivalent website, a screenshot of the advertisement along with the webpage address, and a payment receipt is required as documentation. **The advertisement must run one day at least (16) days prior to bid opening.**

iii) List of all disadvantaged business enterprise (DBE) and non-DBE's that submitted proposals to the bidder along with the date of the proposal. Names, addresses, phone number and/or e-mail are required.

iv) List of disadvantaged businesses not being utilized and justification for non-utilization.

v) If DBE subcontractors will be utilized for the project, a completed and signed copy of Illinois EPA DBE Form No. 3 (DBE Subcontractor Utilization Form) or an equivalent "Notice of Intent" is needed from each subcontractor.

vi) If DBE subcontractors will be utilized for the project, a completed and signed certification from the bidder(s), attesting that the bidder has no controlling or dominating interest or conflict of interest with the disadvantaged business that will be utilized.

vii) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received.

Failure to submit the documentation pursuant to the requirements of A (i-vii) above may cause rejection of the bid as non-responsive**.**

4) SANCTIONS

A) (Name of Loan Recipient) _____W2E, Inc._____ has the option to reject one or all bids when the information submitted by the bidder(s) fails to demonstrate compliance with the disadvantaged business requirements (i.e., the bidder fails to place their pre-bid advertisement in a daily newspaper, or approved website, at least 16 days prior to bid opening).

B) Upon finding that any Party has not complied with the requirements of these specifications, including misrepresenting a firm as a disadvantaged business, any one or a combination of the following actions may be taken.

i) Declare the bidder and/or subcontractor non-responsible and therefore, ineligible for contract award.

ii) Disallow all contract costs associated with non-compliance.

iii) Refer matters which may be fraudulent to the Illinois Attorney General.

5) POST-CONTRACT AWARD COMPLIANCE

A) As required by the award conditions of USEPA's Assistance Agreement with Illinois EPA, all sub-agreements of the prime contractor must identify that the fair share percentages are 5% for MBEs and 12 % for WBEs.

B) After award of the prime contract, copies of all disadvantaged business-related sub-agreements between the prime contractor and subcontractors shall be submitted to the owner.

C) After bid submission, any changes in previously reported disadvantaged businesses utilization shall be handled in accordance with 40 CFR Part 33.302(b-h). If the contractor fails to initiate such actions, the owner may withhold payments and/or institute other appropriate sanctions.

SUGGESTED DISADVANTAGED BUSINESS (DBE) ADVERTISEMENT FOR CONSTRUCTION CONTRACTORS

NOTICE TO DISADVANTAGED BUSINESSES

_____ , _____ , _____ , is
(Name of Company) (Address of Company) (Phone Number)

seeking disadvantaged businesses for the _____
(Name of Loan Recipient)

Project for subcontracting opportunities in the following areas: _____

_____

_____

_____

All disadvantaged businesses should contact, IN WRITING, (certified letter, return receipt requested),

_____ to discuss the subcontracting opportunities.
(Company Contact Person)

All negotiations must be completed prior to bid opening _____
(Date of Bid Opening)

*The advertisement must clearly state the method of evaluating the proposals or quotations, and the relative importance attached to each criterion. Bidders must uniformly and objectively evaluate the proposals submitted by disadvantaged business in response to the advertisement based upon the evaluation criteria stated in the advertisement. The evaluation criteria must not be restrictive or exclusionary.

SUMMARY REPORT OF DISADVANTAGED BUSINESS ENTERPRISE REQUIREMENTS FOR CONTRACTORS

1) Completed and signed certification from bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services in the performance of this contract (may use Illinois EPA DBE Form #1).

OR

"Certificate of publication, or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from a daily publication. For advertisements placed in a construction project clearinghouse such as www.construction.com, a screenshot of the advertisement, link to website, and receipt is required for proof of advertising.

2) List of all disadvantaged business enterprises (DBE) and non-DBE's that submitted proposals to the bidder/prime contractor. Specify as DBE or non-DBE, type of DBE, and the other information listed below (DBE Form #4 may be used for this purpose).

   Name of Company
   Name of Owners
   Address of Company
   E-mail Address of Company
   Telephone Number
   Date of Proposal
   Type of Business
   Type of DBE
   Description of work to be performed

3) List of disadvantaged businesses that submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided (may use Illinois EPA DBE Form #1).

4) Completed and signed copies Illinois EPA DBE Form #3 (Subcontractor Utilization Form) or equivalent "Notice of Intent". Only applies if using DBE subcontractors.

5) Completed and signed certification from bidder(s) attesting that the bidder has no dominating or conflict of interest with the disadvantaged business to be utilized (Illinois EPA DBE Form #1). Only applies if using DBE subcontractors.

6) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received (Illinois EPA DBE Form #1).

7) **Note:** DBE Form #2 is **not** included in this packet. It is for consultants/engineers to report DBE activity. This form may be found in Illinois EPA's DBE Guidance Manual which is available on the Agency's website or mailed upon request by calling 217-782-2027.

Illinois EPA Disadvantaged Business Enterprise (DBE) Program Form #1
Contractor Certification Form

(To be completed by all Prime Contractors)

Please check the appropriate boxes that apply and complete the information on the bottom ofthe form.

☐ This firm will award no subcontracts (including in the procurement of equipment,supplies, or services), in the performance of this contract.

☐ This firm advertised for DBE subcontractors according to the good faith efforts outlinedin the Illinois EPA DBE Guidance Document.

☐ This firm received proposals from DBE(s) that will not be utilized. A list of the DBEs nothired, along with their address, phone number, and reason(s) for non-utilization, is below.

☐ This firm did not receive any inquiries from DBEs.

I certify that the above is true. I further certify that this firm and its partners, directors, and officers do not possess a controlling interest in ownership or conflict of interest or any other authority to control the DBE to be used during the performance of the contracts.

BY: _____

NAME: _____

TITLE: _____

COMPANY: _____

DATE: _____

BIDDER CERTIFICATION REGARDING THE USE OF IRON, STEEL, MANUFACTURED PRODUCTS, AND CONSTRUCTION MATERIALS PRODUCED IN THE UNITED STATES

(BUILD AMERICA, BUY AMERICA ACT)

I _____ , do hereby certify that:
(Name)

1. I am _____ (title) of the _____ (company, partnership, etc.) and have authority to execute this certification on behalf of the firm.
2. I am aware that all iron, steel, manufactured products, and construction materials used for this project must be produced in the United States per the federal Build America, Buy America Act (BABA) signed by President Biden on November 15, 2021. Pub. L No. 117-58, §§ 70901-52.
3. I understand the term "iron and steel products" refers to the following products made primarily of iron or steel: lined or unlined pipes and fittings manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
4. I understand that all manufactured products used in the project must be produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.
5. I acknowledge that all construction materials for this project must be manufactured in the United States. This means all manufacturing processes for the construction materials occurred in the United States.
6. I am aware that this requirement applies to all portions of the project that are subcontracted.

Name of Company: _____

Signature: _____

Title: _____

Date: _____

Corporate Seal (where appropriate)

REQUIREMENTS SPECIFIC TO BUY AMERICA, BUILD AMERICA ACT (BABA)

On November 15, 2021, President Biden signed into law the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. No. 117-58, which includes the Build America, Buy America Act ("BABA"). The purpose of BABA is to ensure that federally funded infrastructure projects only utilize iron, steel, manufactured products, and construction materials produced in the United States. The requirement to use products produced in the United States applies to all projects for the construction, alteration, maintenance, or repair of publicly owned treatment works (POTW) or public water systems. Since Illinois' Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) utilize federal funds, loan recipients must use iron, steel, manufactured products, and construction materials that are produced in the United States. Guidance is available on USEPA's website: https://www.epa.gov/cwsrf/build-america-buy-america-baba. Waivers from the requirements are available under certain circumstances. BABA requires the following:

1. All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
2. All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation.
3. All construction materials are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

BABA only applies to items that are consumed in, incorporated into, or affixed to an infrastructure project. It does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at project completion. BABA does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of or permanently affixed to the structure. BABA requirements apply to an entire infrastructure project, even if it is funded by both Federal and non-Federal funds under one or more awards.

CONSTRUCTION MATERIALS includes an article, material, or supply that consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products including polyvinylchloride, composite building materials, and polymers used in fiber optic cables;
- glass including optic glass;
- lumber; or
- drywall.

CONSTRUCTION MATERIALS does NOT include items made primarily of iron or steel; manufactured products; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

REQUIREMENTS SPECIFIC TO IRON AND STEEL

The existing American Iron and Steel (AIS) Requirements will continue as part of BABA. An iron or steel product is one of the items listed below and is made primarily of iron or steel that is permanently incorporated into the public water system or treatment works.

- Pipes (lined or unlined) and pipe fittings
- Pipe clamps and restraints
- Valves
- Structural steel
- Hydrants
- Flanges
- Tanks
- Reinforced precast concrete
- Manhole Covers and other municipal castings such as valves boxes, drainage grates, bollards, etc.
- Construction materials such as trusses, wire, grating, wire, ductwork, fence tubing, wall panels, etc.

For one of the listed iron or steel products to be considered subject to the BABA requirements, it must be made of greater that 50% iron or steel, measured by the material costs. "Steel" means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels. AIS Guidance is available at: https://epa.illinois.gov/topics/grants-loans/state-revolving-fund/american-iron-and-steel/american-iron-and-steel-requirements.html.

RECORDKEEPING AND DOCUMENTING THE COUNTRY OF ORIGIN FOR IRON, STEEL, MANUFACTURED PRODUCTS, & CONSTRUCTION MATERIALS USED IN LOAN FUNDED PROJECTS

Loan recipients with assistance from their general contractor must be able to verify that products used in their projects comply with the BABA requirements. USEPA recommends loan recipients use a "Step Certification" process to ensure that producers adhere to the BABA requirements. Step certification is a process under which each handler (supplier, fabricator, manufacturer, etc.) of the iron, steel, manufactured products, or construction materials certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin.

A certification can be quite simple if it includes the name of the manufacturer, the location of the manufacturing facility (not company headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Certification could be achieved by other methods such as requiring the final manufacturer, who delivers the products to the worksite, to provide certification that all manufacturing processes occurred in the US. While this type of certification is easier and acceptable, it may not provide the same degree of assurance and additional documentation may be needed. USEPA auditors recommend keeping records of when and where the products were delivered. Records from the manufacturer should refer to specific items such as pipes, valves, meters. Try to avoid records containing broad statements such as, "All products delivered were USA made".

Regardless of the method, documents regarding the country of origin for all covered items should be collected and maintained by the loan recipients. Having a good paper trail is invaluable during an inspection or audit.

SAMPLE CERTIFICATION LETTER

Below is a sample step certification letter for BABA compliance. The completed letter is provided to the construction contractor or loan applicant by the supplier, fabricator, manufacturer, etc. of covered products. Documentation must be provided on company letterhead.

Company Letterhead

Date

Company Name
Company Address
City, State, Zip

Subject: Build America, Buy America Act Step Certification for Project (Identify Project Here xxx)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project are in full compliance with the federal Build America, Buy America Act requirements as required in EPA's State Revolving Fund Programs.

Item, Products, and/or Materials:

1. XXX
2. XXX
3. XXX

Such process took place at the following location (City and State must be included):

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

Signed by Company Representative

INSURANCE REQUIREMENTS

ARTICLE 6 - BONDS AND INSURANCE

Performance, Payment, and Other Bonds

SC-6.01 – Disregard EJCDC Guidance Notes – Performance and Payment Bonds, Note 1. Performance and Payment Bonds are required for WEP projects. EJCDC Guidance Notes – "Other Bonds, "Warranty Bond, Note 1. RD does not require a Warranty Bond, and RD will not accept a Warranty Bond in place of a Performance and Payment Bond. The decision to include a Warranty Bond is made by the Owner and their counsel. Please refer to EJCDC for guidance.

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

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

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

6.02 *Insurance—General Provisions*

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

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

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

3. For the following Subcontractors, Suppliers, or categories of Subcontractor or Supplier, Contractor shall require the following specified insurance, with policy limits as stated: Same Requirements as the General Contractor.

6.03 *Contractor's Insurance*

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

D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following: **[Here list by legal name (not category, role, or classification) other persons or entities to be included as additional insureds. See GC-6.03.C.]**

E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	$ N/A
Bodily injury by disease—aggregate	$ N/A
Employer's Liability	
Each accident	$500,000
Each employee	$500,000
Policy limit	$500,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	$ N/A

F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
    a. Such insurance must be maintained for three years after final payment.
    b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.
5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of Contractor's work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	**Policy limits of not less than:**
General Aggregate	$2,000,000
Products—Completed Operations Aggregate	$1,000,000
Personal and Advertising Injury	$1,000,000
Bodily Injury and Property Damage—Each Occurrence	$1,000,000

J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	**Policy limits of not less than:**
Bodily Injury	
Each Person	$1,000,000
Each Accident	$1,000,000

Automobile Liability	Policy limits of not less than:
Property Damage	
Each Accident	$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$1,000,000

K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	$5,000,000
General Aggregate	$5,000,000

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of $**[specify amount]** after accounting for partial attribution of its limits to underlying policies, as allowed above.

M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	As required by the permit
General Aggregate	As required by the permit

N. *Contractor's Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The

retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	$ N/A
Annual Aggregate	$ N/A

O. *Railroad Protective Liability Insurance:* Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

[Insert additional specific requirements, commonly set by the railroad, here.]

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	As required by the permit
Aggregate	As required by the permit

P. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly *referred* to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	As applicable
General Aggregate	As applicable

Q. *Other Required Insurance:* **[Here list additional types and amounts of insurance that Contractor is required to carry.]**

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following

risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of $**25,000.**

5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of $**50,000**.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include performance/hot testing and start-up, if applicable.

9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.

10 include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties

required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

N/A

11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:

    N/A

12. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of N/A.

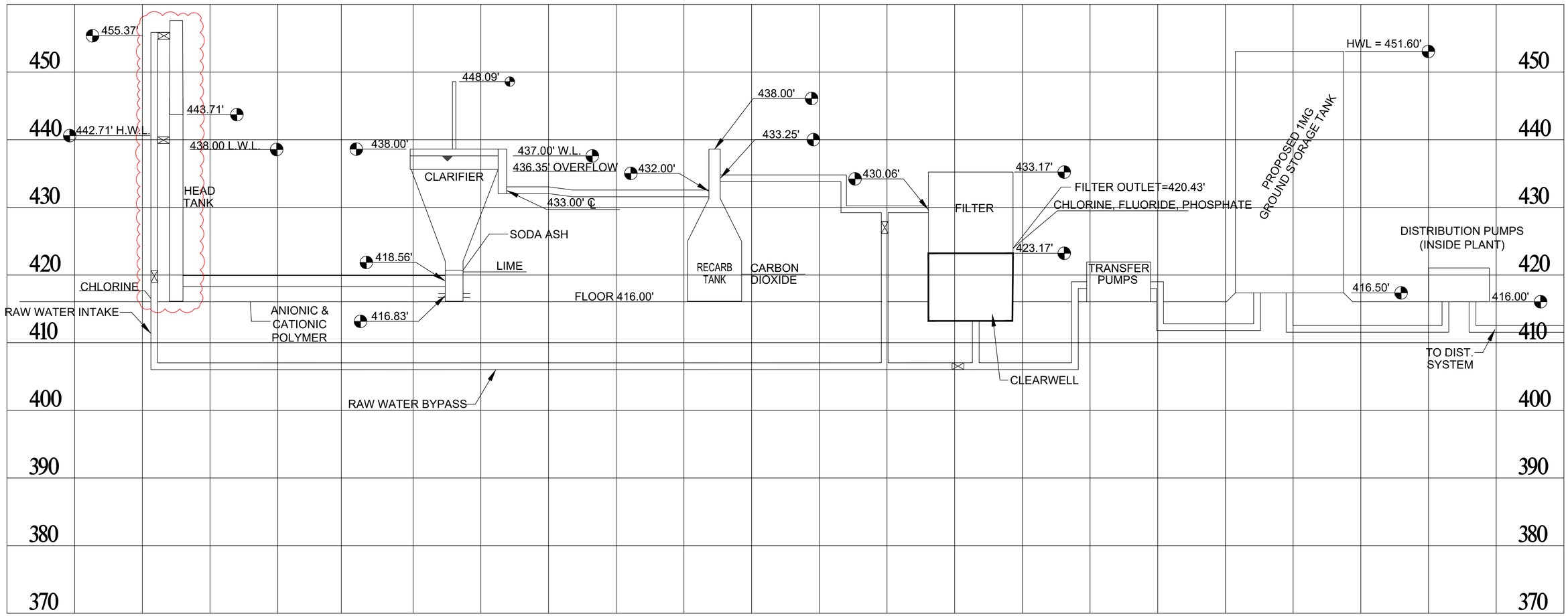
SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provision:

G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than **$1000** for direct physical loss in any one occurrence.



HYDRAULIC PROFILE
1.728 MGD DESIGN FLOW (1200 GPM) – DESIGN
2.16 MGD MAXIMUM DESIGN FLOW (1500 GPM) – PLANT MAX.

HEAD TANK (1 UNIT)

HEIGHT	27'-7 1/2"
DIAMETER	10'-6"
INFLUENT PIPE	12 INCH DIA.
EFFLUENT PIPE	16 INCH DIA.
DOWNFLOW VOLUME	17377.62 GAL.
RETENTION	14.48 MIN.
DOWNFLOW AREA	85.80 FT²
DOWNFLOW VELOCITY	0.03 FT/SEC

26'–0" DIAMETER CLARICONE (2 UNITS)

HEIGHT	21'- 11"
SURFACE AREA (EA.)	530.93 FT²
VOLUME (EA.)	75,000 GAL.
TOTAL RETENTION	>60 MIN.
RISE RATE @ SURFACE	<1.0 GPM/FT²
LARGE INLET	10 INCH - 1.99 FT/SEC
SMALL INLET	4 INCH - 10.64 FT/SEC
OUTLET	12 INCH
CAPACITY	1500 GPM

RECARBONATION VESSEL (1 UNIT)

HEIGHT	22'-7 1/2"
DIAMETER	10 FT.
INLET	12 INCH
INLET VELOCITY	2.81 FT/SEC
TOTAL VOLUME	8,680 GAL.
RETENTION	>5 MIN.
OUTLET	12 INCH

15 FT. X 10 FT. FILTERS (3 UNITS)

HEIGHT	10 FT.
SURFACE AREA @ UNDERDRAIN	150 FT² (EA.)
INLET	12 INCH (EA.)
INLET VELOCITY	1.42 FT/SEC (EA.)
FILTRATION	3.33 GPM/FT²
BACKWASH	15 GPM/FT²
AIR SCOUR	6 SCFM/FT²
DEPTH OF ANTHRACITE	1.00 FT.
DEPTH OF GREEN SAND	1.50 FT.

CLEARWELL (1 UNIT)

VOLUME	57267 GAL. OPERATIONAL
DIMENSIONS (INTERIOR)	60 FT. x 19.5 FT.
HEIGHT	10 FT. - BOTTOM TO H.W.L.
RETENTION	53.65 MIN.

NOTE: ABOVE CALCULATIONS ARE BASED ON 1200 GPM

ADDENDUM 2

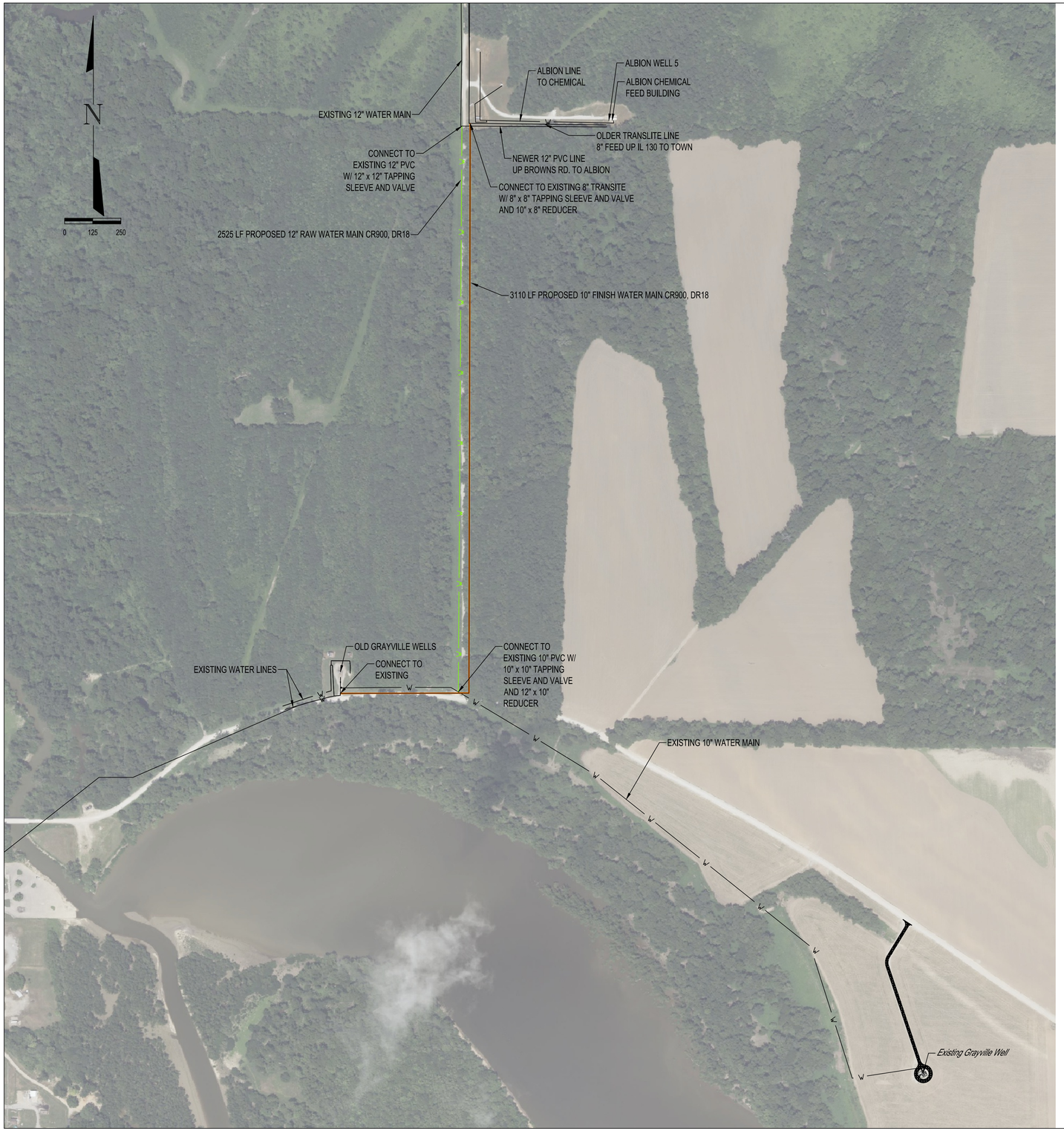
Addendum #2 Sealed Head Tank
KCF 05/05/2026

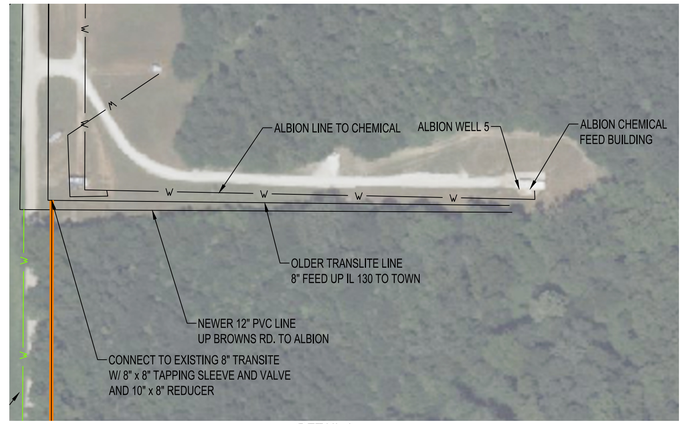
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MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401
Phone: (217) 347-7262 | (800) 677-2714
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

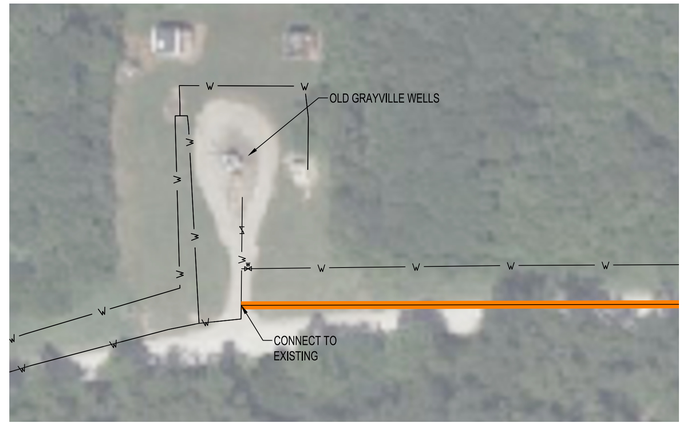
HYDRAULIC PROFILE
PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 3 OF 77
JOB # 22228

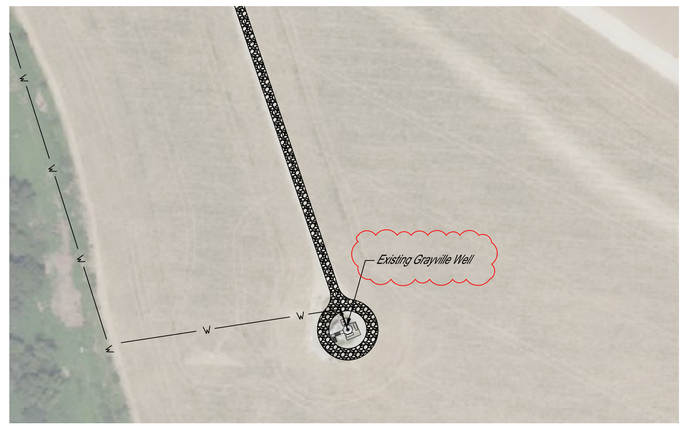




DETAIL A
SCALE: 1" = 100'



DETAIL B
SCALE: 1" = 50'



DETAIL C
SCALE: 1" = 100'

NOTES

1. ALL PROPOSED PIPING ON THIS SHEET IS TO BE CR900, DR19
2. ALL PIPING ON THIS PAGE IS THE RESPONSIBILITY OF CONTRACT 5.

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Well Leader

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MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
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Design Firm #184-003108

PROCESS INTERCONNECTIONS (2)

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET #
72 OF 77

JOB #
22228

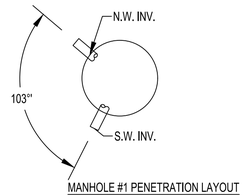


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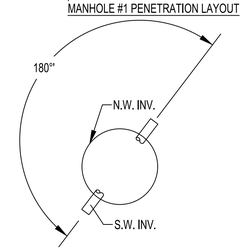
0 25 50

LEGEND

- 6" PCC CONCRETE PAVEMENT & 4" AGGREGATE BASE COURSE, TYPE A
- AGGREGATE SURFACE COURSE, 6"
- PROPOSED FENCING
- PROPOSED SANITARY
- PROPOSED STORM



MANHOLE #1 PENETRATION LAYOUT



MANHOLE #2 PENETRATION LAYOUT

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Add Inlet D Change Inlets to Manholes

MILANO & GRUNLOH ENGINEERS, LLC
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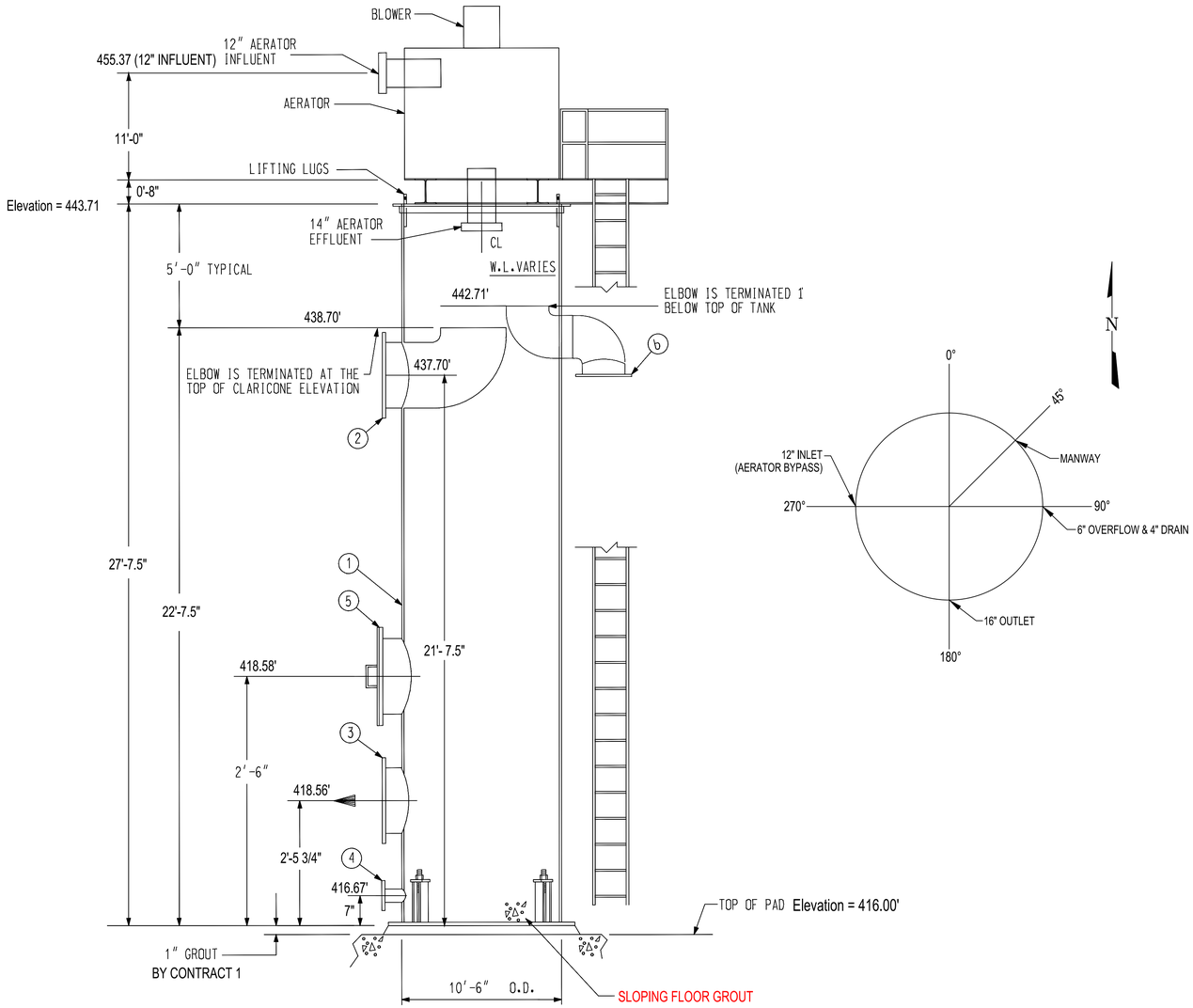
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PLANT EFFLUENT

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 77 OF 77

JOB # 22228



ASSEMBLY LIST

1. HEAD TANK
2. INLET 12" DIA., AERATOR BYPASS OPTION
3. OUTLET 16" DIA.,
4. TANK DRAIN - 4" FLANGED
5. MANWAY - 24" DIA. W/COVER
6. OVERFLOW - 8" DIA. FLANGED

NOTES:

1) HEAD TANK CAN BE EQUIPPED WITH CHEMICAL FEED COUPLINGS AND PIPE BRACKETS IF DESIRED. CLIENT TO ADVISE IF REQUIRED FOR THIS PROJECT
2) ALL NOZZLES PROJECT 6" OUTSIDE OF STEEL SHELL.
3) FINAL ORIENTATIONS OF NOZZLES TO BE DETERMINED. ORIENTATIONS SHOWN HERE ARE FOR INFORMATION ONLY.

PROJECT: W2E WATER TREATMENT PLANT
ALBION-GRAYVILLE, IL

ENGINEER: MILANO & GRUNLOH

DESIGN FLOW RATE: 1500 GPM

NUMBER OF UNITS REQ'D: 1

DATE SUBMITTED: _____ BY: _____

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Added Sloping Floor Grout Callout

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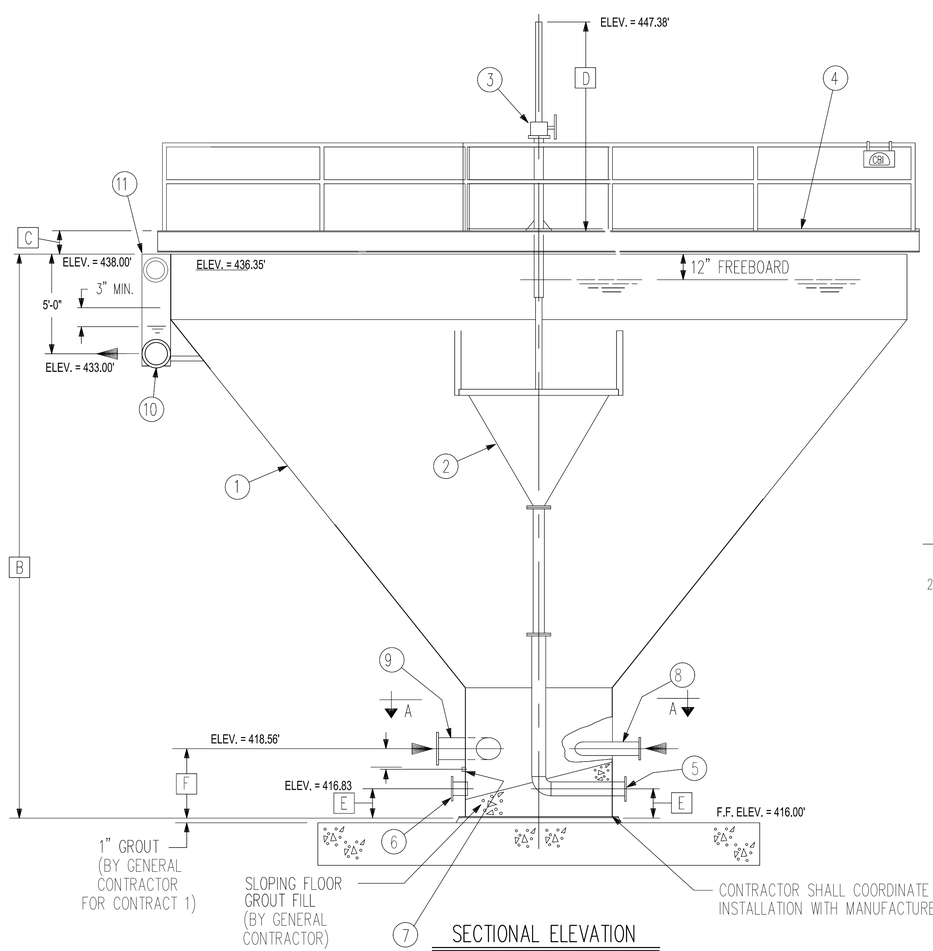
HEAD TANK

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

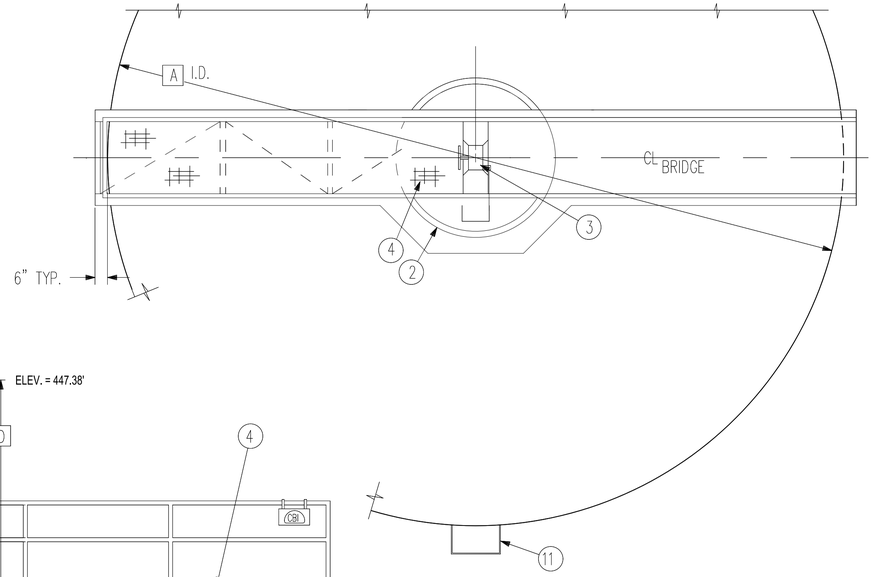
SHEET # 14 OF 77

JOB # 22228

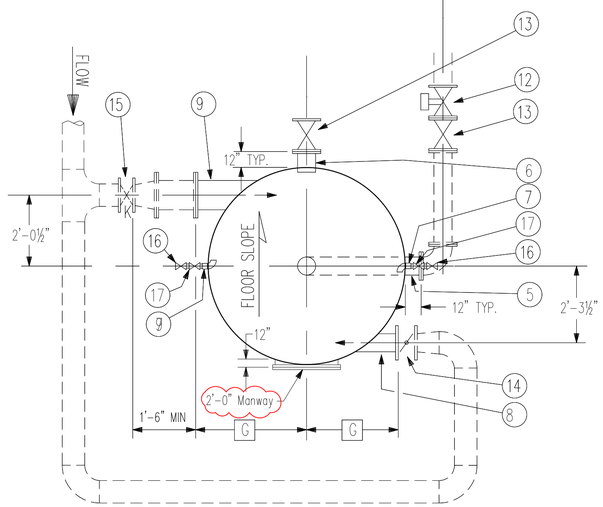
A	B	C SEE NOTE #3	D	E	F	G
26' - 0"	21' - 11"	1' - 10 3/4"	7' - 6"	9"	2'-5 3/4"	2'-10 1/4"



SECTIONAL ELEVATION



PLAN VIEW



SECTION A-A

ASSEMBLY LIST

1. CLARICONE SHELL
2. SLURRY CONCENTRATOR
3. CONCENTRATOR OPERATOR
4. ACCESS BRIDGE (ACROSS ENTIRE CLARIFIER)
5. 6" DIA SLURRY BLOWDOWN LINE
6. 6" DIA GRIT/DRAIN BLOWDOWN
7. 1 1/2"DIA WATER JET (2 – REQUIRED) W/50 P.S.I. NOMINAL SUPPLY PRESSURE
8. 4" SMALL INLET NOZZLE
9. 10" LARGE INLET NOZZLE
10. 12" DIA OUTLET NOZZLE
11. DROP BOX

SUPPLIED BY GENERAL CONTRACTOR

12. 6" DIA SLURRY BLOWDOWN VALVE – MANUAL PLUG VALVE
13. 6" DIA SHUT OFF VALVE – MANUAL PLUG VALVE
14. MANUAL BUTTERFLY VALVE FOR SMALL INLET
15. ACTUATOR KNIFE GATE VALVE FOR LARGE INLET
16. 1 1/2" DIA MANUAL PLUG VALVE FOR WATER JET
17. 2" DIA MANUAL PLUG VALVE FOR WATER JET

NOTES:

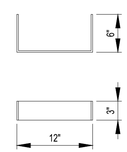
1) MAINTAIN ORIENTATION OF (6) RELATIVE TO (9) AS SHOWN IN SECTION A-A. NOZZLE (6) ROTATED IN ELEVATION VIEW FOR CLARITY.
2) CBI WALKER PROVIDES TO THE FACE OF THE FIRST FLANGE OR FITTING OUTSIDE CLARICONE SHELL. VALVES BY GENERAL CONTRACTOR.
3) DIMENSION "C" INCLUDES A 1" GAP BETWEEN THE BEAM AND THE CLARICONE.
4) NOZZLE (5) (SLURRY) AND NOZZLE (6) (GRIT/DRAIN) ARE TO BE LOCATED AT THE SAME ELEVATION.
6) CBI WALKER REQUIRES A MINIMUM STRUCTURAL SLAB THICKNESS OF 16" FOR PROPER ANCHOR BOLT EMBEDMENT.

DESIGN FLOW RATE: 750 G.P.M. EACH UNIT

RISE RATE: 1.41 G.P.M./FT 2 EACH UNIT

DETENTION TIME: 60 MIN. EACH UNIT

NUMBER OF UNITS REQ'D: 2



SUPPORT BRACKET DETAIL

ADDENDUM 2

KCF 05/05/2026 Addendum #2 Fixed Inlet Size Note. Fixed Manway Dimension

MILANO & GRUNLOH ENGINEERS, LLC
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EFFINGHAM, IL 62401
Phone: (217) 347-7262 | (800) 677-2714
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

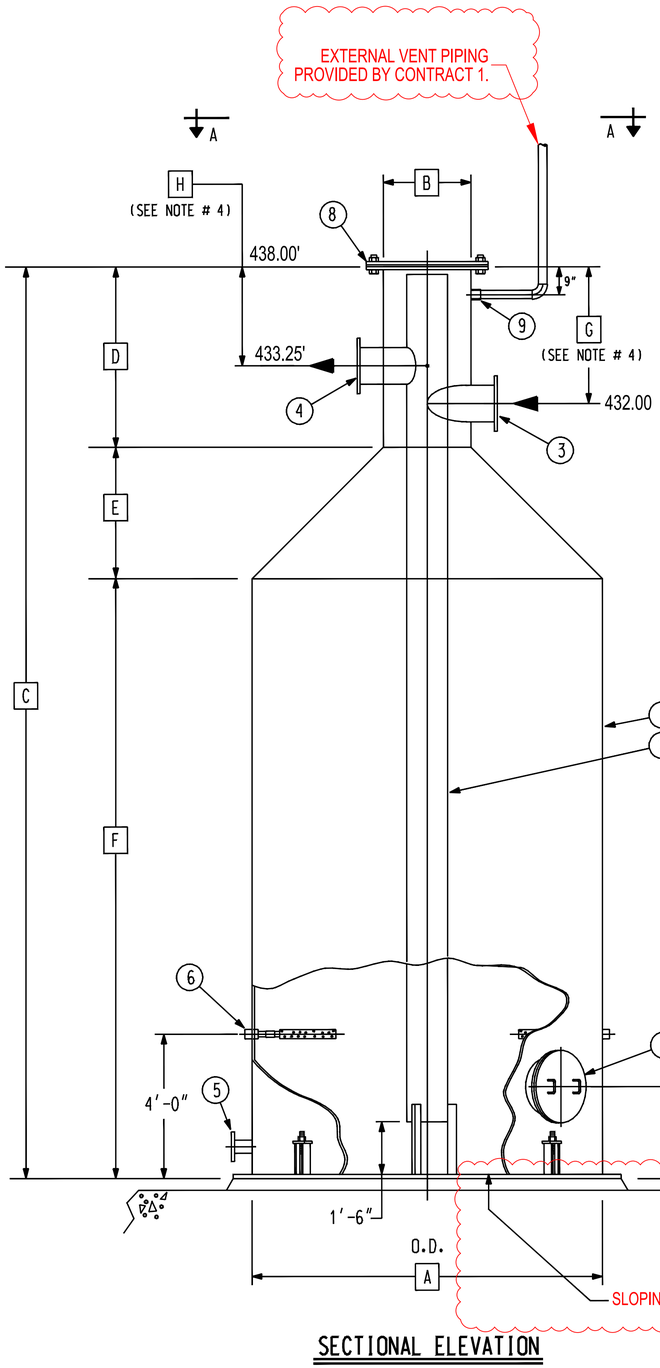
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DRAWN BY: KCF \ BAF \ CRG
CHECKED BY:
FILE LOCATION: S:\2022\22228\DWG\MECHANICAL\CLARICONE.DWG
SAVE DATE: 5/7/2026 14:48

CLARICONE

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 17 OF 77

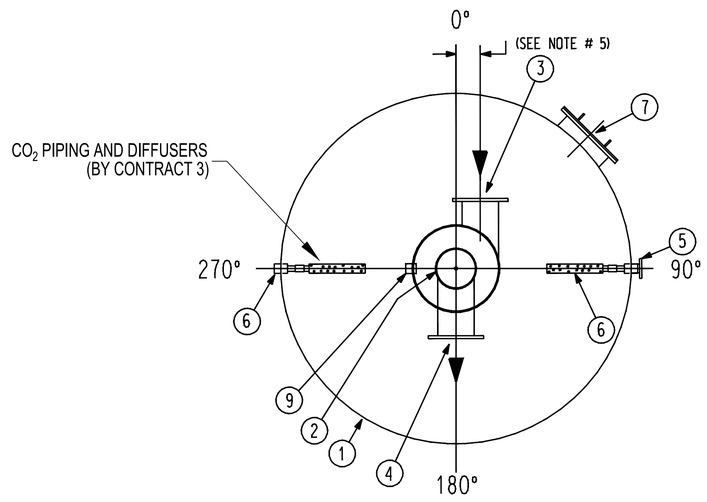
JOB # 22228



SECTIONAL ELEVATION

DIMENSIONS ARE CONTRACT SPECIFIC

	MAX. FLOW (GPM)	VOLUME (GALLONS)	DETENTION TIME (MIN)	A	B	C	D	E	F	G	H	I	J	K
	1500	8680	>5	12'-0"	2'-3"	21'-11"	TBD	TBD	TBD	6'-0"	4'-9"	12"	12"	12"



PLAN VIEW A-A

REF (8) NOT SHOWN FOR CLARITY

NOZZLE ORIENTATION

INLET: 0 ° (OFFSET)

OUTLET: 180 °

DRAIN: 90 °

MANWAY: 45 °

CO_2 CONN.: 90 ° AND 270 °

VENT: 270 °

ASSEMBLY LIST

1. STEEL OUTER SHELL
2. INTERNAL RISER, [I] DIA.
3. INLET NOZZLE, [J] DIA.
4. OUTLET NOZZLE, [K] DIA.
5. TANK DRAIN - 6" FLANGED
6. CO_2 CONNECTION - 2" DIA. NPT
7. MANWAY - 24" DIA. W/COVER
8. REMOVEABLE COVER
9. VENT - 2" DIA. NPT

NOTE:

1) ALL VALVES AND PIPING BEYOND HELICARB NOZZLE FLANGES BY PURCHASER.
2) CO_2 PIPING AND DIFFUSERS BY CONTRACT 3.
3) ALL NOZZLES PROJECT 12" OUTSIDE OF STEEL SHELL.
4) ELEVATION DIFFERENCE BETWEEN INLET AND OUTLET TO BE EQUAL TO THE PIPE DIAMETER PLUS 3".
5) OFFSET DETERMINED BY PIPE SIZE.
6) CB&I REQUIRES A MINIMUM STRUCTURAL SLAB THICKNESS OF 16" FOR PROPER ANCHOR BOLT EMBEDMENT.
7) Dimensions D, E, and F shall be determined by manufacturer

PROJECT: W2E WATER TREATMENT PLANT

ENGINEER: MILANO & GRUNLOH ENGINEERS

DESIGN FLOW RATE: 1500 GPM EACH

TOTAL DETENTION TIME: >5 MIN. PER UNIT

NUMBER OF UNITS REQUIRED: (1)

DATE SUBMITTED: 2-04-21 BY: JRC

ADDENDUM 2

Addendum #2 | KCF | 05/05/2026 | Fix Callout, Add Sloping Grout Callout

FIELD BOOK: XXX | DRAWN BY: KCF | CHECKED BY: | FILE LOCATION: S:\2022\22228\DWG\MECHANICAL\RECARB.DWG | SAVE DATE: 5/7/2026 14:48

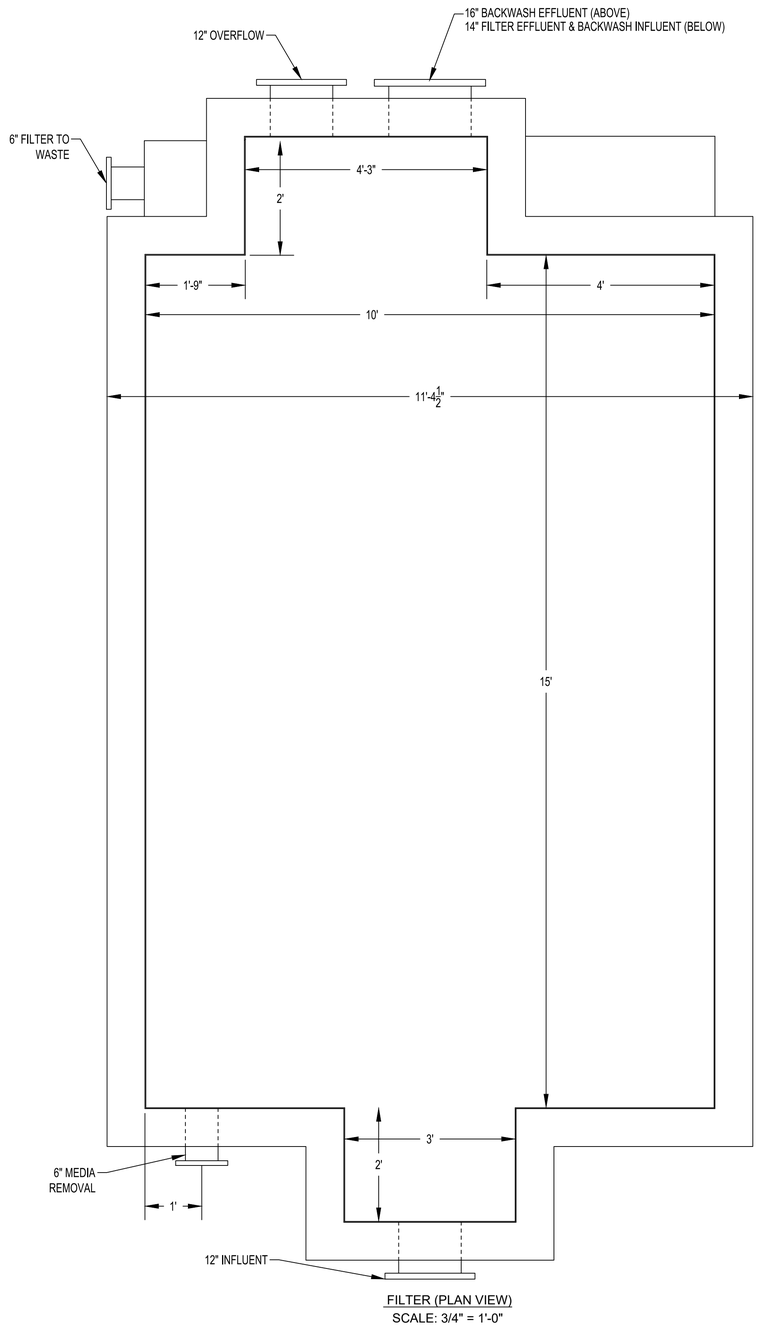
MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401
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Design Firm #184-003108

RECARBONATION VESSEL

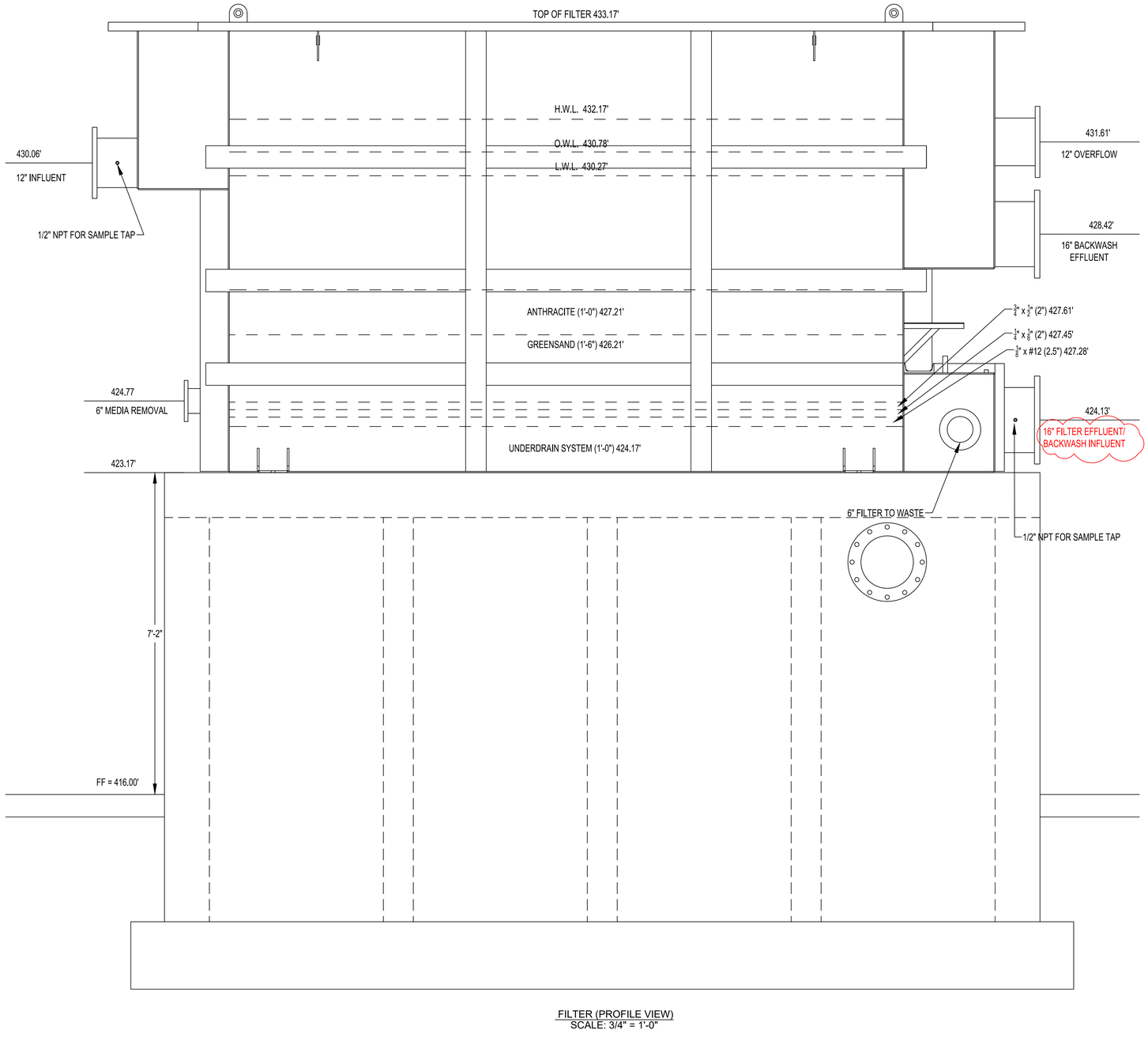
PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 18 OF 77

JOB # 22228



FILTER (PLAN VIEW)
SCALE: 3/4" = 1'-0"



FILTER (PROFILE VIEW)
SCALE: 3/4" = 1'-0"

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Filter Effluent Size Callout

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	S:\2022\22228\DWG\MECHANICAL\FILTER.DWG
FILE LOCATION	5/7/2026 14:48
SAVE DATE	

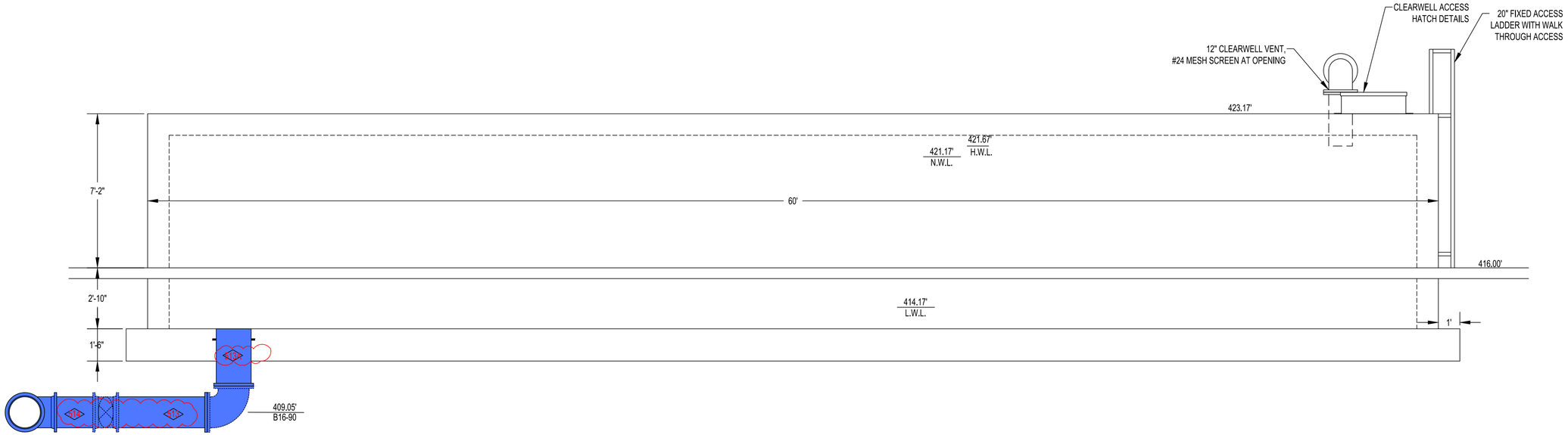
MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
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Web: www.mgengineers.com
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GRAVITY FILTER

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

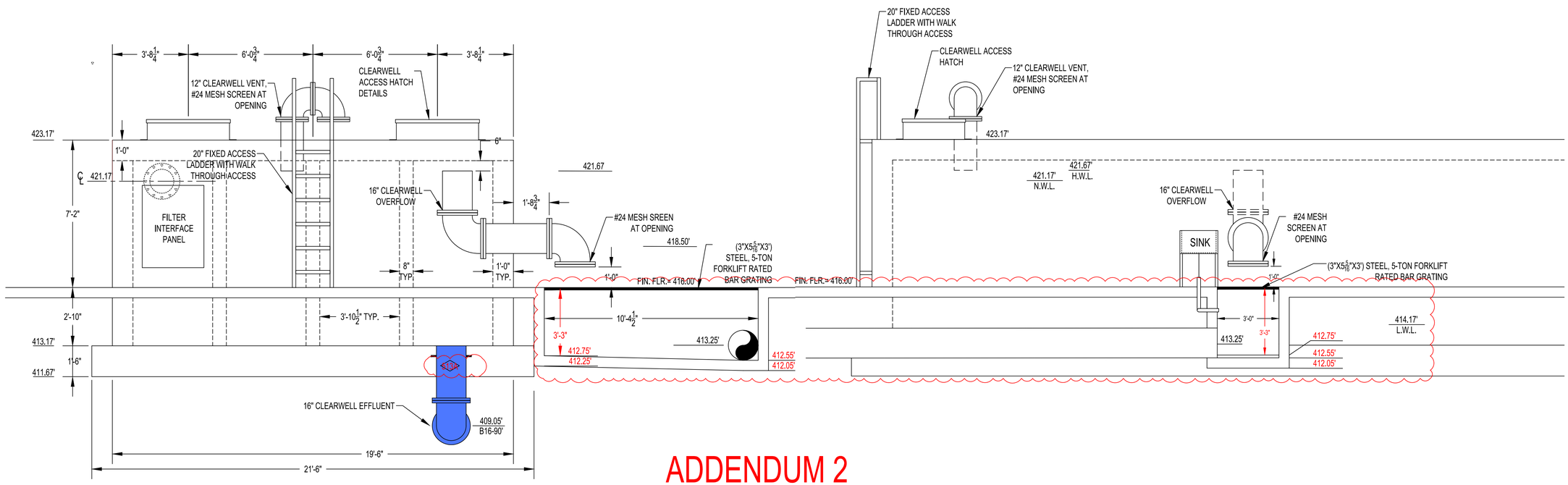
SHEET #
19 OF 77

JOB #
22228



PROFILE OF CLEARWELL\FILTER FOUNDATION

SCALE: 3/8" = 1'-0"



EAST PROFILE OF CLEARWELL\FILTER FOUNDATION

SCALE: 3/8" = 1'-0"

PROFILE OF CLEARWELL OVERFLOW

SCALE: 3/8" = 1'-0"

ADDENDUM 2

Addendum #2	
KCF	03/05/2026
Add Pipe ID	
Fix Overflow Profile/Elevations	

FIELD BOOK	XXX
DRAWN BY	
CHECKED BY	KCF \ BAF \ CRG
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\CLEARWELL.DWG
SAVE DATE	5/7/2026 14:48

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CLEARWELL\FILTER FOUNDATION

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 21 OF 77

JOB # 22228

ABBREVIATIONS

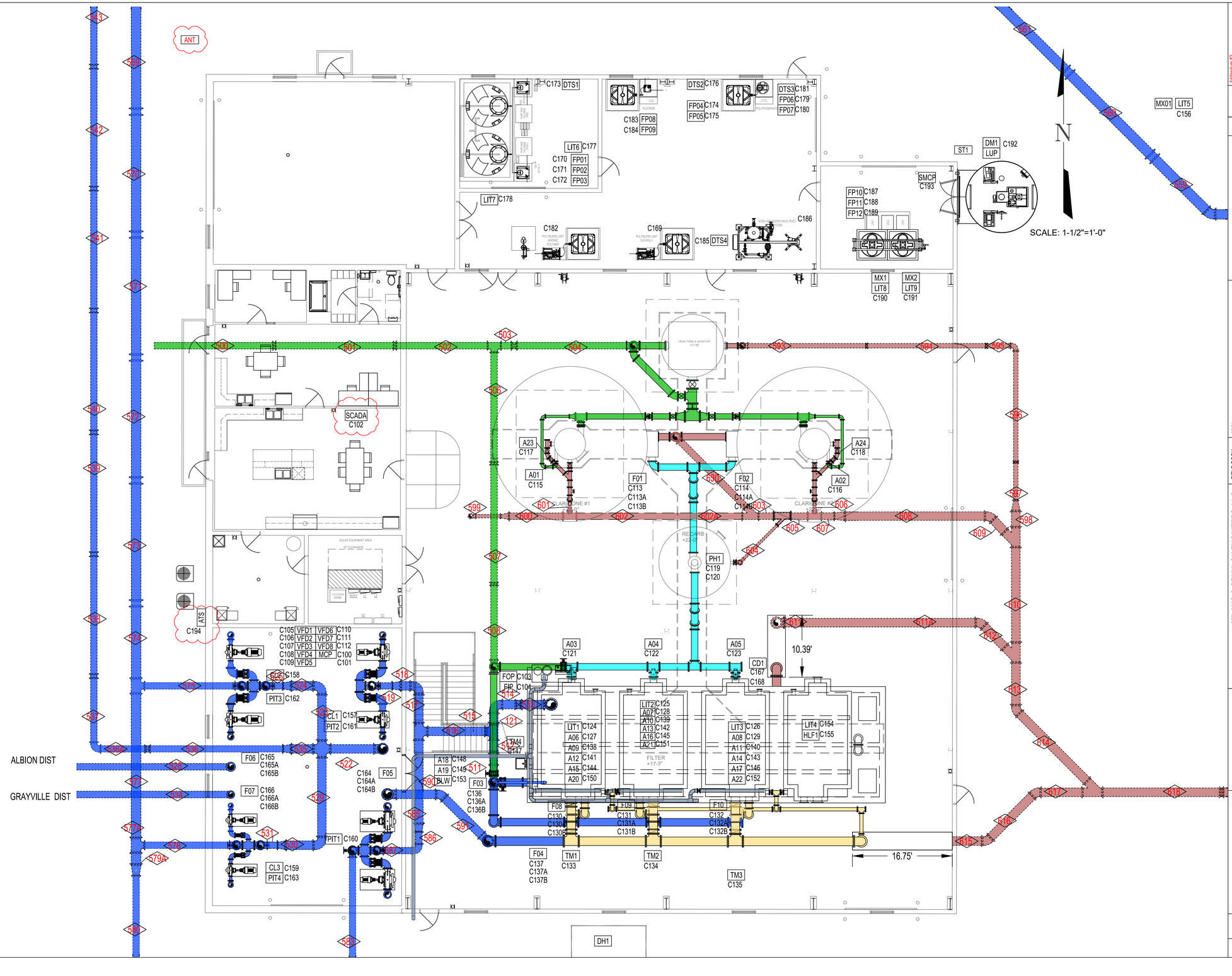
TM#	TURBIDITY METER
PIT#	PRESSURE TRANSMITTER
F#	FLOW METER
A#	ACTUATOR VALVE
PH#	PH METER
LIT#	LEVEL TRANSMITTER
HLF#	HIGH LEVEL FLOAT
VFD#	VARIABLE FREQUENCY DRIVE
ATS	AUTOMATIC TRANSFER SWITCH
CL#	CHLORINE ANALYZER
CD#	LIQUID CARBON CONTROL PANEL
FIP	FILTER INTERFACE PANEL
ANT	TELEMETRY ANTENNA
DTS	DAY TANK SCALE
MX#	TANK MIXER
ST#	SLURRY TRANSFER PUMP
MCP	MASTER CONTROL PANEL
SCADA	SCADA
DM#	DENSITY METER
FP#	FEED PUMP
DH#	DEHUMIDIFIER
SMCP	SILO MASTER CONTROL PANEL
LUP	LIME UNLOAD PANEL
FOP	FILTER OPERATOR PANEL

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR

NOTE
1. TELECOM ANTENNA SHALL BE LOCATED BY SCADA INSTALLER FOR OPTIMAL SIGNAL

ADDENDUM 2



Addendum #2	Add Post ID, Add Antenna Label & Note; Move ATS Control Label/SCADA Labels
KCF	05/05/2026

FIELD BOOK	XXX
DRAWN BY	KCF | BAF | CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\ELECTRICAL\CONDUIT SCHEDULE.DWG
SAVE DATE	5/7/2026 14:48

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EFFINGHAM, IL 62401
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Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

CONTROLS ID

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 24 OF 77

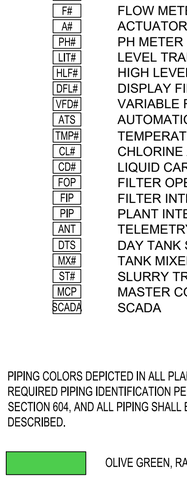
JOB # 22228

ABBREVIATIONS

TM#	TURBIDITY METER
PIT#	PRESSURE TRANSMITTER
F#	FLOW METER
A#	ACTUATOR VALVE
PH#	PH METER
LIT#	LEVEL TRANSMITTER
HLF#	HIGH LEVEL FLOAT
DFL#	DISPLAY FILTER LEVEL
VFD#	VARIABLE FREQUENCY DRIVE
ATS	AUTOMATIC TRANSFER SWITCH
TMP#	TEMPERATURE TRANSMITTER
CL#	CHLORINE ANALYZER
CD#	LIQUID CARBON CONTROL PANEL
FOP	FILTER OPERATOR PANEL (CATWALK)
FIP	FILTER INTERFACE PANEL
PIP	PLANT INTERFACE PANEL
ANT	TELEMETRY ANTENNA
DTS	DAY TANK SCALE
MX#	TANK MIXER
ST#	SLURRY TRANSFER PUMP
MCP	MASTER CONTROL PANEL
SCADA	SCADA

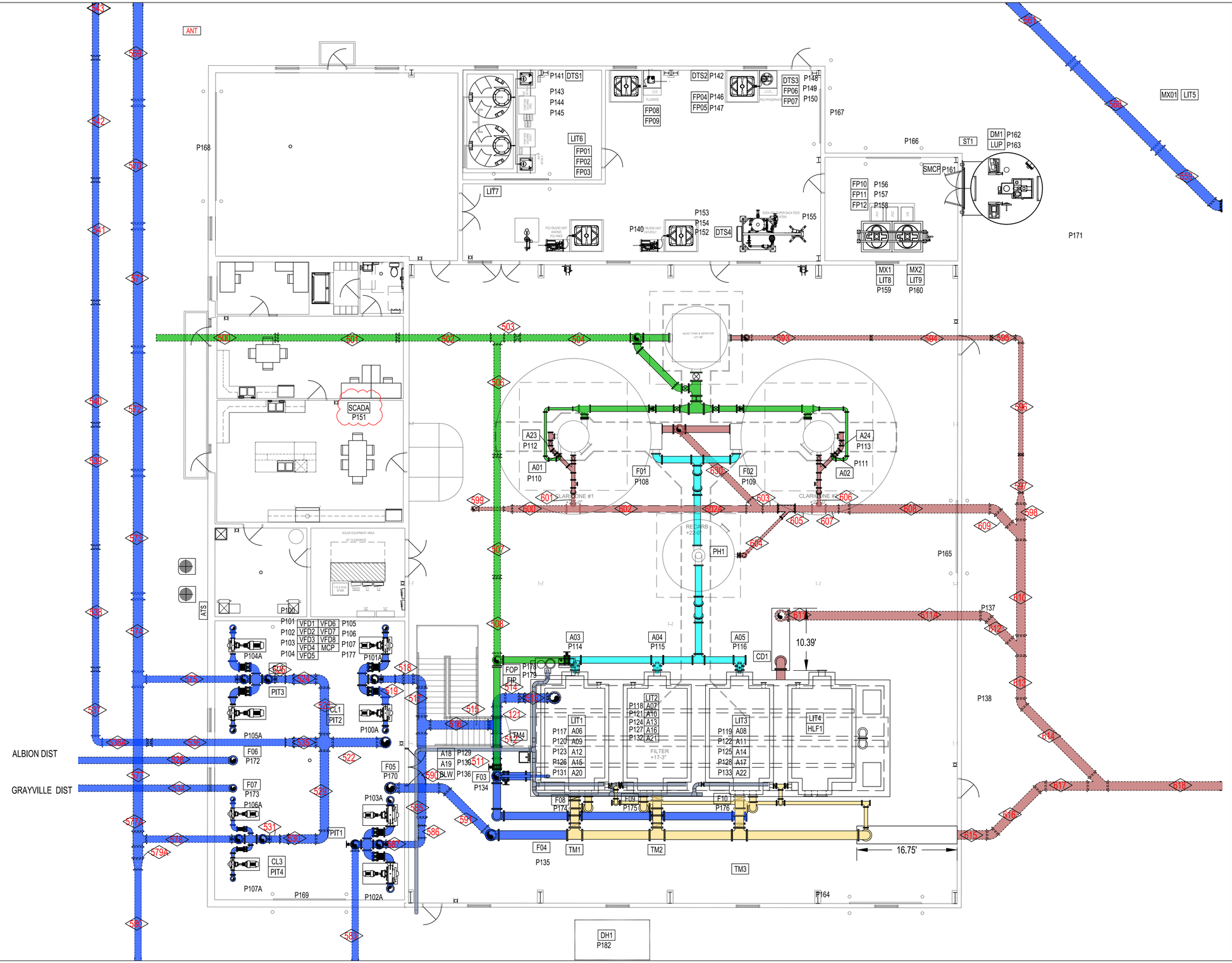
PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR



SCALE: 1-1/2"=1'-0"

ADDENDUM 2



FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\ELECTRICAL\CONDUIT SCHEDULE.DWG
SAVE DATE	5/7/2026 14:48

Addendum #2
KCF 05/05/2026 Add Pipe ID, Add Antenna Label, Move SCADA Labels

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Design Firm #184-003108

POWER ID

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 26 OF 77

JOB # 22228

N

SCALE: 1"=10'-0"

ABBREVIATIONS

F#	FLOW METER
A#	AUTOMATIC VALVE
M#	MANUAL VALVE
CV#	CHECK VALVE
SM#	STATIC MIXER

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR

ALBION DIST

GRAYVILLE DIST

ADDENDUM 2

** GENERAL LOCATION AND IDENTIFICATION PURPOSES ONLY. NOT ALL VALVES SHOWN FOR CLARITY. REFER TO DETAIL PIPING SHEETS FOR SPECIFIC VALVES.

@.60% SOUTH EN

410.09'

10.39'

16.75'

KCF	05/05/2026
Addendum #2	Add Piping

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MISC\VALVE SCHEDULE.DWG
SAVE DATE	5/7/2026 14:50

MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401
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VALVE ID

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 29 OF 77

JOB # 22228

UNDERGROUND MECHANICAL JOINT DIP

PIPE #	SHEET	DIAMETER							DESC.
		4"	6"	8"	12"	14"	16"	18"	
500	34				240				Raw Water Influent
501	34				240				Raw Water Influent
502	34				186.48				Raw Water Influent
503	34				24				Raw Water Influent
504	34				224.13				Raw Water Influent
505	33				57				Raw Water Influent
506	33				223.32				Raw water bypass; Head Tank, Claricones, Recarb
507	33				240				Raw water bypass; Head Tank, Claricones, Recarb
508	33				153.24				Raw water bypass; Head Tank, Claricones, Recarb
509	33				49.2				Raw water bypass; Head Tank, Claricones, Recarb
510	33					78.63			Finished water
511	33					21.84			Finished water
512	33						31.68		Finished water
513A	21						31.96		Finished from clearwell
513	53						46.68		Finished from clearwell
514	53						30.6		Finished from clearwell
515	53						24		Finished from clearwell
516	53						120.48		Finished from clearwell
517	53						61.44		Finished Water to Transfer pumps/ Backwash Pumps
518	53						24		Finished Water to Transfer Pumps
519	53						31.08		Finished Water to Transfer Pumps
520	54				88.9				Finished Water to Transfer Pumps
521	54						95.95		Finished Water From Transfer Pumps
522	53						92.22		Finished Water To Distribution Pumps/ GST
523	53						96.6		Finished Water To Distribution Pumps/ GST
524	53						48.8		Finished Water To Albion Distribution Pumps
525	53				24				Finished Water To Albion Distribution Pumps
526	53				99.06				Finished Water To Albion Distribution Pumps From CW
527	53&57				106.08				Finished Water From Albion Distribution Pumps
528	57				240				Finished Water To Albion
529	57						163.74		Finished Water To Grayville Distribution Pumps
530	57						59.67		Finished Water To Grayville Distribution Pumps
531	53				24				Finished Water To Grayville Distribution Pumps
532	53				99.58				Finished Water To Grayville Distribution Pumps
533	53				105.99				Finished Water From Grayville Distribtion Pumps
534	53				240				Finished Water To Grayville
535	53						48.77		Finished Water to GST
536	56				240				Finished Water to GST
536A	56				122.88				Finished Water to GST
537	56				131.88				Finished Water to GST
538	56				240				Finished Water to GST
539	56				240				Finished Water to GST
540	56				240				Finished Water to GST
541	56				240				Finished Water to GST
542	56				240				Finished Water to GST
543	56				240				Finished Water to GST
544	56				184.32				Finished Water to GST
545	56				104.28				Finished Water to GST
546	57				240				Finished Water to GST
547	57				240				Finished Water to GST
548	57				240				Finished Water to GST
549	53&57				240				Finished Water to GST
550	57				240				Finished Water to GST
551	53				240				Finished Water to GST
552	56				240				Finished Water to GST
553	56				240				Finished Water to GST
554	56				240				Finished Water to GST
555	56				240				Finished Water to GST
556	53				240				Finished Water to GST
557	53							20	Finished Water From GST
558	53							203.63	Finished Water From GST
559	53							151.68	Finished Water From GST
560	53							240	Finished Water From GST
561	55							238.68	Finished Water From GST
562	55							240	Finished Water From GST
563	55							240	Finished Water From GST
564	55							240	Finished Water From GST
565	56							240	Finished Water From GST
566	56							240	Finished Water From GST
567	53							240	Finished Water From GST
568	53							180	Finished Water From GST
569	58							240	Finished Water From GST
570	41							240	Finished Water From GST
571	41							240	Finished Water From GST
572	41							240	Finished Water From GST
573	41							240	Finished Water From GST

UNDERGROUND MECHANICAL JOINT DIP

PIPE #	SHEET	DIAMETER							DESC.
		4"	6"	8"	12"	14"	16"	18"	
574	41							149.28	Finished Water From GST
575	42				185.22				Finished Water From GST to Albion Distribution Pumps
576	41&42				75.05				Finished Water From GST to Albion Distribution Pumps
577	41&42							240	Finished Water From GST to Grayville Distribution Pumps/ Backwash Pumps
577A	41&42							46.68	Finished Water From GST to Grayville Distribution Pumps/ Backwash Pumps
578	41&42							174.24	Finished Water From GST to Grayville Distribution Pumps
579	41&42							75.06	Finished Water From GST to Grayville Distribution Pumps
579A	41&42							27.48	Finished Water From GST to Grayville Distribution Pumps
580	41				190.61				Finished Water From GST to Backwash
581	41				240				Finished Water From GST to Backwash
582	41				166.47				Finished Water From GST to Backwash
583	41				227.76				Finished Water From GST to Backwash
584	41				80.69				Finished Water From GST to Backwash
585	41						174.12		Finished Water From Clearwell to Backwash Pumps
586	55				24				Finished Water From Clearwell to Backwash Pumps
587	55				61.56				Finished Water From Clearwell to Backwash Pumps
588	55				80.7				Finished Water From Clearwell to Backwash Pumps
589	55						86		Finished Water from Backwash Pumps
590	34						84.34		Finished Water from Backwash Pumps
591	34						110.64		Finished Water from Backwash Pumps
592	34			55.93					Finished Water to Backwash Inf.
593	55			240					Headtank Drain/Overflow
593A	55			53.88					Headtank Drain/Overflow
594	55			240					Headtank Drain/Overflow
595	41			49.8					Headtank Drain/Overflow
596	41			224.52					Headtank Drain/Overflow
597	41			77.78					Headtank Drain/Overflow
598	41						24		Headtank Drain/Overflow
599	41	53.48							Floor Drain
600	41				111.72				Floor Drain
601	41		34.42						Claricone Drain
602	46				240.00				Claricone Drain/Floor Drain
602A	46				94.08				Claricone Drain/Floor Drain
603	35				33.84				Claricone Drain/Floor Drain
604	35		98.64						Recarb Drain
605	35				37.8				Claricone Drain/Floor Drain/recarb drain
606	35		37.42						Claricone Drain
607	35				24				Claricone Drain/Floor Drain/recarb drain
608	35						285.12		Claricone Drain/Floor Drain/recarb drain
609	35						37.04		Claricone Drain/Floor Drain/recarb drain
610	35						195.6		Claricone Drain/Floor Drain/recarb drain/HT drain
611	35						240		Clearwell Overflow
611A	35						144.48		Clearwell Overflow
612	35						63		Clearwell Overflow
613	35						89.52		Claricone Drain/Floor Drain/recarb drain/HT drain/CW overflow
614	35						195.84		Claricone Drain/Floor Drain/recarb drain/HT drain/CW overflow
615	35						61.68		Backwash to Drying Bed
616	35						122.76		Backwash to Drying Bed
617	35						87.48		Backwash to Drying Bed
618	35						240		Waste Water to Drying Bed
619	35						93.12		Waste Water to Drying Bed
620	35						30		Waste Water to Drying Bed
621	35						125.24		Waste Water to Drying Bed
622	35						30.58		Waste Water to Drying Bed
623	35						29.4		Waste Water to Drying Bed
624	35						30		Waste Water to Drying Bed
625	35						130.44		Waste Water to Drying Bed
626	35						240		Waste Water to Drying Bed
627	35						254.76		Waste Water to Drying Bed
628	35						171.6		Waste Water to Drying Bed
629	35						30		Waste Water to Drying Bed
630	35						189		Waste Water to Drying Bed
631	35						30		Claricone Overflow to drying beds
632	35						30		Drain Line to Drying Beds
633	35						130.44		Waste Water to Drying Bed
634	35						240		Waste Water to Drying Bed
635	35						240		Waste Water to Drying Bed
636	13						170.16		Waste Water to Drying Bed
637	13			516					Waste Water From DB
638	13			396					Waste Water From DB
639	13			516					Waste Water From DB
640	13			396					Waste Water From DB
555A	57				112.08				GST INFLUENT
555B	57				240				GST INFLUENT
557A	57						240		GST EFFLUENT
599A	42	44.4							FLOOR DRAIN
Total (in) =		97.88	170.48	2765.91	9753.92	100.47	5684.03	3666.73	
Total (ft) =		8.16	14.21	230.49	812.83	8.37	473.67	305.56	

UNDERGROUND PVC SDR 26

PIPE #	SHEET	DIAMETER	DESC.
		12"	
500	77	2064	Drying bed to Ditch
501	77	4152	Drying bed to Ditch
502	77	4176	Drying bed to Ditch
Total (in) =		10392.00	
Total (ft) =		866.00	

ADDENDUM 2

NOTES:

1. ALL MEASUREMENTS PIPE END TO INSERT.
2. PIPE LENGTHS TO BE USED AS ESTIMATES ONLY. FIELD CONDITIONS MAY VARY. CONTRACTOR TO VERIFY ALL LENGTHS PRIOR TO INSTALLATION.

◇ # ◇ OR ◇ # ◇ ANNOTATES PIPE # ON INDIVIDUAL PLAN SHEETS

Addendum #2	Multiple Length & ID Tag Changes
KCF	05/05/2026

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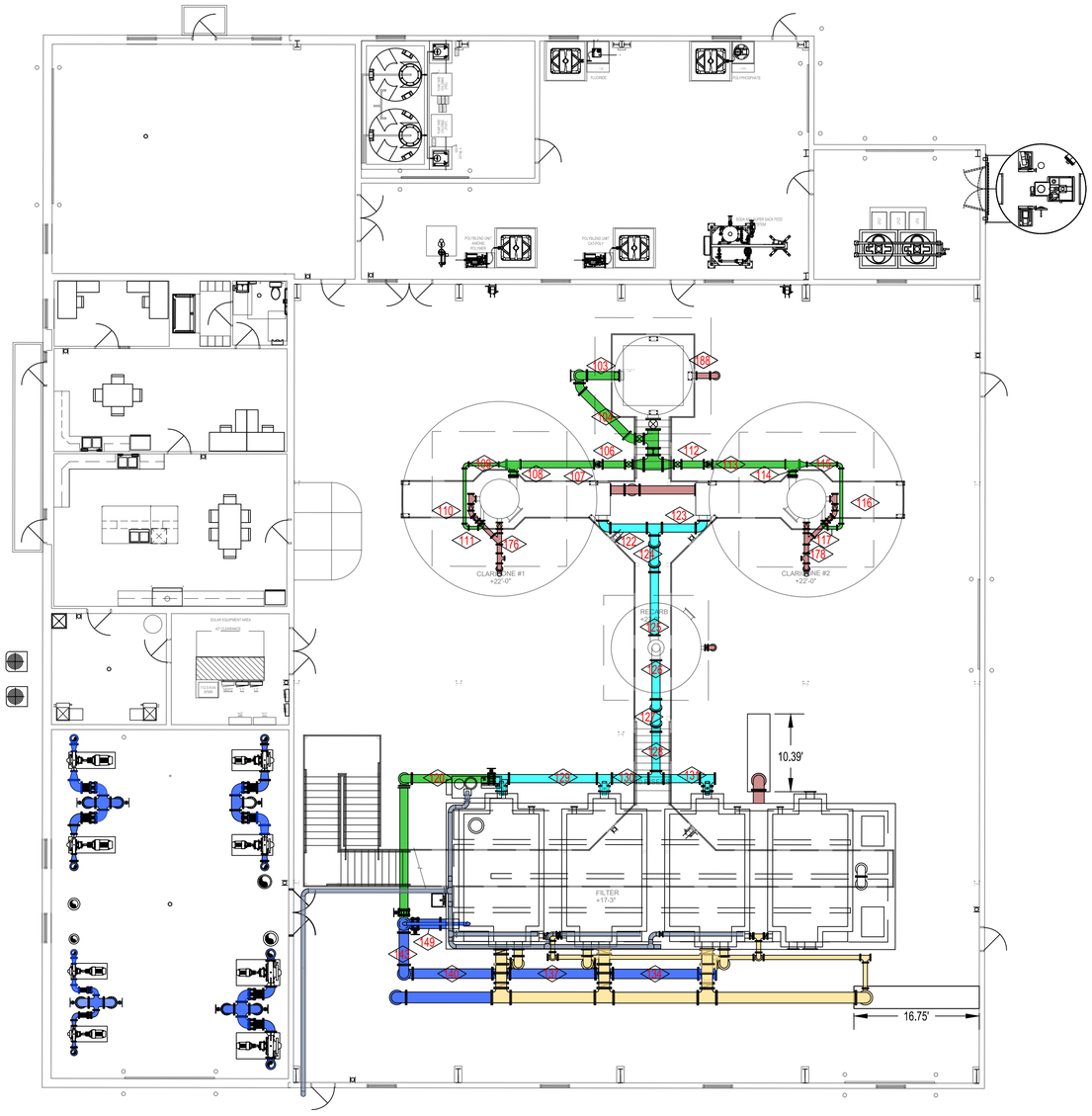
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CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MISC\VALVE SCHEDULE.DWG
SAVE DATE	5/7/2026 14:50

UNDERGROUND PIPING SCHEDULE

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 31 OF 77

JOB # 22228



SCALE: 1" = 10'

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR

IN ADDITION, ALL PIPES SHALL BE LABELED IN ACCORDANCE WITH SECTION 604, WHICH STATES, *"PIPING IN A COMMUNITY WATER SUPPLY TREATMENT FACILITY MUST BE IDENTIFIED CLEARLY BY LEGENDS OR THE USE OF NAMETAG LABELS IDENTIFYING THE CONTENTS OF INDIVIDUAL PIPES, SPACED AT INTERVALS TO ALLOW CONVENIENT IDENTIFICATION OF INDIVIDUAL PIPES. A CONSISTENT STANDARD MUST BE USED THROUGHOUT THE SYSTEM. "*

NOTE*

1. ALL PIPING WITHIN 10' OUTSIDE THE FOUNDATION SHALL BE CONSIDERED PROCESS PIPING

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Add Plant ID

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FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\PLANT PIPING.DWG
SAVE DATE	5/6/2026 16:27

PLANT PIPING - INTERIOR

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 33 OF 77

JOB # 22228

GST INF

GST EFF

ALBION DIST

GRAYVILLE DIST

ADP1

ADP2

GDP1

GDP2

TP1

TP2

BWP1

BWP2

ARSENONE #1

CLARISONE #2

RECARB

FILTER

413.53'℄

413.41'℄

413.28'℄

413.26'℄

413.26'℄

413.41'℄

413.30'℄

413.31'℄

413.35'℄

413.24'℄

413.63'℄

413.60'℄

413.60'℄

413.53'℄

413.54'℄

413.36'℄

413.34'℄

413.33'℄

413.31'℄

413.30'℄

413.25'℄

413.27'℄

413.28'℄

413.41'℄

413.09'℄

413.10'℄

413.10'℄

413.09'℄

413.07'℄

413.07'℄

413.06'℄

413.06'℄

413.14'℄

413.25'℄

10.39'

413.02'℄

413.06'℄

413.05'℄

413.02'℄

413.00'℄

413.00'℄

412.95'℄

412.95'℄

412.89'℄

412.85'℄

412.83'℄

412.90'℄

412.83'℄

412.85'℄

412.97'℄

412.96'℄

413.00'℄

16.75'

412.66'℄

410.16'℄

@.60% SOUTH END TO MATCH

410.09'℄

410.09'℄

410.09'℄

@.60%

@.34%

N

SCALE: 1" = 10'

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE

IN ADDITION, ALL PIPES SHALL BE LABELED IN ACCORDANCE WITH SECTION 604, WHICH STATES, *"PIPING IN A COMMUNITY WATER SUPPLY TREATMENT FACILITY MUST BE IDENTIFIED CLEARLY BY LEGENDS OR THE USE OF NAMETAG LABELS IDENTIFYING THE CONTENTS OF INDIVIDUAL PIPES, SPACED AT INTERVALS TO ALLOW CONVENIENT IDENTIFICATION OF INDIVIDUAL PIPES. A CONSISTENT STANDARD MUST BE USED THROUGHOUT THE SYSTEM. "*

NOTE 1:
SEE PLAN SHEET 57, GST PIPING PLAN, FOR CONTINUATION.

NOTE 2:
ALL PIPING WITHIN 10' OUTSIDE THE FOUNDATION SHALL BE CONSIDERED PROCESS PIPING.

NOTE 3:
ALL PIPING INSTALLED UNDER IMPROVED SURFACES SHALL BE DIP.

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Add Pipe ID, Add Elevation Callouts

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	JBY
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\PLANT PIPING.DWG
SAVE DATE	5/6/2026 16:27

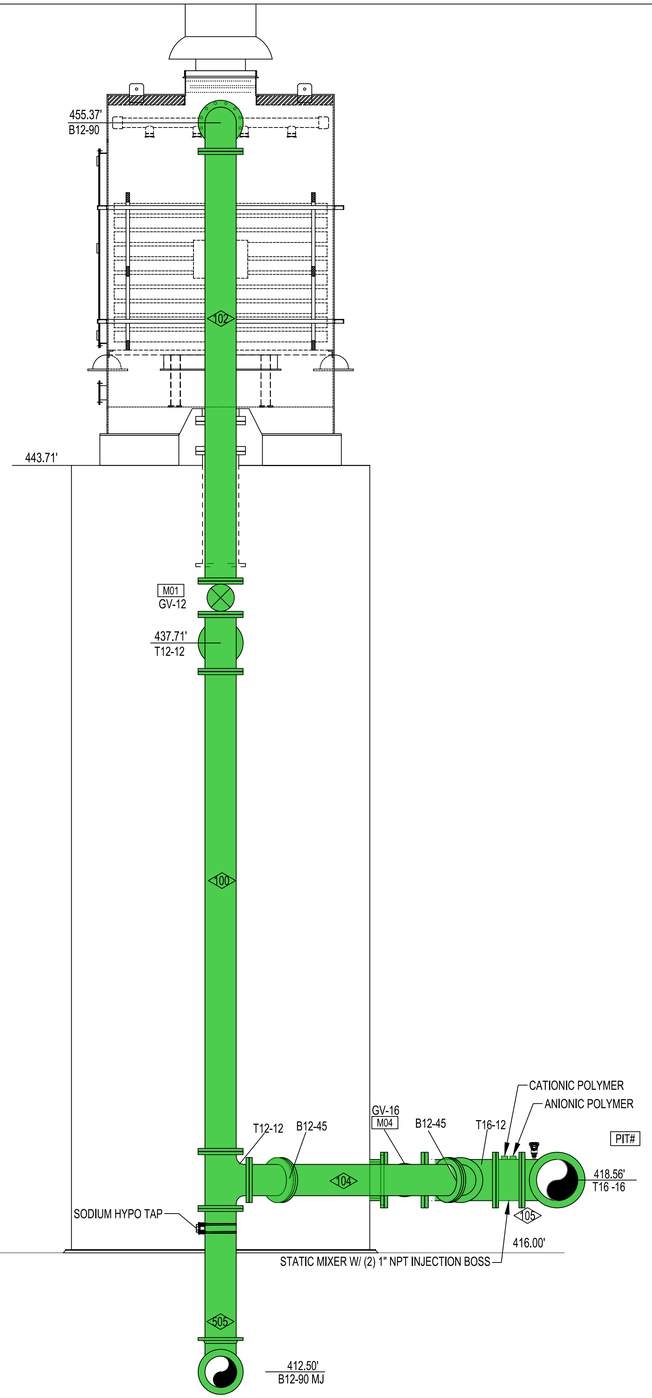
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Design Firm #184-003108

PLANT PIPING - UNDERGROUND

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

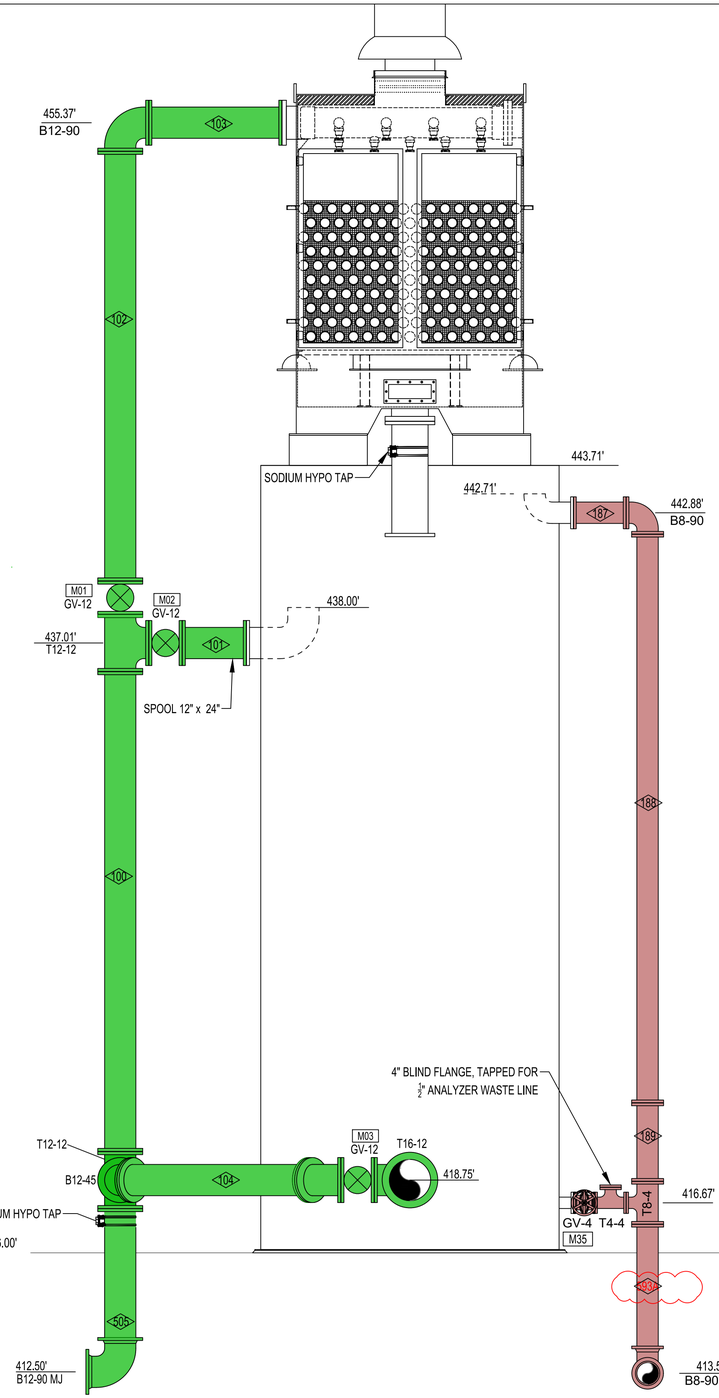
SHEET # 34 OF 77

JOB # 22228



EAST PROFILE OF HEADTANK INFLUENT

SCALE: 3/8" = 1'-0"



SOUTH PROFILE OF HEADTANK INFLUENT

SCALE: 3/8" = 1'-0"

ABBREVIATIONS

T4-4	TEE 4"x4"
T8-4	TEE 8"x4"
T12-12	TEE 12"x12"
T16-12	TEE 16"x12"
B8-90	BEND 8"x90°
B12-90	BEND 12"x90°
B8-90MJ	BEND 8"x90° MECHANICAL JOINT
B12-45MJ	BEND 12"x45° MECHANICAL JOINT
B12-90MJ	BEND 12"x90° MECHANICAL JOINT
GV- 4	GATE VALVE 4"
GV-12	GATE VALVE 12"
GV-16	GATE VALVE 16"
M#	MANUAL VALVE
PIT#	PRESSURE TRANSMITTER
TM#	TURBIDITY METER
#	PIPE ID #

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR

IN ADDITION, ALL PIPES SHALL BE LABELED IN ACCORDANCE WITH SECTION 604, WHICH STATES, *"PIPING IN A COMMUNITY WATER SUPPLY TREATMENT FACILITY MUST BE IDENTIFIED CLEARLY BY LEGENDS OR THE USE OF NAMETAG LABELS IDENTIFYING THE CONTENTS OF INDIVIDUAL PIPES, SPACED AT INTERVALS TO ALLOW CONVENIENT IDENTIFICATION OF INDIVIDUAL PIPES. A CONSISTENT STANDARD MUST BE USED THROUGHOUT THE SYSTEM. "*

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

CHAIN OPERATORS FOR M01 & M02 SHALL BE PROVIDED BY THE CONTRACTOR FOR CONTRACT 1.

ADDENDUM 2

Addendum #2 | KCF | 05/05/2026 | Updated Page ID

FIELD BOOK: XXX
DRAWN BY: KCF \ BAF \ CRG
CHECKED BY:
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SAVE DATE: 5/5/2026 11:03

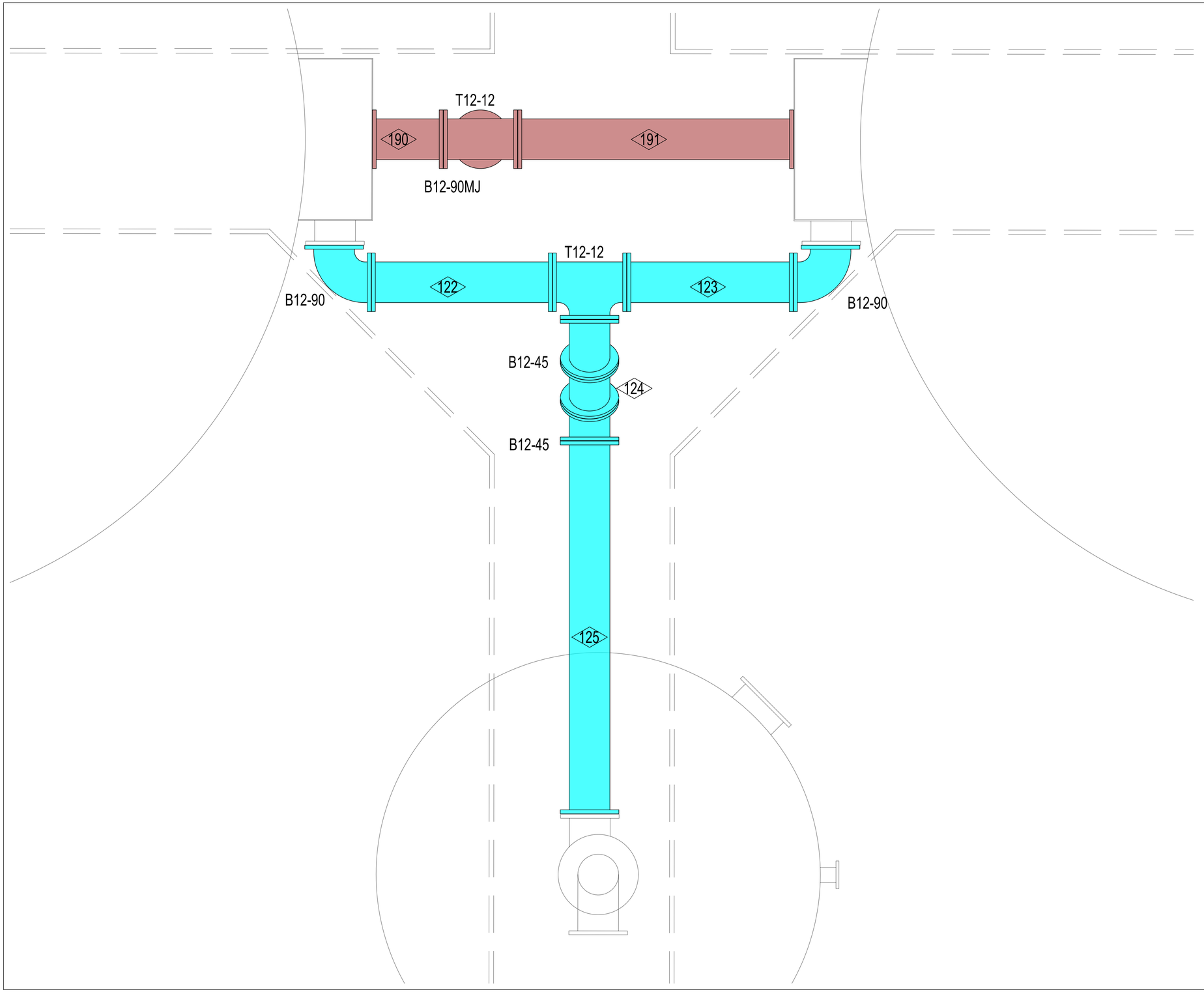
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PLANT PIPING - HEAD TANK INFLUENT AND OVERFLOW PROFILE

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 36 OF 77

JOB # 22228



N

SCALE: 3/4" = 1'-0"

ABBREVIATIONS

T12-12	TEE 12"x12"
B12-90	BEND 12"x90°
B12-45	BEND 12"x45°
◇#	PIPE ID #

NOTE: CLARIFIED PIPING TO BE PAINTED AQUA.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

NOTE: OVERFLOW PIPING TO BE PAINTED BROWN. PIPING BELOW GRADE NEED NOT BE PAINTED.

ADDENDUM 2

Addendum #2	
KCF	05/05/2026
Fixed Note	

FIELD BOOK	XXX
DRAWN BY	
CHECKED BY	KCF \ BAF \ CRG
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\CLARICONE EFFLUENT.DWG
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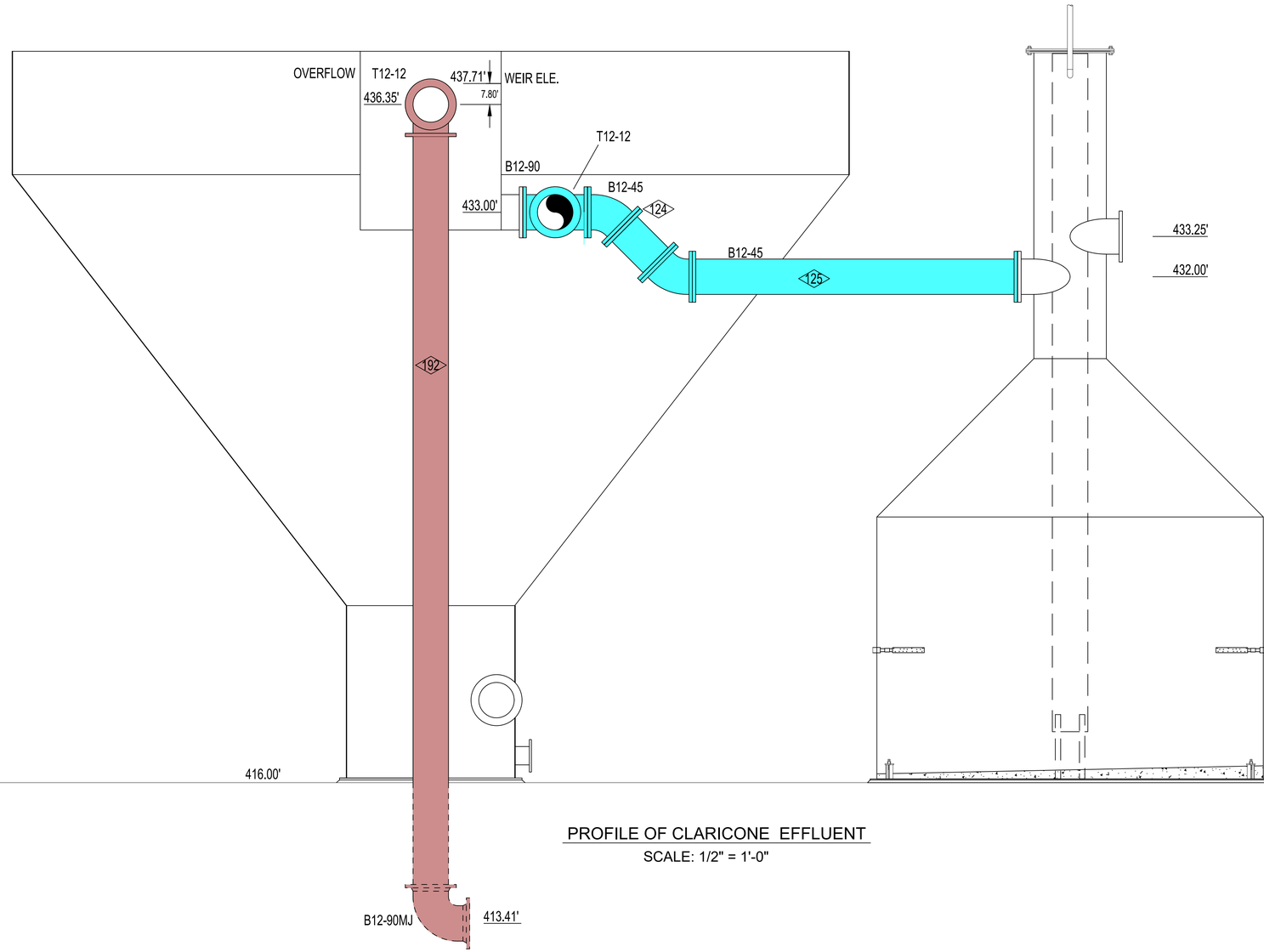
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PLANT PIPING - CLARICONE EFFLUENT

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 39 OF 77

JOB # 22228



PROFILE OF CLARICONE EFFLUENT

SCALE: 1/2" = 1'-0"

ABBREVIATIONS

T12-12	TEE 12"x12"
B12-90	BEND 12"x90°
B12-90MJ	BEND 12"x90° MECHANICAL JOINT
B12-45	BEND 12"x45°
◇#	PIPE ID #

NOTE: CLARIFIED PIPING TO BE PAINTED AQUA.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

NOTE: OVERFLOW PIPING TO BE PAINTED BROWN. PIPING BELOW GRADE NEED NOT BE PAINTED.

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Plumbing Notes

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
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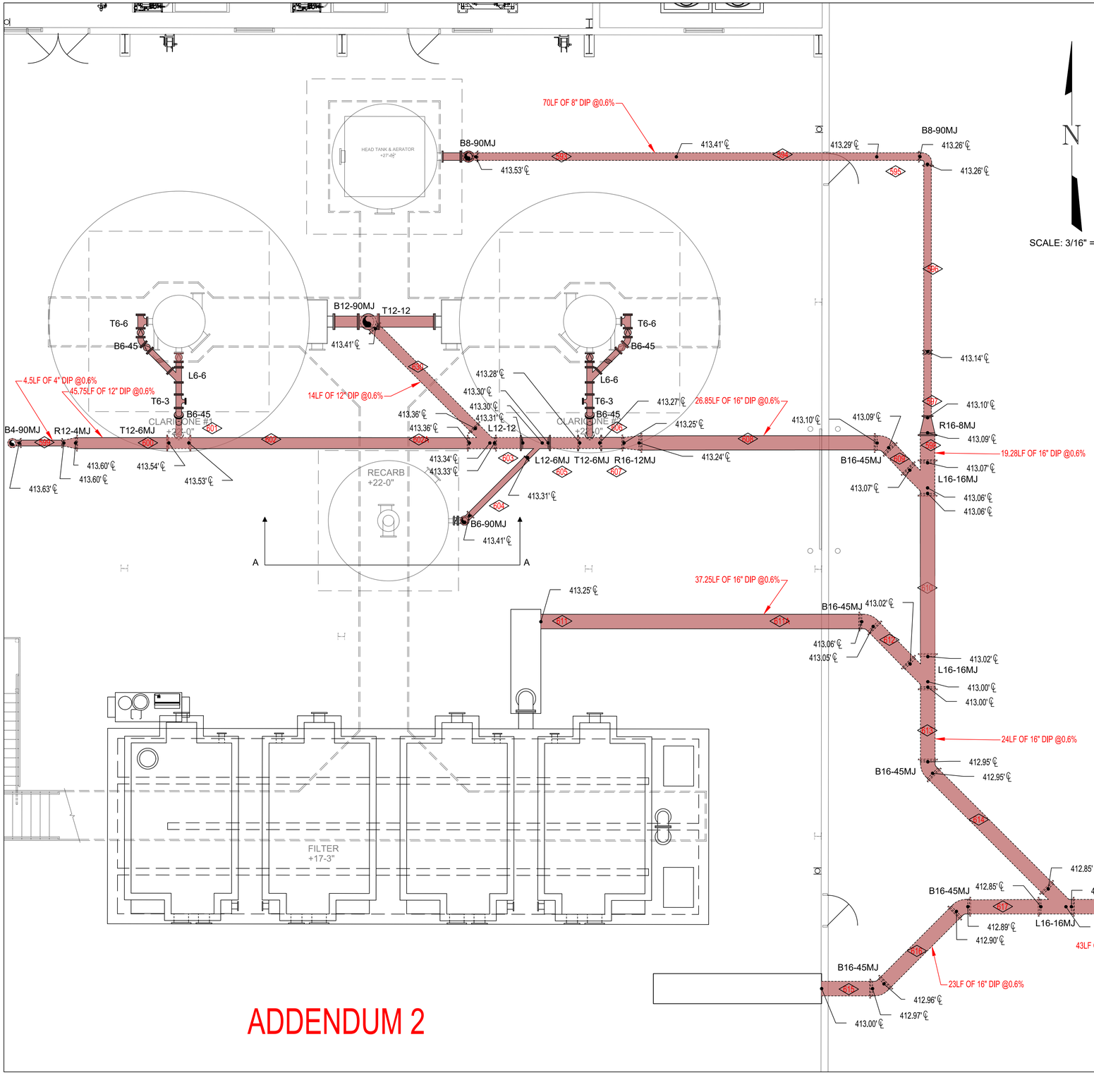
MILANO & GRUNLOH ENGINEERS, LLC
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PLANT PIPING - CLARICONE EFFLUENT

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

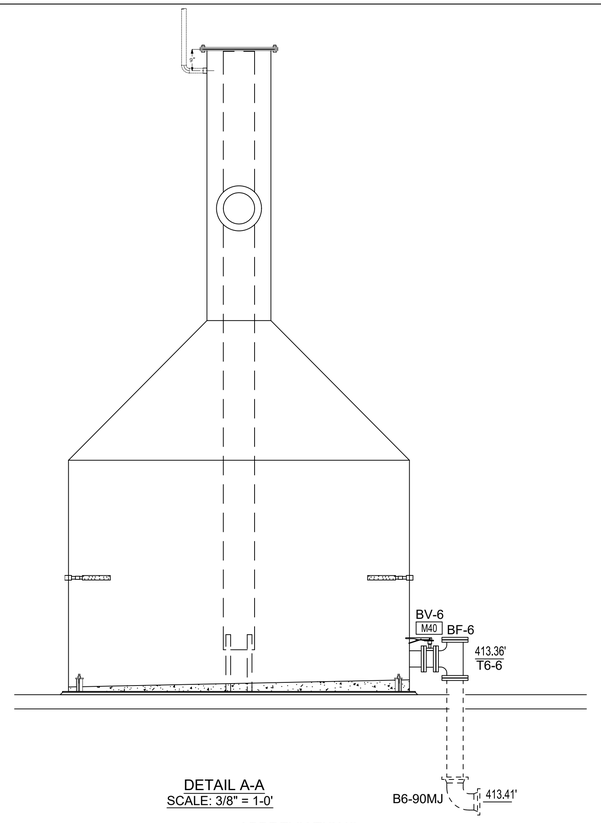
SHEET # 40 OF 77

JOB # 22228



N

SCALE: 3/16" = 1'-0"



DETAIL A-A
SCALE: 3/8" = 1-0'

ABBREVIATIONS

B4-90MJ	BEND 4"x90° MECHANICAL JOINT
B6-90MJ	BEND 6"x90°
B6-45	BEND 6"x45°
T6-6	TEE 6"x6"
T6-3	TEE 6"x3"
BF6-1T	BLIND FLANGE 6" W/1" TAP
BF6-3T	BLIND FLANGE 6" W/3" TAP
L6-6	6"x 6" LATERAL
PV-6	PLUG VALVE 6"
APV-6	ACTUATOR PLUG VALVE 6"
BV-6	BUTTERFLY VALVE 6"
B8-90MJ	BEND 8"x90°
B12-90MJ	BEND 12"x90° MECHANICAL JOINT
B12-45MJ	BEND 12"x45° MECHANICAL JOINT
T12-12	TEE 12"x12" MECHANICAL JOINT
T12-6MJ	TEE 12"x6" MECHANICAL JOINT
R12-6MJ	REDUCER 12"x6" MECHANICAL JOINT
R12-4MJ	TEE 12"x4" MECHANICAL JOINT
L12-12	LATERAL 12"x12" MECHANICAL JOINT
C12-12MJ	CROSS 12"x12" MECHANICAL JOINT
B16-90MJ	BEND 16"x90° MECHANICAL JOINT
B16-45MJ	BEND 16"x45° MECHANICAL JOINT
T16-16MJ	TEE 16"x6" MECHANICAL JOINT
R16-8MJ	REDUCER 16"x8" MECHANICAL JOINT
R16-12MJ	REDUCER 16"x12" MECHANICAL JOINT
L16-6MJ	16"x 6" LATERAL MECHANICAL JOINT
A#	ACTUATOR VALVE
M#	MANUAL VALVE

NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED DARK BROWN.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Add Pipe ID, Add Pipe Callouts

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\CLARICONE SLURRY DISCHARGE.DWG
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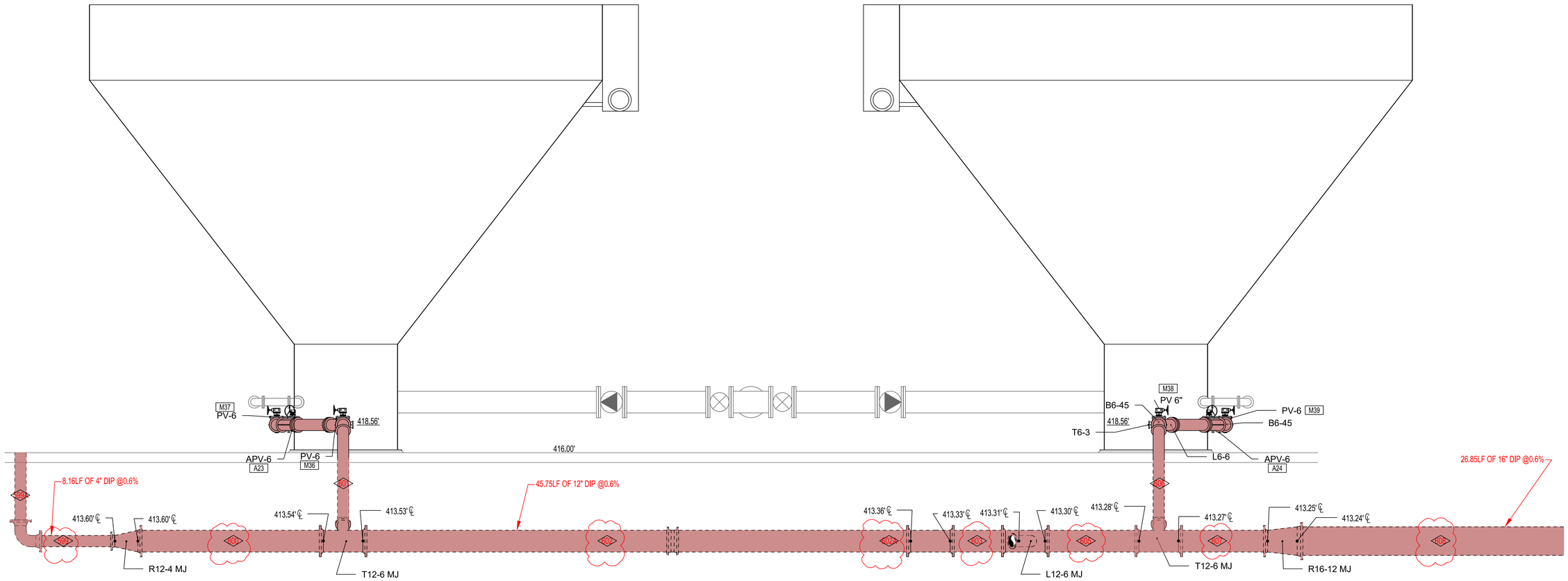
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PLANT PIPING - CLARICONE SLURRY DISCHARGE

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 41 OF 77

JOB # 22228



CLARICONE SLURRY PROFILE
SCALE: 3/8" = 1-0'

ADDENDUM 2

ABBREVIATIONS

B6-45	BEND 6"x45°
T6-6	TEE 6"x6"
T6-3	TEE 6"x3"
R12-4MJ	REDUCER 12"X4" MECH. JOINT
R16-12MJ	REDUCER 16"X12" MECH. JOINT
L6-6	6"x 6" LATERAL
L12-4MJ	12"x 4" LATERAL
PV-6	PLUG VALVE 6"
APV-6	ACTUATOR PLUG VALVE 6"
T12-6MJ	TEE 12" X 6"
A#	ACTUATOR VALVE
M#	MANUAL VALVE

NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED DARK BROWN.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

KCF	05/05/2026	Addendum #2 Add Pipe ID, Add Pipe Callouts

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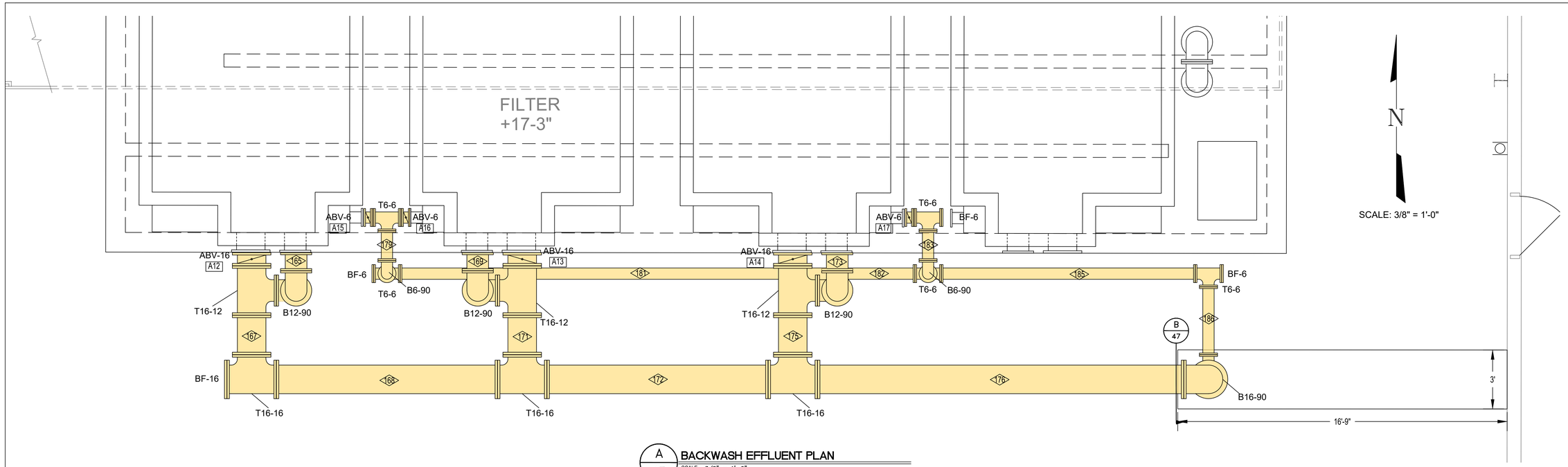
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SAVE DATE: 5/7/2026 14:48

PLANT PIPING - CLARICONE SLURRY PROFILE

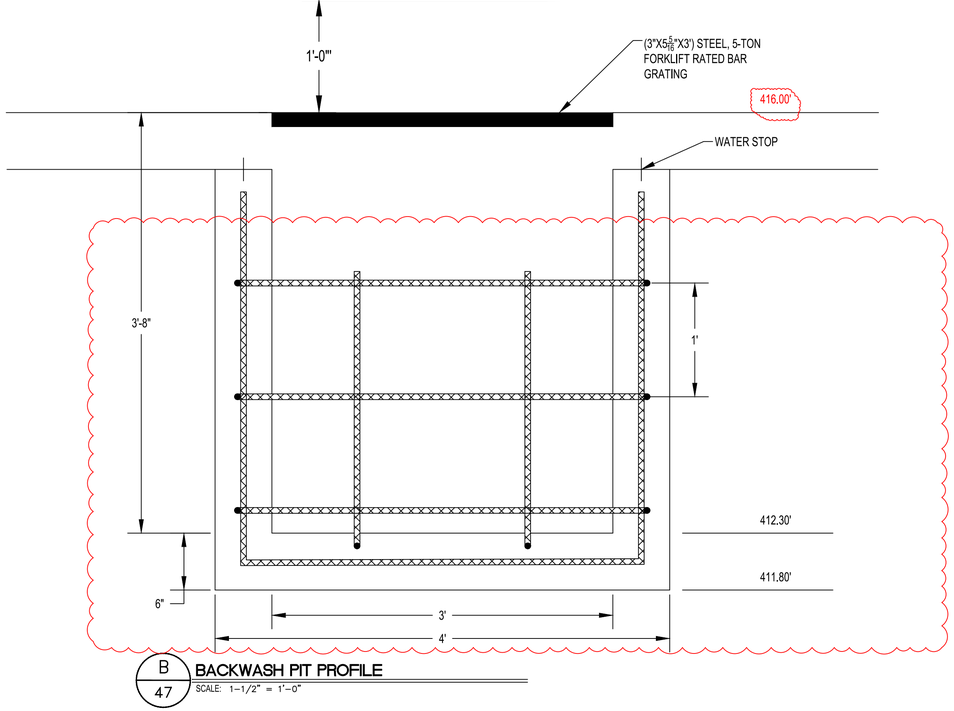
PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 42 OF 77

JOB # 22228



A 47 **BACKWASH EFFLUENT PLAN**
SCALE: 3/8" = 1'-0"



B 47 **BACKWASH PIT PROFILE**
SCALE: 1-1/2" = 1'-0"

ABBREVIATIONS

T6-6	TEE 6"x6"
T16-6	TEE 16"x6"
T16-12	TEE 16"x12"
T16-16	TEE 16"x16"
B6-90	BEND 6"x90°
B12-90	BEND 12"x90°
B16-90	BEND 16"x90°
ABV-6	AUTOMATIC BUTTERFLY VALVE 6"
ABV-16	AUTOMATIC BUTTERFLY VALVE 16"
BF-6	BLIND FLANGE 6"
BF-16	BLIND FLANGE 16"
A#	ACTUATOR VALVE #
#	PIPE ID #

NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED LIGHT BROWN.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

ADDENDUM 2

KCF	05/05/2026
Addendum #2	Fix Elevation Label

FIELD BOOK	XXX
DRAWN BY	
CHECKED BY	KCF \ BAF \ CRG
FILE LOCATION	S:\2022\22228\DWG\MECHANICAL\BACKWASH EFFLUENT.DWG
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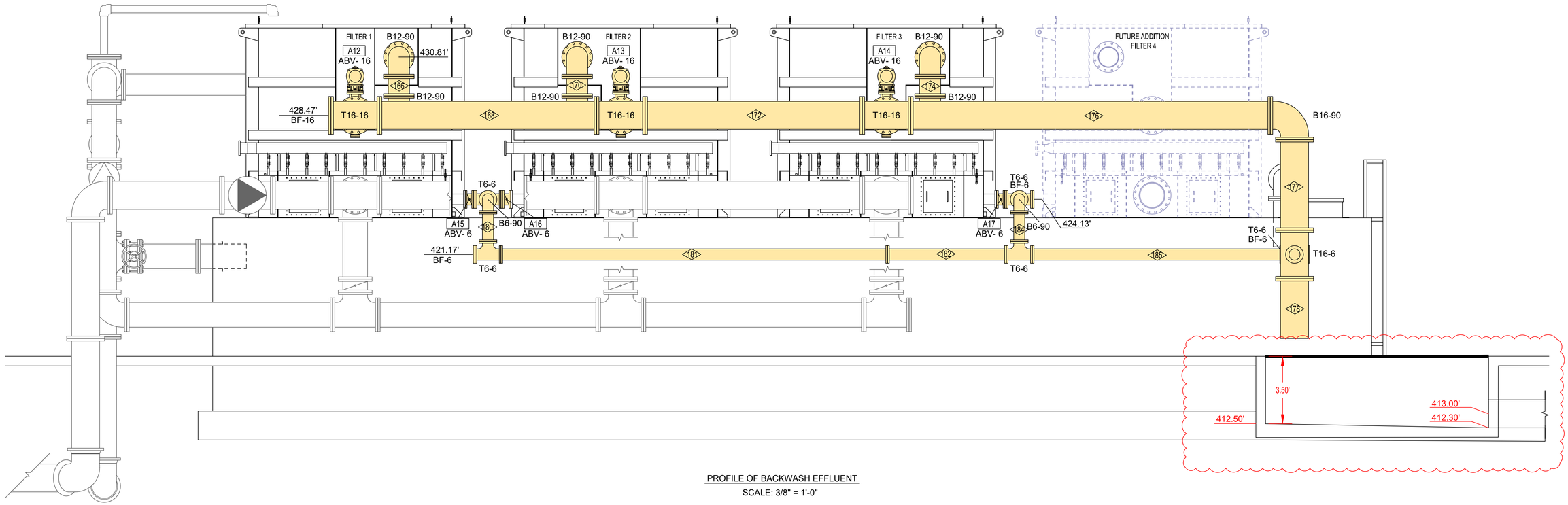
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Design Firm #184-003108

PLANT PIPING - BACKWASH EFFLUENT

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

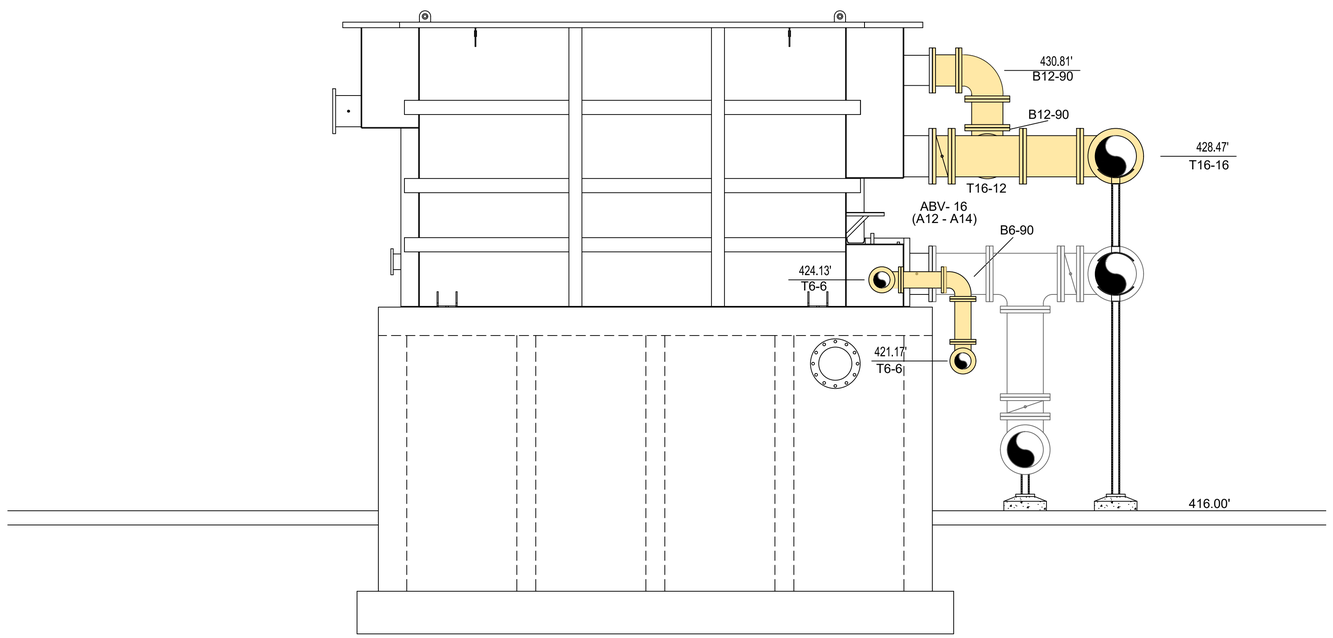
SHEET # 49 OF 77

JOB # 22228



PROFILE OF BACKWASH EFFLUENT

SCALE: 3/8" = 1'-0"



PROFILE OF BACKWASH EFFLUENT

SCALE: 3/8" = 1'-0"

ABBREVIATIONS

T6-6	TEE 6"x6"
T16-6	TEE 16"x6"
T16-12	TEE 16"x12"
T16-16	TEE 16"x16"
B6-90	BEND 6"x90°
B12-90	BEND 12"x90°
B16-90	BEND 16"x90°
ABV-6	AUTOMATIC BUTTERFLY VALVE 6"
ABV-16	AUTOMATIC BUTTERFLY VALVE 16"
BF-6	BLIND FLANGE 6"
BF-16	BLIND FLANGE 16"
A#	ACTUATOR VALVE #
#	PIPE ID #

NOTE: ALL HATCHED PIPING SHOWN ON THIS PLAN SHALL BE PAINTED LIGHT BROWN.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

KCF	05/05/2026	Addendum #2 Add Elevation Label, Fix Trough Detail

FIELD BOOK: XXX
DRAWN BY: KCF \ BAF \ CRG
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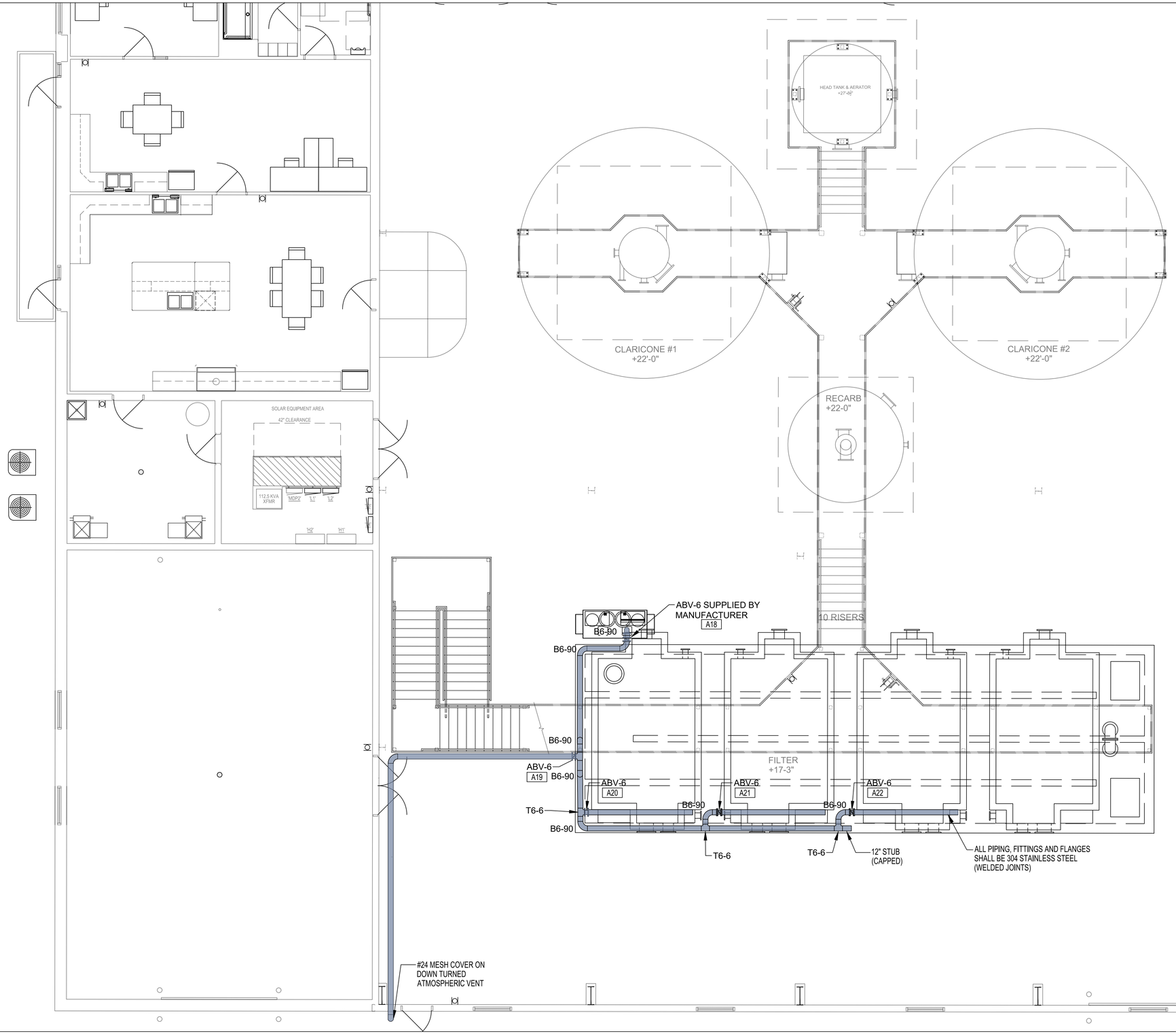
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EFFINGHAM, IL 62401
Phone: (217) 347-7282 | (800) 677-2714
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
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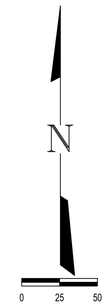
PLANT PIPING - BACKWASH EFFLUENT

PROPOSED WJE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 50 OF 77

JOB # 22228





ABBREVIATIONS

T6-6	TEE 6"x6"
B6-90	BEND 6"x90°
R6-5	REDUCER 6"x5"
CV-5W	CHECK VALVE 5" (WAFER STYLE)
ABV-6	AUTOMATIC BUTTERFLY VALVE 6"
A#	ACTUATOR VALVE #
M#	MANUAL VALVE #

NOTE: AIR SCOUR PIPING MUST REACH AN ELEVATION GREATER THAN TOP OF FILTER.

NOTE: ALL AIR SCOUR PIPING SHOWN ON THIS PLAN SHALL BE NOT BE PAINTED.

NOTE: BLOWER VENT PIPE TO BE ATTACHED TO WALL BY MEANS OF 4" STAINLESS PIPE HANGERS.

NOTE: AIR SCOUR PIPING TO BE HUNG FROM PROPOSED CATWALK UNTIL REACHING FILTERS

NOTE: SEE BLOWER CUT SHEET FOR CONNECTION DETAILS.

NOTE: AIR SCOUR PIPING MUST BE ELEVATED TO A POINT ABOVE FILTER HIGH WATER LEVEL, BETWEEN BLOWER AND DISCHARGE POINT

AIR SCOUR PIPING SCHEDULE		
Item	Page 51 & 52	Total
6" Pipe	111'	111'
B6-90	12	12
T6-6	4	4

ADDENDUM 2

KCF	05/05/2026
Addendum #2	Fix Schedule Page #'s & Abbreviations

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
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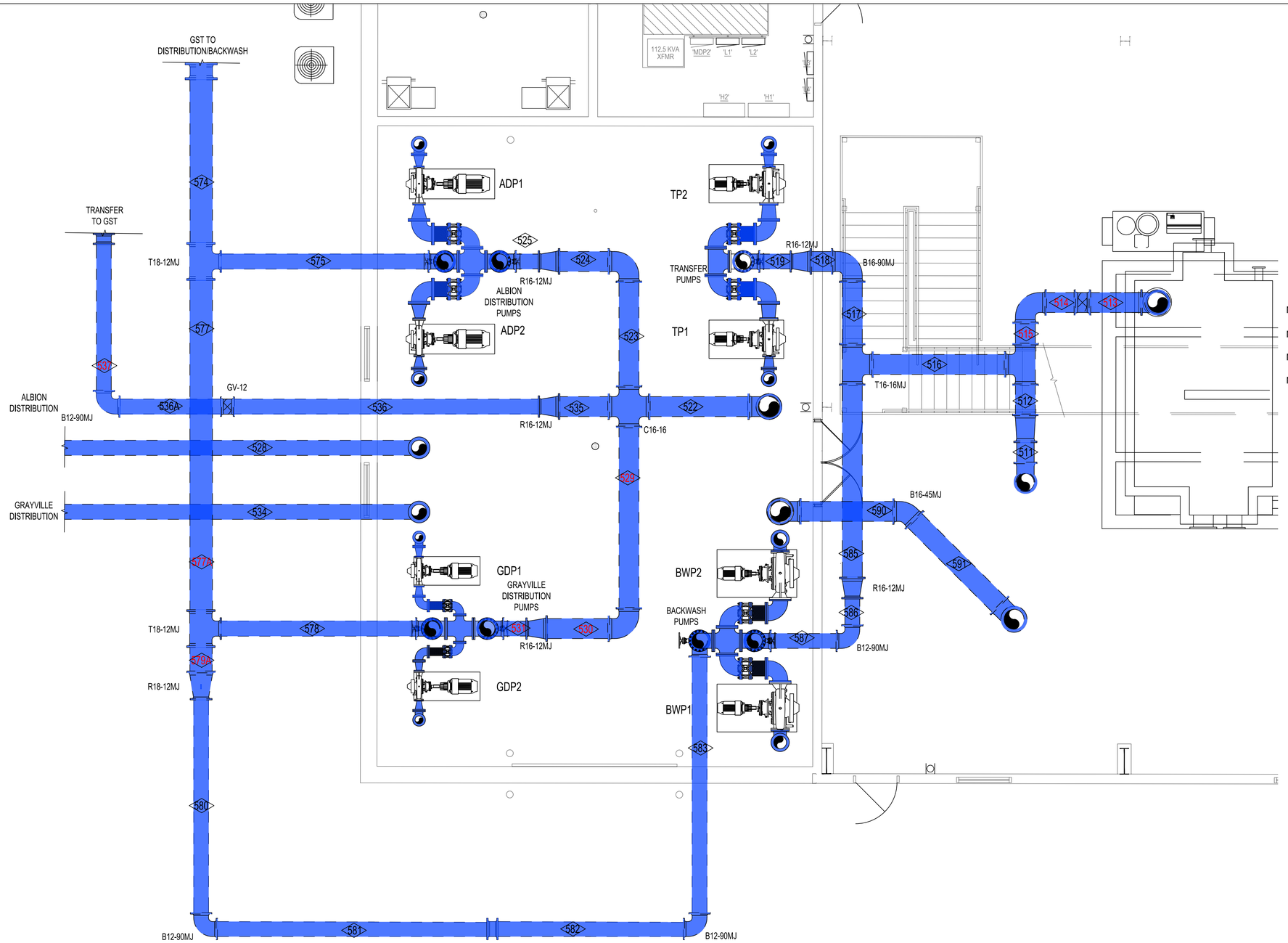
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FILTER AIR SCOUR PLAN

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 51 OF 77

JOB # 22228



NOTE: VERTICAL PIPE CROSSINGS SHALL BE BACKFILLED WITH CLEAN FINE AGGREGATE AT POINT OF INTERSECTION

NOTE: BURIED VALVE ASSEMBLY UTILIZES 2' LAY LENGTH DIP BETWEEN FITTINGS. MINIMUM 2' FROM FOUNDATION WALL.

NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED DARK BLUE, UNLESS NOTED OTHERWISE.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.

PIPING COLORS DEPICTED IN ALL PLAN SHEETS REFLECT REQUIRED PIPING IDENTIFICATION PER IAC TITLE 35, SECTION 604, AND ALL PIPING SHALL BE PAINTED AS DESCRIBED.

- OLIVE GREEN, RAW WATER
- AQUA, CLARIFIED WATER
- DARK BLUE, FINISHED WATER
- LIGHT BROWN, BACKWASH WASTE
- DARK BROWN, SLUDGE
- GRAY, AIR SCOUR

IN ADDITION, ALL PIPES SHALL BE LABELED IN ACCORDANCE WITH SECTION 604, WHICH STATES, *"PIPING IN A COMMUNITY WATER SUPPLY TREATMENT FACILITY MUST BE IDENTIFIED CLEARLY BY LEGENDS OR THE USE OF NAMETAG LABELS IDENTIFYING THE CONTENTS OF INDIVIDUAL PIPES, SPACED AT INTERVALS TO ALLOW CONVENIENT IDENTIFICATION OF INDIVIDUAL PIPES. A CONSISTENT STANDARD MUST BE USED THROUGHOUT THE SYSTEM."*

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Plant Note, Fix Pipe #'s

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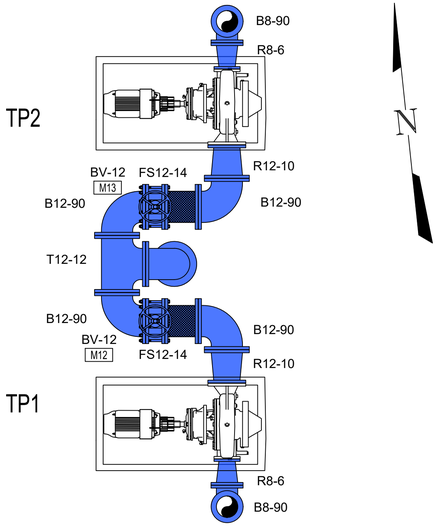
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PUMP PIPING PLAN

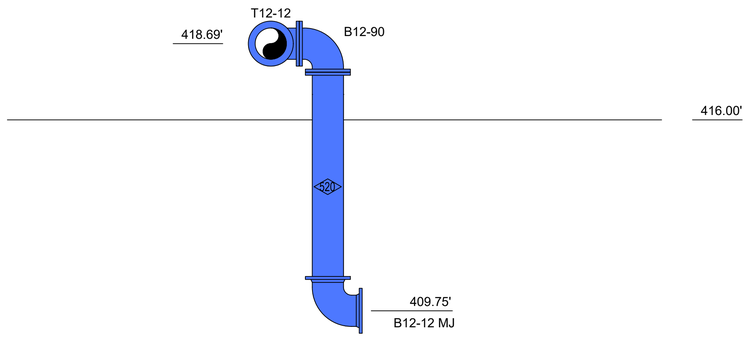
PROPOSED W2E WTP
EDWARDS\WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 53 OF 77

JOB # 22228



PLAN OF TRANSFER PUMP DISCHARGE
SCALE: 3/8" = 1'-0"



SOUTH PROFILE OF TRANSFER PUMP SUCTION
SCALE: 3/8" = 1'-0"

ABBREVIATIONS

FS12-20	FLEX SPOOL 12" X 20"
CV-12	CHECK VALVE 12"
T12-12	TEE 12"x12"
BV-12	BUTTERFLY VALVE 12"
B12-90	BEND 12"x90°
B12-90 MJ	BEND 12"x90° MECHANICAL JOINT
T12-12 MJ	TEE 12"x12" MECHANICAL JOINT
FM-12	FLOW METER 12"
CV#	CHECK VALVE #
M#	MANUAL VALVE #
PIT#	PRESSURE TRANSMITTER
F#	FLOWMETER #
◇#	PIPE ID #

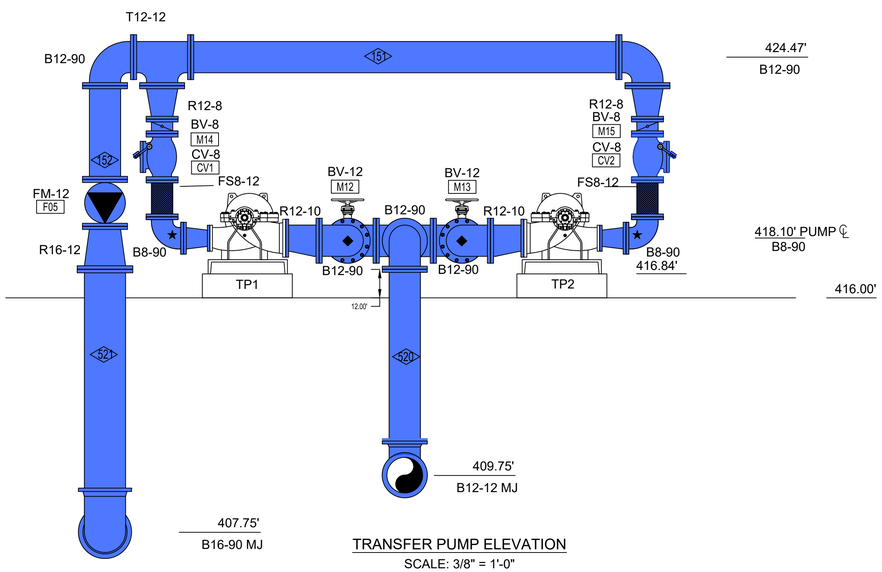
◆ COMPOUND GAUGE LOCATION AT EACH SUCTION SIDE OF PUMP

★ STANDARD PRESSURE GAUGE LOCATION AT EACH DISCHARGE SIDE OF PUMP

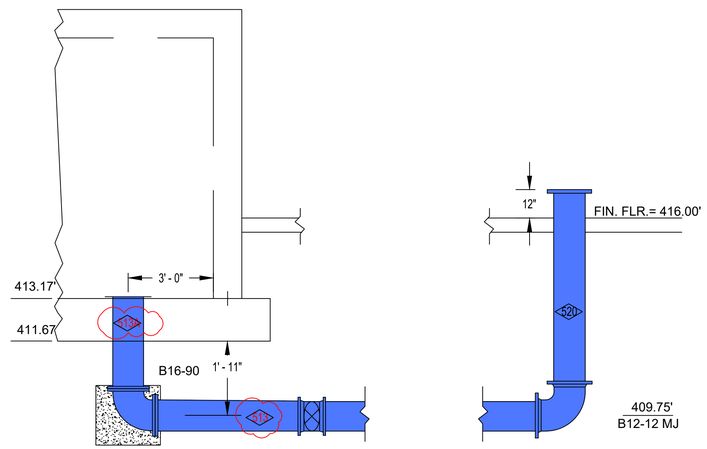
SEE SHEET 60 FOR GAUGE DETAILS

NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED DARK BLUE.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.



TRANSFER PUMP ELEVATION
SCALE: 3/8" = 1'-0"



CLEARWELL-TRANSFER PUMP SUCTION
SCALE: 3/8" = 1'-0"

ADDENDUM 2

Addendum #2	
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File Plot ID	
FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
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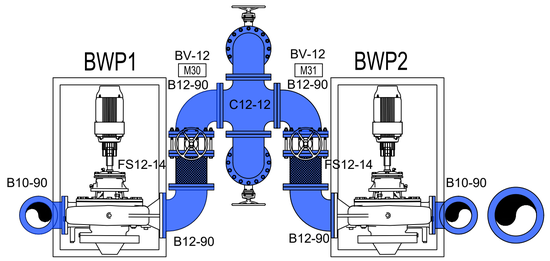
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PUMP PIPING -TRANSFER PROFILE

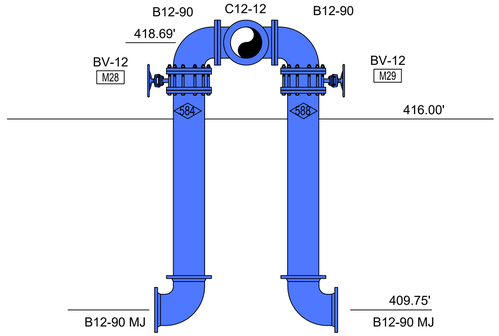
PROPOSED WJE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 54 OF 77

JOB # 22228



PLAN OF BACKWASH PUMPS
SCALE: 3/8" = 1'-0"



SOUTH PROFILE OF BACKWASH PUMP SUCTION
SCALE: 3/8" = 1'-0"

ABBREVIATIONS

R 16-12	REDUCER 16"X12"
C12-12	CROSS 12" X 12"
FS12-20	FLEX SPOOL 12" X 20"
CV-12	CHECK VALVE 12"
BV-12	BUTTERFLY VALVE 12"
B12-90	BEND 12"x90°
B16-90 MJ	BEND 16"x90° MECHANICAL JOINT
B18-90 MJ	BEND 18"x90° MECHANICAL JOINT
CV#	CHECK VALVE #
M#	MANUAL VALVE #
#	PIPE ID #

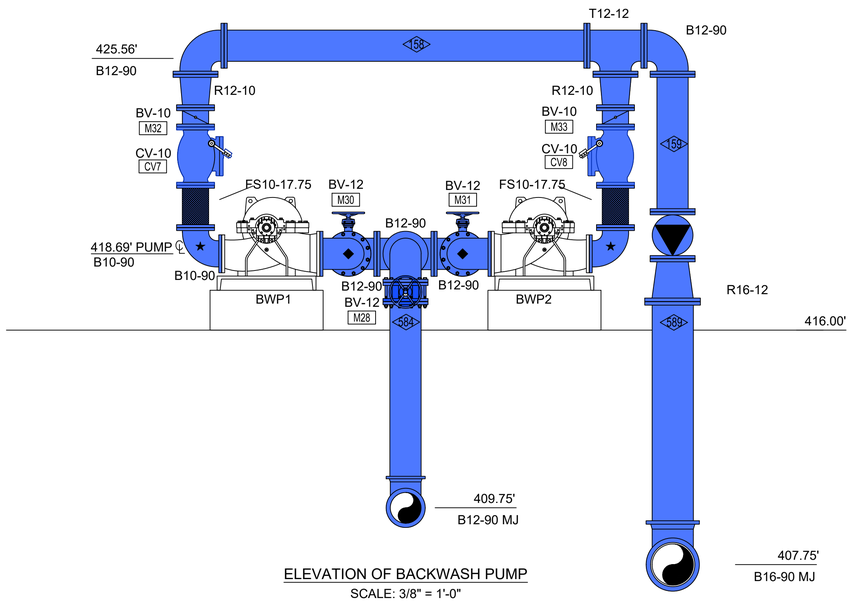
◆ COMPOUND GAUGE LOCATION
AT EACH SUCTION SIDE OF PUMP

★ STANDARD PRESSURE GAUGE LOCATION
AT EACH DISCHARGE SIDE OF PUMP

SEE SHEET 60 FOR GAUGE DETAILS

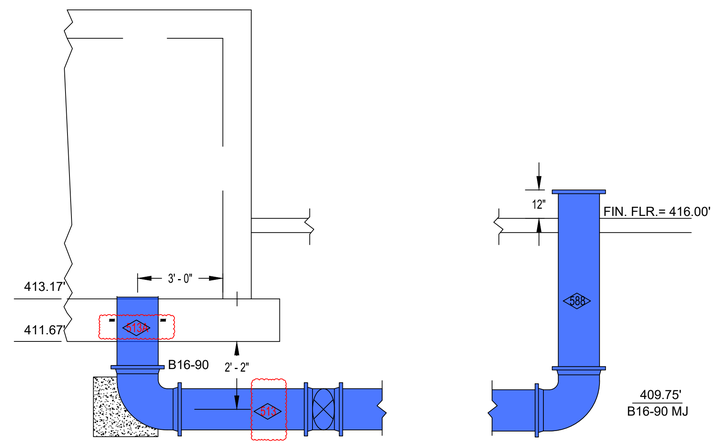
NOTE: ALL PIPING SHOWN ON THIS PLAN SHALL BE PAINTED DARK BLUE.

NOTE: ALL PIPING LARGER THAN 4 INCH INSIDE THE PLANT AREA, TO A POINT A MINIMUM OF 20 FOOT OUTSIDE THE BUILDING SHALL BE FLANGE JOINT, PRESSURE CLASS 250 DUCTILE IRON PIPE.



ELEVATION OF BACKWASH PUMP
SCALE: 3/8" = 1'-0"

ADDENDUM 2



CLEARWELL-BACKWASH PUMP SUCTION
SCALE: 3/8" = 1'-0"

Addendum #2 File Page ID
KCF 05/05/2026

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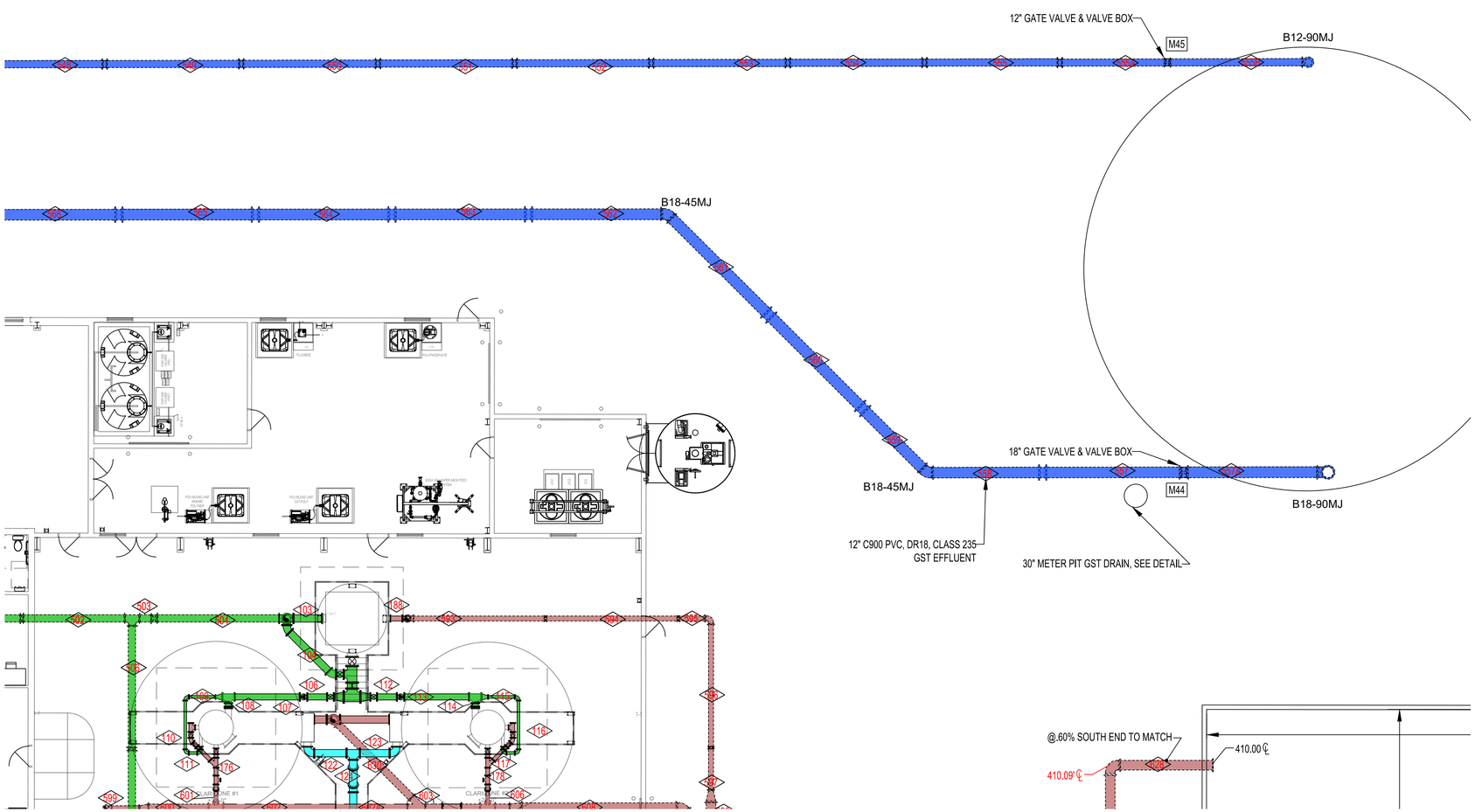
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PUMP PIPING - BACKWASH PROFILE

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 55 OF 77

JOB # 22228



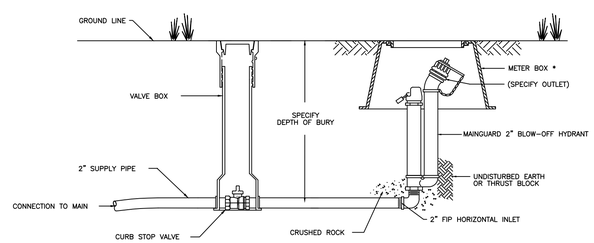
ABBREVIATIONS

B12-90 MJ BEND 12"x90° MECHANICAL JOINT
B12-45 MJ BEND 12"x45° MECHANICAL JOINT

ADDENDUM 2

MAINGUARD NO. 78 BLOW–OFF HYDRANT

(ALL BRASS PARTS SHALL BE MADE OF LOW LEAD BRASS)



GST DRAIN DETAIL
NOT TO SCALE

Addendum #2	Add Pipe ID
KCF	05/05/2026

FIELD BOOK	XXX
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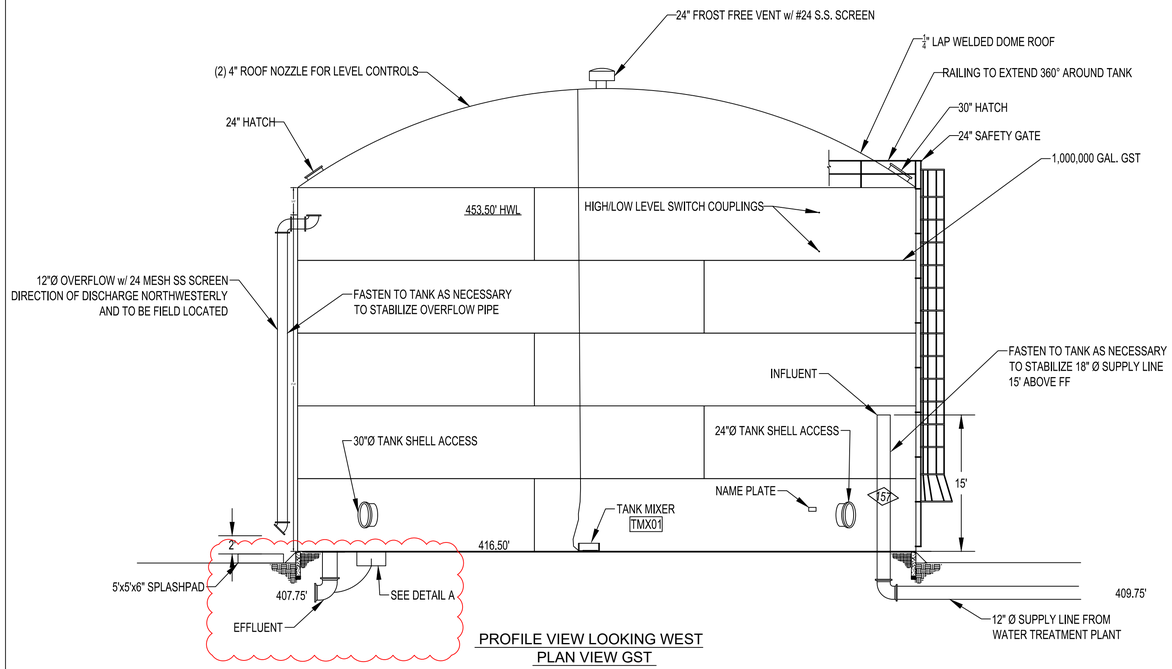
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GST PIPING PLAN

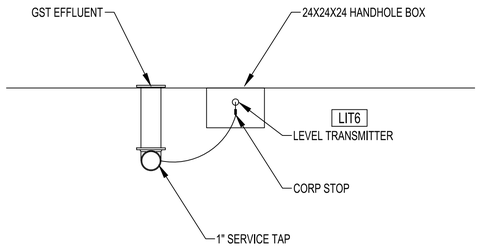
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EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET #
57 OF 77

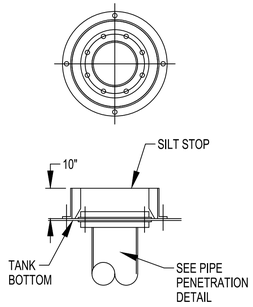
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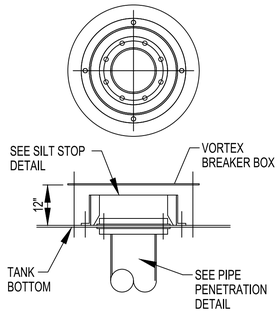
PROFILE VIEW LOOKING WEST
PLAN VIEW GST



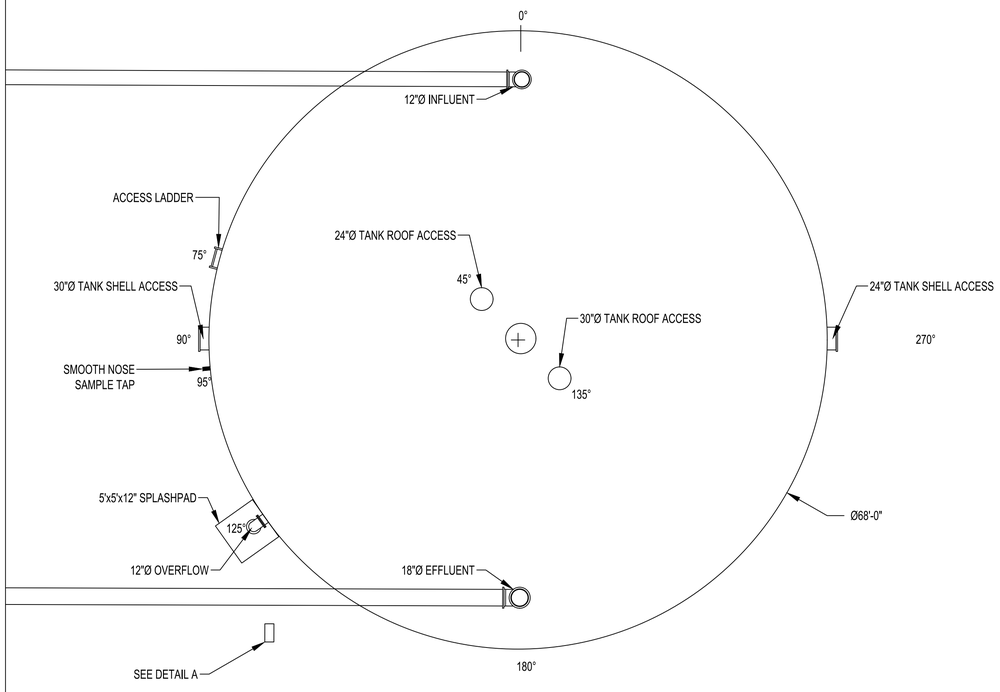
DETAIL A
1"=50'

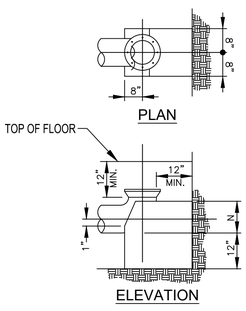


SILT STOP DETAIL
NOT TO SCALE



VORTEX BREAKER BOX DETAIL
NOT TO SCALE





NOTES:
CONTRACTOR SHALL REFERNCE TECHNICAL SPECIFICATIONS FOR TANK DESIGN, CONSTRUCTION MATERIALS, AND ASSOCIATED APPURTANCES AND TESTING

THE TRENCH SHALL BE BACKFILLED WITH FLOWABLE FILL TO THE TOP OF THE PIPE. (SEE SPECIIFICATINOS FOR FLOWABLE FILL REQUIREMENTS).

ALL JOINTS TO BE SEAL WELDED.

THRUST BLOCK FOR INFLUENT AND EFFLUENT TO TANK
NOT TO SCALE

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Effluent Location

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CHECKED BY:
FILE LOCATION: S:\2022\22228\DWG\MECHANICAL\GST.DWG
SAVE DATE: 5/6/2026 12:00

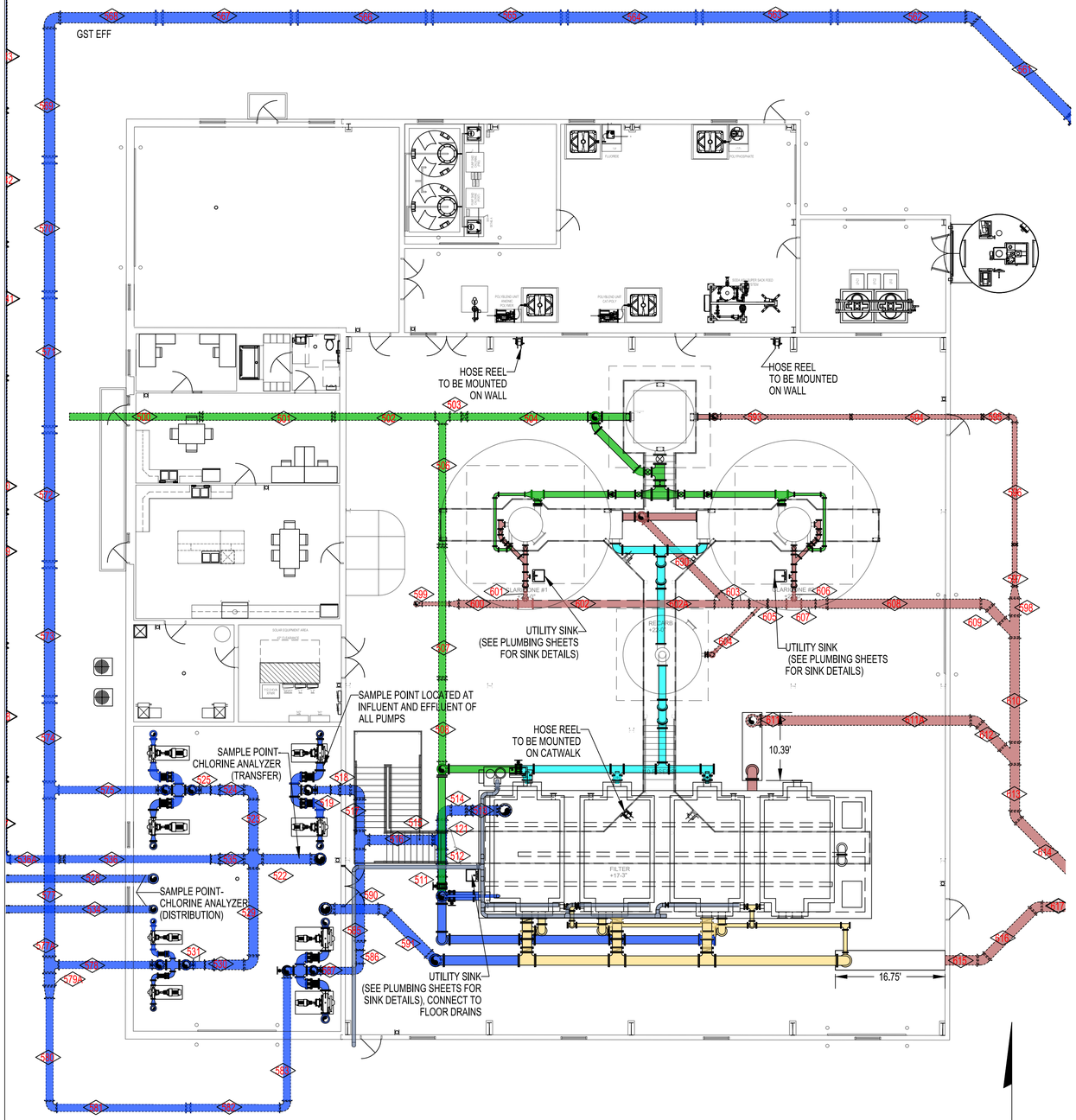
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1 MG STORAGE TANK AND DETAILS

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 58 OF 77

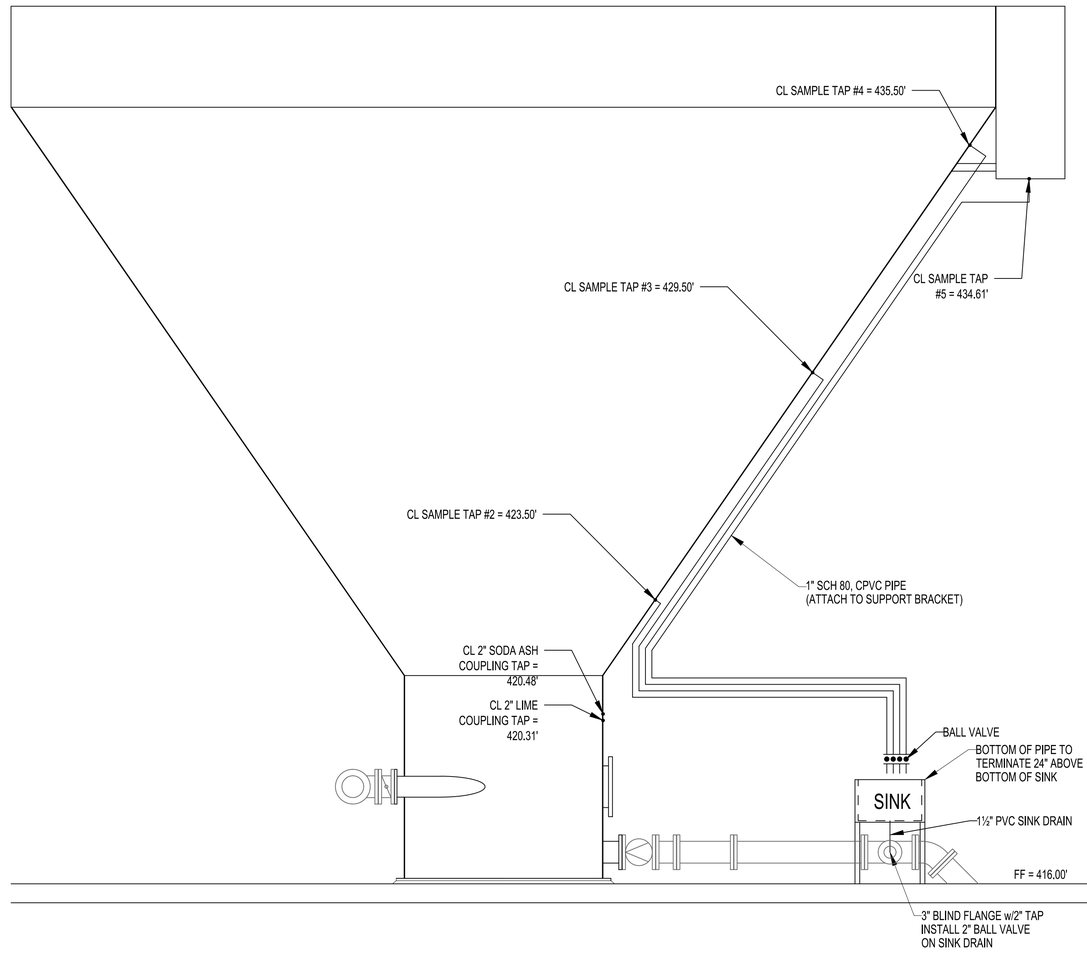
JOB # 22228



SAMPLE POINTS PLAN VIEW
SCALE 1" = 10'

SCALE: 1"=10'-0"

NOTE: SEE PUMP GAUGE / SAMPLE TAP DETAIL
SHEET 60



CLARICONE SAMPLE SINK DETAIL
SCALE 1" = 2'

ADDENDUM 2

Addendum #2	KCF	05/05/2026
Add Point ID		

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
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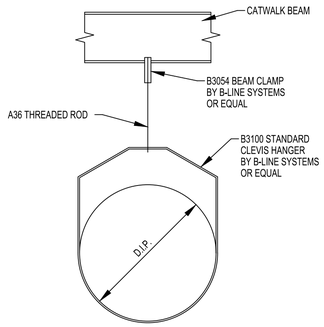
MILANO & GRUNLOH ENGINEERS, LLC
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SAMPLE POINT PLAN AND DETAIL

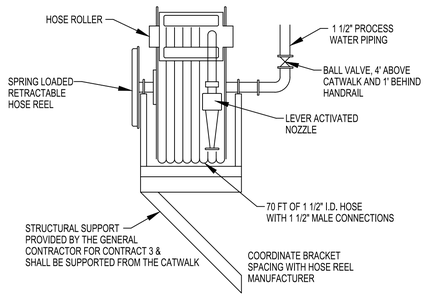
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EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET #
59 OF 77

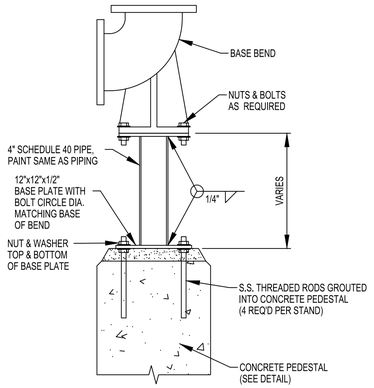
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22228



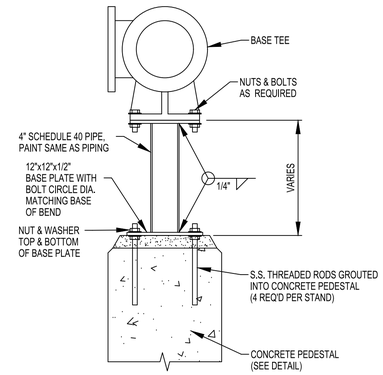
PIPE HANGER (HUNG FROM CATWALK) - DETAIL "D"



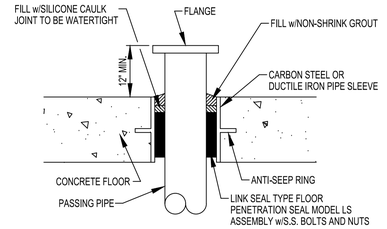
HOSE REEL DETAIL



BASE BEND ON PIPE STANCHION - DETAIL "E"

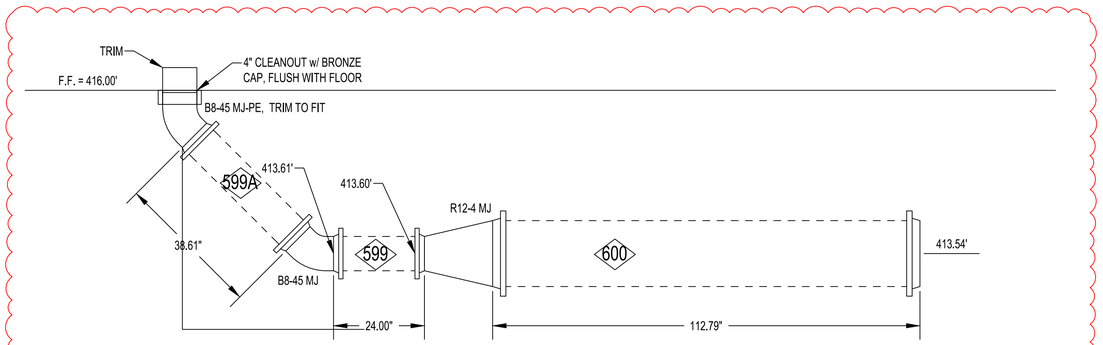


BASE TEE ON PIPE STANCHION - DETAIL "F"

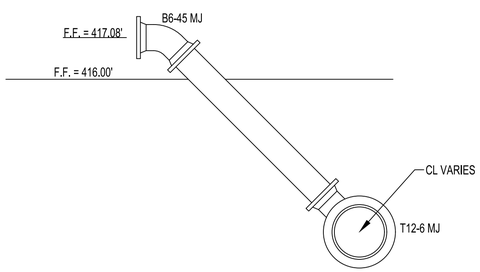


NOTE: CONTRACTOR TO COORDINATE PIPE SLEEVE AND LINK SEAL SIZES.

FLOOR PENETRATION SEAL DETAIL

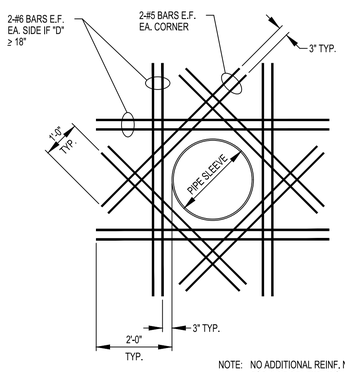


CLARICONE SLURRY CLEANOUT DETAIL
SCALE: 1" = 20'



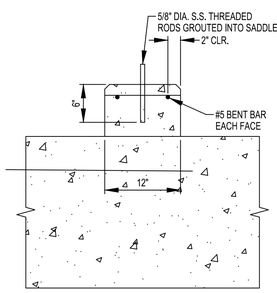
CLARICONE WASTE LINE DETAIL
SCALE: 1" = 20'

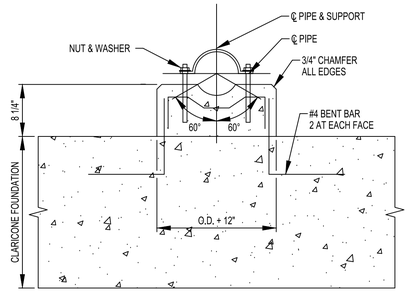
ADDENDUM 2



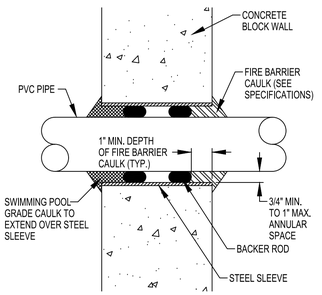
NOTE: NO ADDITIONAL REINF. NEEDED FOR PIPE PENETRATIONS LESS THAN 4"

TYPICAL ADDITIONAL REINFORCEMENT AROUND PIPE PENETRATIONS

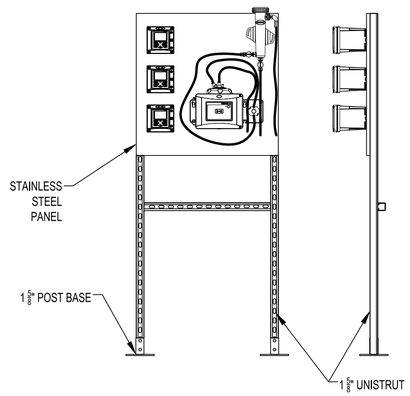




PIPE SUPPORT DETAIL "G"

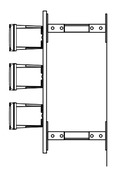


SMALL DIAMETER PVC PIPE PENETRATION DETAIL



CONTROLS MOUNT (FLOOR)

ALL CONTROLS SHALL BE MOUNTED AS SHOWN IN LOCATION SPECIFIED BY OWNER. PANEL SIZE VARIES DEPENDENT ON CONTENTS.



CONTROLS MOUNT (SURFACE)

Addendum #2	KCF 05/05/2026 FDO Detail Added
FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MISC\MISC DETAILS.DWG
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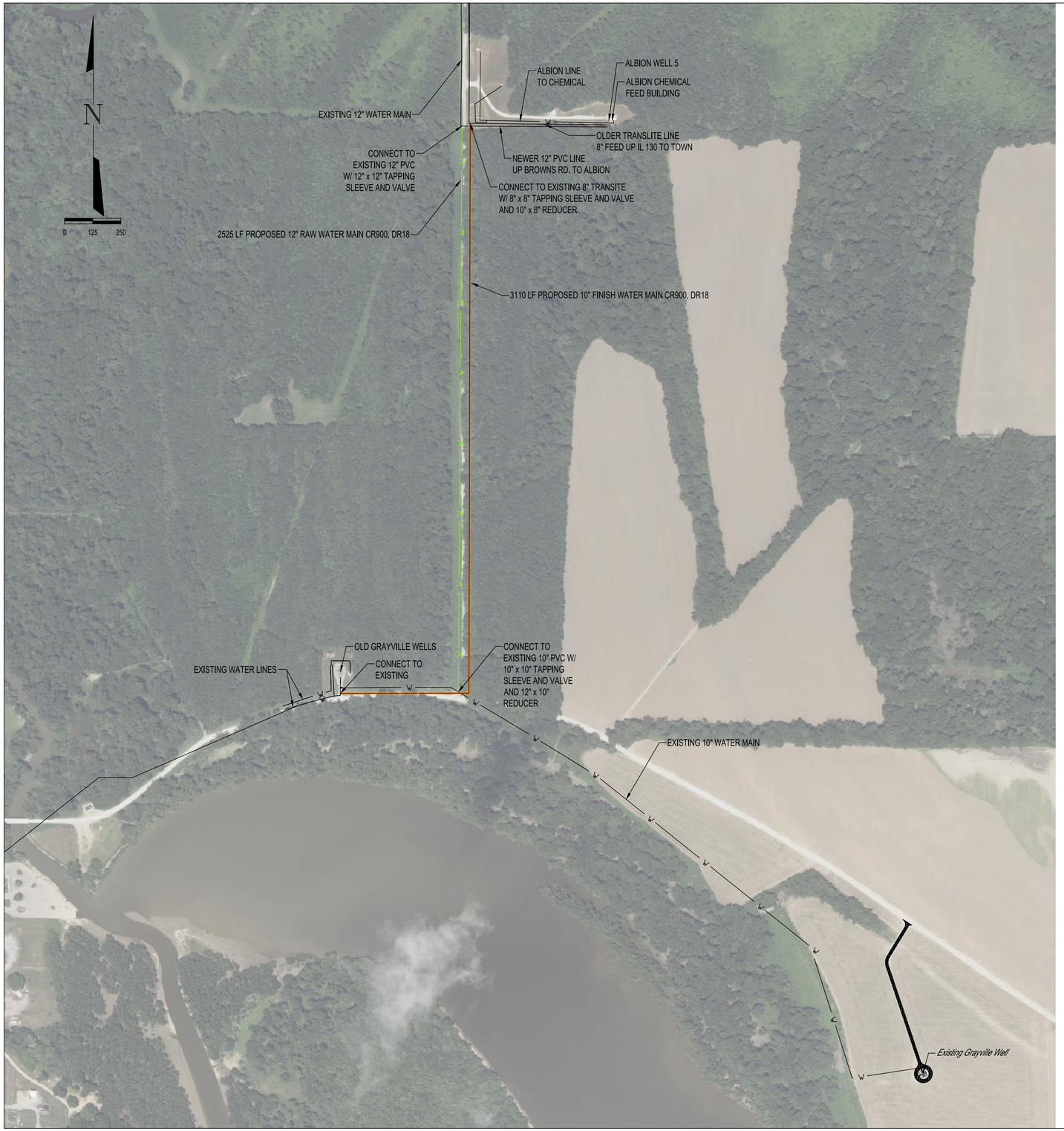
MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401 | (800) 677-2714
Phone: (217) 347-7262
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

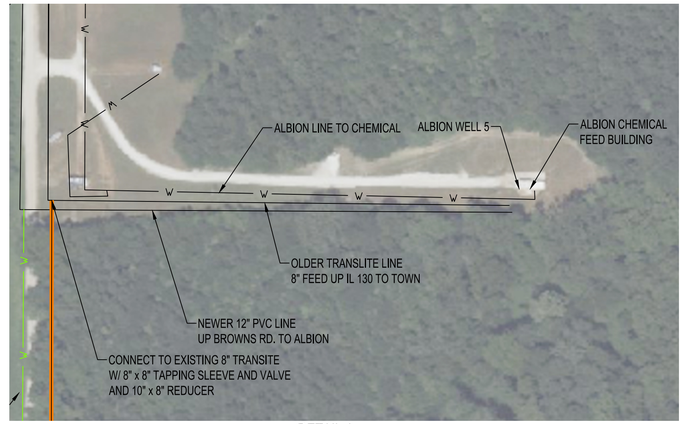
MISCELLANEOUS DETAILS

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

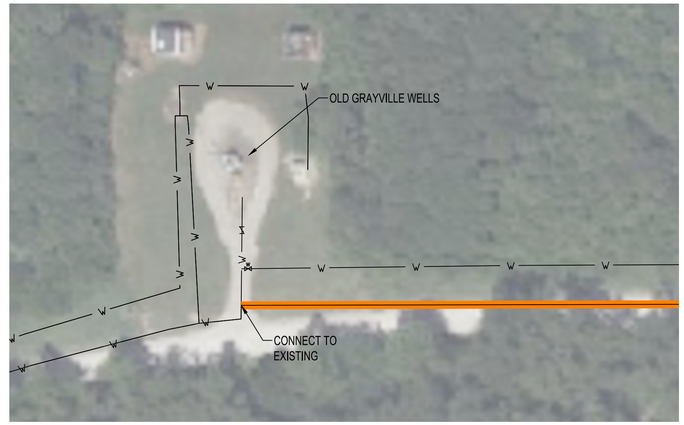
SHEET # 61 OF 77

JOB # 22228

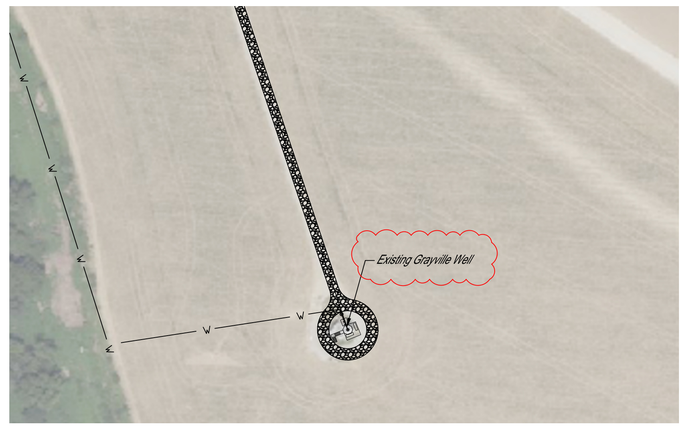




DETAIL A
SCALE: 1" = 100'



DETAIL B
SCALE: 1" = 50'



DETAIL C
SCALE: 1" = 100'

NOTES

1. ALL PROPOSED PIPING ON THIS SHEET IS TO BE CR900, DR19
2. ALL PIPING ON THIS PAGE IS THE RESPONSIBILITY OF CONTRACT 5.

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Fix Well Leader

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\MISC\ALBION DISTRIBUTION.DWG
SAVE DATE	5/7/2026 15:21

MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401
Phone: (217) 347-7262 | (800) 677-2714
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

PROCESS INTERCONNECTIONS (2)

PROPOSED WZE WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET #
72 OF 77

JOB #
22228

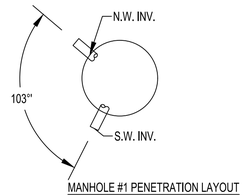


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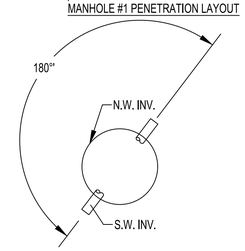
0 25 50

LEGEND

- 6" PCC CONCRETE PAVEMENT & 4" AGGREGATE BASE COURSE, TYPE A
- AGGREGATE SURFACE COURSE, 6"
- PROPOSED FENCING
- PROPOSED SANITARY
- PROPOSED STORM



MANHOLE #1 PENETRATION LAYOUT



MANHOLE #2 PENETRATION LAYOUT

ADDENDUM 2

KCF	05/05/2026	Addendum #2 Add Inlet D Change Inlets to Manholes

MILANO & GRUNLOH ENGINEERS, LLC
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Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

FIELD BOOK	XXX
DRAWN BY	KCF \ BAF \ CRG
CHECKED BY	
FILE LOCATION	S:\2022\22228\DWG\CIVIL\WASTE DISCHARGE.DWG
SAVE DATE	5/7/2026 15:21

PLANT EFFLUENT

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # 77 OF 77

JOB # 22228

NEW PHOTOVOLTAIC SYSTEM 79.17 KW DC
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

GENERAL NOTES

1.1.1 PROJECT NOTES:
1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION'S (AHJ) APPLICABLE CODES.
1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION
1.1.4 GROUND FAULT DETECTION AND INTERRUPTION (GFDI) DEVICE IS IN ACCORDANCE WITH NEC 690.41(B)
1.1.5 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINER BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4: PV MODULES: UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE INVERTERS: UL 1741 CERTIFIED, IEEE 1547, 929, 519 COMBINER BOX(ES): UL 1703 OR UL 1741 ACCESSORY
1.1.6 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
1.1.7 ALL INVERTERS, PHOTOVOLTAIC MODULES,PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
1.1.8 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

1.2.1 SCOPE OF WORK:
1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT
1.2.3 INSTALLING CONTRACTOR IS RESPONSIBLE FOR FOLLOWING EQUIPMENT MANUFACTURER'S INSTALLATION AND COMMISSIONING MEANS AND METHODS.

1.3.1 WORK INCLUDES:
1.3.2 PV RACKING SYSTEM INSTALLATION - UNIRAC SM RAIL WITH UNIRAC L FEET & S-5! S-5-U MINI CLAMP
1.3.3 PV MODULE AND INVERTER INSTALLATION - MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES / SOLAREDGE SE33.3KUS (480V) INVERTERS / SOLAREDGE U650 POWER OPTIMIZERS
1.3.4 PV EQUIPMENT ROOF MOUNT
1.3.5 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
1.3.6 PV LOAD CENTERS (IF INCLUDED)
1.3.7 PV METERING/MONITORING (IF INCLUDED)
1.3.8 PV DISCONNECTS
1.3.9 PV GROUNDING ELECTRODE & BONDING TO (E) GEC
1.3.10 PV FINAL COMMISSIONING
1.3.11 (E) ELECTRICAL EQUIPMENT FOR PV
1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

PROJECT INFORMATION

PROJECT NAME
NAME: W2E WATER TREATMENT PLANT

SCOPE OF WORK
SYSTEM SIZE : STC : 182 X 435W= 79.17 KW DC
PTC : 182 X 405.6W = 73.82 KW DC
AC SIZE: 66.6 KW AC
(182) MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
(02) SOLAREDGE SE33.3KUS (480V) INVERTERS
(182) SOLAREDGE U650 POWER OPTIMIZERS

ATTACHMENT TYPE: UNIRAC SM RAIL WITH UNIRAC L FEET & S-5! S-5-U MINI CLAMP

MSP UPGRADE: NO

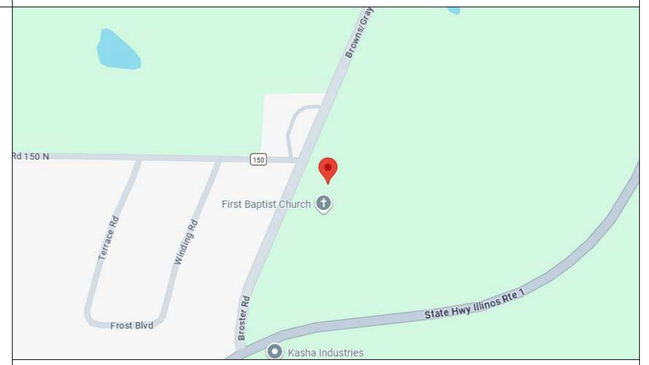
AUTHORITIES HAVING JURISDICTION
BUILDING : CITY OF GRAYVILLE
UTILITY : WAYNE WHITE ELECTRIC COOPERATIVE (WWCEC)

DESIGN SPECIFICATION

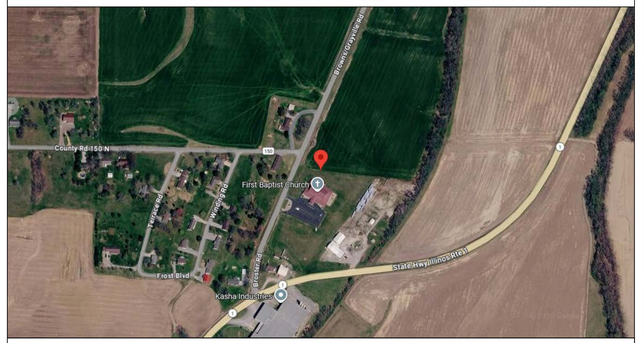
OCCUPANCY	- GROUP R-3
CONSTRUCTION	- TYPE 2
ZONING	- CITY OF GRAYVILLE
GROUND SNOW LOAD	- 30 PSF
WIND EXPOSURE	- C
WIND SPEED	- 115 MPH
RISK CATEGORY	- II

APPLICABLE CODES & STANDARDS
BUILDING: IBC 2021
ELECTRICAL: NEC 2020
FIRE: IFC 2021

VICINITY MAP



SATELLITE VIEW



SHEET INDEX

T-001	COVER PAGE
G-001	NOTES
A-101	SITE PLAN
A-102	ELECTRICAL PLAN
A-103	ATTACHMENT PLAN
E-601	ELECTRICAL LINE DIAGRAM
E-602	ELECTRICAL CALCULATIONS
E-603	WARNING LABELS
E-604	PLACARD
R-001 - R-004	RESOURCE DOCUMENTS

GREENTECH -RENEWABLES- DESIGN SERVICES
GREENTECH RENEWABLES

CONTRACTOR
WindSolarUSA CLEAN ENERGY SOLUTIONS
WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

NOT FOR CONSTRUCTION UNLESS SIGNED BY THE CONTRACTOR OR SEALED BY PROFESSIONAL ENGINEER

REVISIONS

REV	DESCRIPTION	DATE
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE
COVER PAGE

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
T-001

NOTES

1. PLUMBING VENTS, SKYLIGHTS,EXHAUST OUTLETS, VENTILATIONS INTAKE AIR OPENINGS SHALL NOT BE COVERED BY THE SOLAR PHOTOVOLTAIC SYSTEM.
2. EQUIPMENT. INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, SOURCE-CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN PHOTOVOLTAIC POWER SYSTEMS SHALL BE IDENTIFIED AND LISTED FOR THE APPLICATION. (NEC 690.4(B))
3. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED, INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND NON ROOF SWITCHES. ROOF SWITCHES TO BE NEMA 4 RATED.
4. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
5.PROTECTION DEVICES FOR PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS ALSO CONNECTED TO SOURCES HAVING SIGNIFICANTLY HIGHER CURRENT AVAILABILITY (E.G., PARALLEL STRINGS OF MODULES, UTILITY POWER), SHALL BE PROTECTED AT THE SOURCE FROM OVERCURRENT. [NEC 690.9(A)]
6.PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION THAT CONTROLS SPECIFIC CONDUCTORS. [NEC 690.12]
7.THE UTILITY INTERACTIVE INVERTERS SHALL AUTOMATICALLY DE-ENERGIZE ITS OUTPUT TO THE CONNECTED ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK UPON LOSS OF VOLTAGE IN THE SYSTEM AND SHALL REMAIN IN THAT STATE UNTIL THE ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK VOLTAGE HAS BEEN RESTORED. [NEC 705.41]
8.ALL CONDUCTOR EXPOSED TO WEATHER SHALL BE LISTED & IDENTIFIED FOR USE IN DIRECT SUNLIGHT. [NEC 310.10(D)(1)]
9.THE MODULE CONDUCTORS MUST BE TYPE USE-2 OR LISTED FOR PHOTOVOLTAIC (PV) WIRE. (NEC 690.31(C)
10.ALL CONDUCTORS SHALL BE MARKED ON EACH END FOR UNIQUE IDENTIFICATION.
11.AN INSULATED GROUNDED CONDUCTOR OF 6 AWG OR SMALLER SHALL BE IDENTIFIED AS A CONTINUOUS WHITE FINISH.[NEC 200.6]
12.THE OUTPUT OF AN INTERCONNECTED ELECTRICAL POWER SOURCE SHALL BE PERMITTED TO BE CONNECTED TO THE LOAD SIDE. INTERCONNECTING PROVISIONS FOR OTHER POWER SOURCES SHALL COMPLY WITH 705.12(B)(1) THROUGH 705.12(B)(5)
13. EACH SOURCE INTERCONNECTION OF ONE OR MORE POWER SOURCES INSTALLED IN ONE SYSTEM SHALL BE MADE AT A DEDICATED CIRCUIT BREAKER OR FUSIBLE DISCONNECTING MEANS [NEC 705.12(B)(1)]
14.THE SUM OF THE AMPERE RATING OF THE OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO THE BUSBAR OR CONDUCTOR SHALL NOT EXCEED 120% OF THE RATING OF BUSBAR OR CONDUCTOR.[NEC 705.12(B)(3)(2)]
15.A CONNECTION AT EITHER END, BUT NOT BOTH ENDS, OF A CENTER-FED PANEL BOARD IN DWELLINGS SHALL BE PERMITTED WHERE THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR DOES NOT EXCEED 120 PERCENT OF THE CURRENT RATING OF THE BUSBAR. [NEC 705.12(B)(3)(2)]
16.EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUS BAR OR CONDUCTOR SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES. [NEC 705.12(B)(3)]
17.CIRCUIT BREAKER, IF BACKFED, SHALL BE SUITABLE FOR SUCH OPERATION. [NEC 705.12(B)(4)]
18.TO MINIMIZE OVERHEATING OF THE BUSBAR IN PANELBOARD, THE PANELBOARD MAIN CIRCUIT BREAKER AND THE PV POWER SOURCE CIRCUIT BREAKER SHALL BE PHYSICALLY LOCATED AT THE OPPOSITE END OF THE BUSBAR.
19. ALL THE NEC REQUIRED WARNING SIGNS, MARKINGS, AND LABELS SHALL BE POSTED ON EQUIPMENT AND DISCONNECTS PRIOR TO ANY INSPECTIONS TO BE PERFORMED BY THE BUILDING DEPARTMENT INSPECTOR.
20.WHERE PV SYSTEM DC CIRCUIT'S RUN INSIDE A BUILDING, THEY SHALL BE CONTAINED IN METAL RACEWAYS TYPE MC METAL CLAD CABLE OR METAL ENCLOSURES FROM POINT OF PENETRATION OF THE SURFACE OF THE BUILDING TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS. [NEC 690.31(G)]
21.FLEXIBLE, FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH TERMINALS, LUGS, DEVICES OR CONNECTOR THAT ARE IS IN ACCORDANCE WITH NEC 110.14
22.CONNECTORS SHALL BE OF LATCHING OR LOCKING TYPE. CONNECTORS THAT ARE READILY ACCESSIBLE AND OPERATING AT OVER 30V DC OR 15V AC SHALL REQUIRE TOOL TO OPEN AND MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING". [NEC 690.33(C) & (E)(2)]
23. EQUIPMENT GROUNDING CONDUCTOR FOR PV MODULES SMALLER THAN 6AWG SHALL BE PROTECTED FROM PHYSICAL DAMAGE BY A RACEWAY OR CABLE ARMOR. NEC 690.46 & 250.120(C)]
24. AN EQUIPMENT GROUNDING CONDUCTOR SHALL NOT BE SMALLER THAN 12 AWG. [NEC 690.45]
25. FINE STRANDED CABLES USED FOR BATTERY TERMINALS, DEVICES, AND CONNECTIONS REQUIRE LUGS AND TERMINALS IS IN ACCORDANCE WITH NEC 110.14
26.GROUNDING ELECTRODE CONDUCTOR(S) SHALL BE INSTALLED IN ONE CONTINUOUS LENGTH WITHOUT A SPLICE OR JOINT. IF NECESSARY,SPLICES OR CONNECTIONS SHALL BE MADE AS PERMITTED. (NEC 250.64 C)
27.ALL SMOKE ALARMS, CARBON MONOXIDE ALARMS AND AUDIBLE NOTIFICATION DEVICES SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 217 AND UL 2034. THEY WILL BE INSTALLED IN ACCORDANCE WITH NFPA 72 AND NFPA 720.

GENERAL CONDUCTOR INSULATION KEY

DC CONDUCTORS

POSITIVE(UNGROUNDED)	RED
NEGATIVE(UNGROUNDED)	BLACK

480/277V AC CONDUCTORS

PHASE L1	BROWN
PHASE L2	ORANGE
PHASE L3	YELLOW

120/208V OR 240V AC CONDUCTORS

PHASE L1	BLACK
PHASE L2	RED
PHASE L3	BLUE
NEUTRAL	WHITE OR GREY
GROUND	GREEN OR BARE Cu

GROUND FAULT PROTECTION

1. PHOTOVOLTAIC INVERTERS SHALL BE EQUIPPED WITH DC GROUND FAULT PROTECTION. INVERTERS ARE ALSO EQUIPPED WITH ANTI-ISLANDING CIRCUITRY.

DISCONNECTING MEANS

1. MEANS SHALL BE PROVIDED TO ISOLATE EACH SOURCE CIRCUIT FROM THE SYSTEM.
2. WHERE A CIRCUIT GROUNDING CONNECTION IS NOT DESIGNED TO BE AUTOMATICALLY INTERRUPTED AS PART OF THE GROUND-FAULT PROTECTION, A SWITCH OR CIRCUIT BREAKER USED AS A DISCONNECTING MEANS SHALL NOT HAVE A POLE ON THE GROUNDED CONDUCTOR.
3. THE GROUNDED CONDUCTOR MAY HAVE A BOLTED OR TERMINAL DISCONNECTING MEANS TO ALLOW MAINTENANCE OR TROUBLESHOOTING BY QUALIFIED PERSONNEL.
4. EQUIPMENT SUCH AS PHOTOVOLTAIC SOURCE CIRCUITS, OVER CURRENT DEVICES, AND BLOCKING DIODES SHALL BE PERMITTED ON THE PHOTOVOLTAIC SIDE OF THE PHOTOVOLTAIC DISCONNECTING MEANS.
5. MEANS SHALL BE PROVIDED TO DISCONNECT INVERTERS FROM ALL UNGROUNDED CONDUCTORS OF ALL SOURCES. IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE DISCONNECTING MEANS SHALL BE GROUPED AND IDENTIFIED.
6. A SINGLE DISCONNECTING MEANS SHALL BE PERMITTED FOR THE COMBINED OUTPUT OF ONE OR MORE INVERTERS IN A GRID INTERACTIVE SYSTEM.
7. DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT A FUSE FROM ALL SOURCES OF SUPPLY IF THE FUSE IS ENERGIZED FROM BOTH DIRECTIONS AND IS ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS. SUCH A FUSE IN A PHOTOVOLTAIC SOURCE CIRCUIT SHALL BE CAPABLE OF BEING DISCONNECTED INDEPENDENTLY OF FUSES IN OTHER PHOTOVOLTAIC SOURCE CIRCUITS.

GREENTECH -RENEWABLES- DESIGN SERVICES
GREENTECH RENEWABLES

CONTRACTOR
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LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

NOT FOR CONSTRUCTION UNLESS SIGNED BY THE CONTRACTOR OR SEALED BY PROFESSIONAL ENGINEER

REVISIONS

REV	DESCRIPTION	DATE
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE
NOTES

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
G-001

LEGEND

- FIRE SETBACK
- PROPERTY LINE
- FENCE
- JB - JUNCTION BOX

BROSTER RD

(E) GATE

4' FIRE SETBACK

(E) MAIN BUILDING

(E) FENCE (TYP.)

(E) PROPERTY LINE

478'-3"

318'-7"

117'-4"

78'-1"

33'-1"

2"

70'-8"

14'-6"

22'-11"

254'-6"

312'-3"

141'-1"

127'-7"

33'-1"

93'-0"

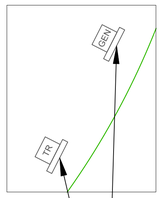
6"

87'-0"

576'-5"

SEE ENLARGED VIEW 3

ENLARGED VIEW 3



(E) UTILITY TRANSFORMER (ON POURED PAD)

(E) GENERATOR (ON POURED PAD)

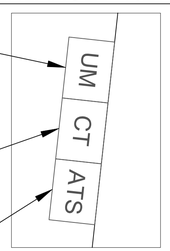
DRIVEWAY

SEE ENLARGED VIEW 2

SEE ENLARGED VIEW 1

(N) (182) MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES

ENLARGED VIEW 2

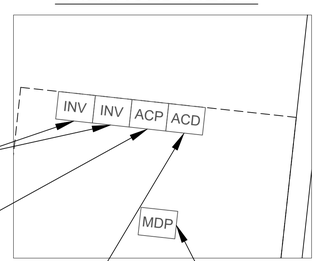


(E) UTILITY METER (EXTERIOR)

(E) CT CABINET (EXTERIOR)

(E) ATS PANEL (EXTERIOR)

ENLARGED VIEW 1



(2x) (N) SOLAREDGE SE33.3KUS (480V)INVERTERS (INTERIOR)

(N) AC ACCUMULATION PANEL (INTERIOR)

(N) VISIBLE LOCKABLE LABELED AND FUSED AC DISCONNECT (PV DISCONNECT) (INTERIOR)

(E) MAIN DISTRIBUTION PANEL (INTERIOR)

N W E S

1 | SITE PLAN

SCALE: 1/24" = 1'-0"

GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

NOT FOR CONSTRUCTION UNLESS SIGNED BY THE CONTRACTOR OR SEALED BY PROFESSIONAL ENGINEER

REVISIONS

REV	DESCRIPTION	DATE
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE

SITE PLAN

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER

A-101

ROOF SECTION(S)

ROOF 1	TILT - 18.4° AZIMUTH - 186° MODULE - 182

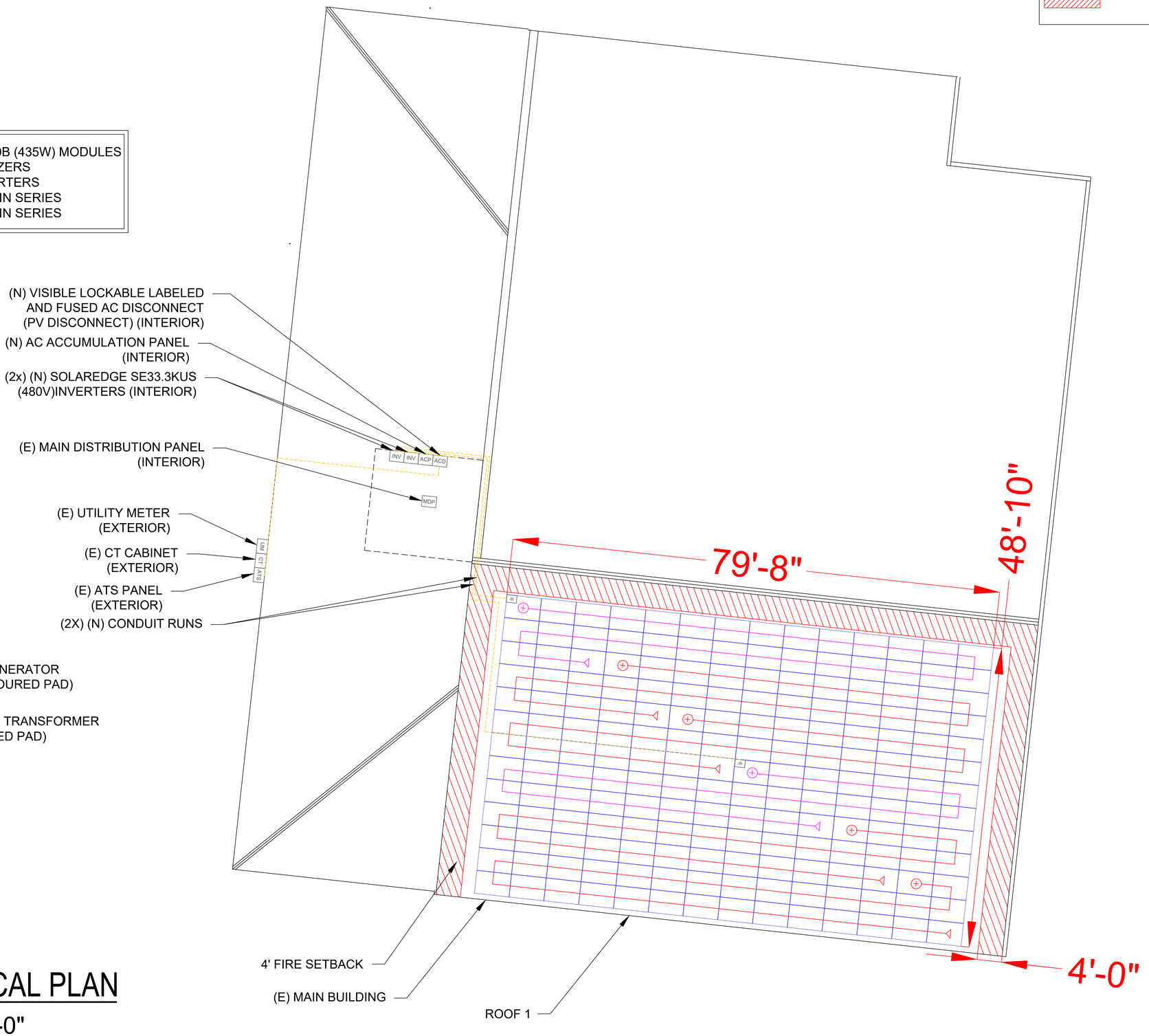
- (02) STRINGS OF (31) MODULES
- (04) STRING OF (30) MODULES

(182) MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
WITH (182) SOLAREDGE U650 POWER OPTIMIZERS
FOR (02) SOLAREDGE SE33.3KUS (480V) INVERTERS
(02) STRINGS OF (31) MODULES CONNECTED IN SERIES
(04) STRINGS OF (30) MODULES CONNECTED IN SERIES

LEGEND

JB - JUNCTION BOX

- FIRE SETBACK



N
W
E
S

1 | ELECTRICAL PLAN

SCALE: 1/8" = 1'-0"

GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
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PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

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SHEET TITLE

ELECTRICAL PLAN

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

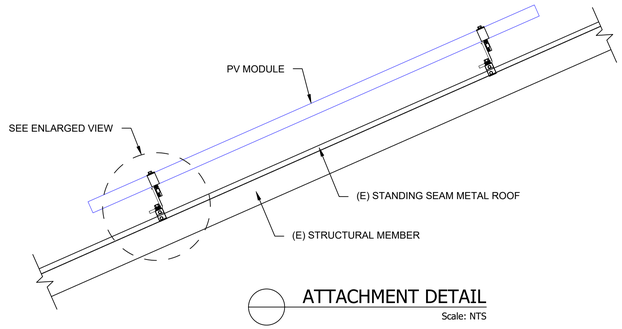
SHEET NUMBER

A-102

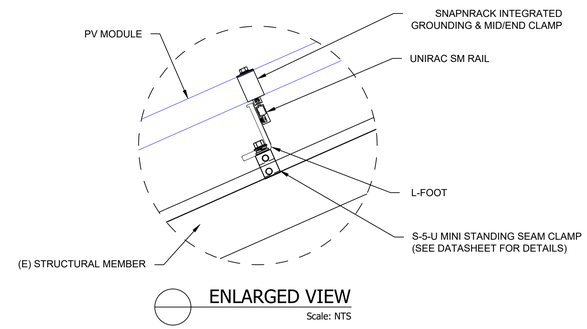
POINT LOAD CALCULATIONS

MODULE TYPE:	MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
MODULE WEIGHT:	46.96 LBS
NUMBER OF MODULES:	182
TOTAL WEIGHT OF MODULES:	8546.72 LBS
TYPE OF RACKING:	UNIRAC SM RAIL
DISTRIBUTED WEIGHT OF RACKING:	0.5 PSF
TOTAL WEIGHT OF ARRAY:	10459.50 LBS
TYPE OF ATTACHMENT:	UNIRAC L FEET & S-5! S-5-U MINI CLAMP
NUMBER OF ATTACHMENTS:	560
POINT LOAD AT EACH ATTACHMENT:	15.28 LBS
AREA OF MODULE:	21.02 SQFT
TOTAL ARRAY AREA:	3825.57 SQFT
DISTRIBUTED LOAD:	2.24 LBS
TOTAL ROOF AREA:	17579.806 SQFT
PERCENTAGE OF ROOF COVERED BY ARRAY:	21.76 %

ATTACHMENT DETAILS



ATTACHMENT DETAIL
Scale: NTS



ENLARGED VIEW
Scale: NTS

- CLAMP
- S-5! S-5-U MINI CLAMP
- UNIRAC L-FEET & UNIRAC SM RAILS

560 - TOTAL MOUNT

DESIGN CRITERIA

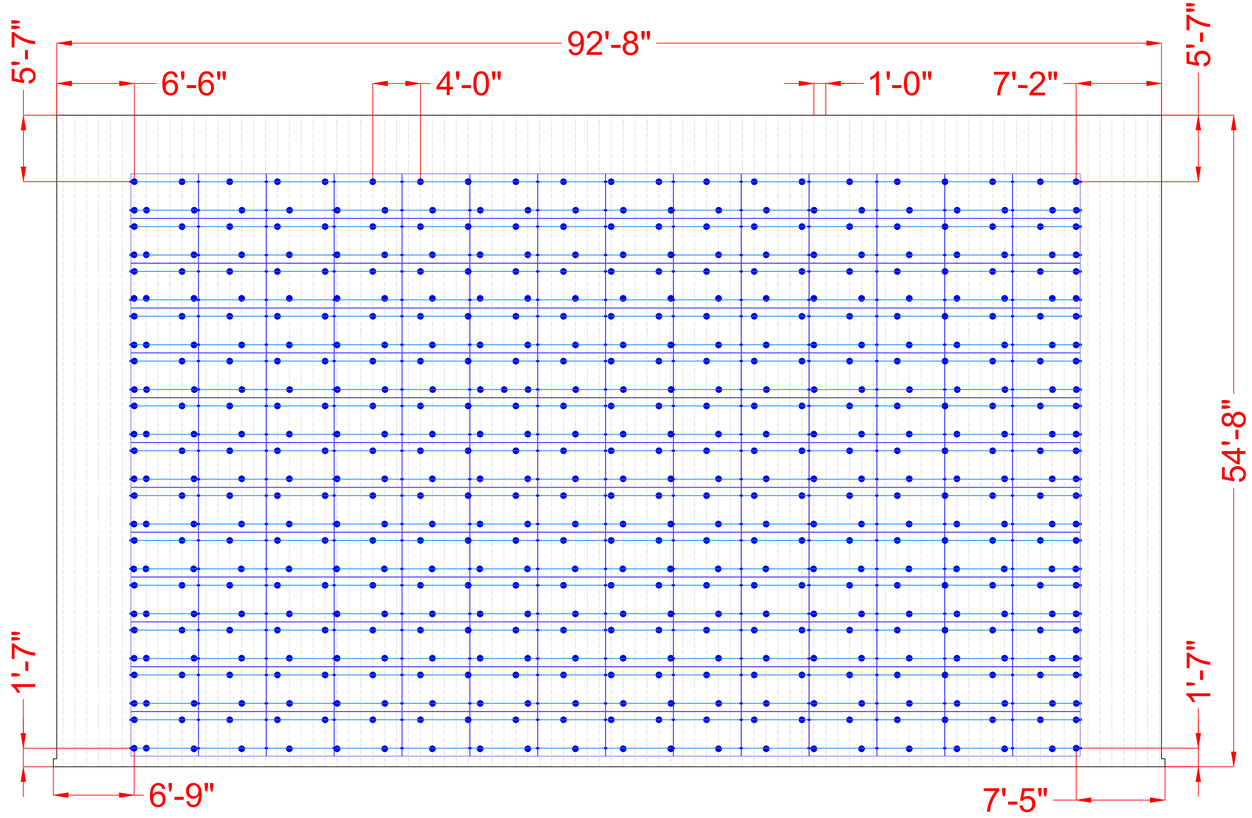
NUMBER OF PANELS IN ARRAY = 182 MODULES
MODULE TYPE = MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
ATTACHMENT= UNIRAC SM RAIL WITH UNIRAC L FEET & S-5! S-5-U MINI CLAMP
ROOF TYPE: STANDING SEAM METAL
TOTAL NUMBER OF ATTACHMENTS: 560

NOTE: DESIGN ASSUMES A STRUCTURAL ENGINEER IS TO REVIEW SEAM ATTACHMENT SPACING TO ENSURE PROPER CONNECTION TO ROOF STRUCTURE

ROOF SECTION(S)

ROOF 1	ROOF MATERIAL - STANDING SEAM METAL SEAM SPACING - @ 12" O.C

ROOF 1
TILT - 18.4°
AZIMUTH - 186°



1 ATTACHMENT PLAN

SCALE: 1/6" = 1'-0"

GREENTECH -RENEWABLES- DESIGN SERVICES
GREENTECH RENEWABLES

CONTRACTOR
WindSolarUSA CLEAN ENERGY SOLUTIONS
WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

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REVISIONS	DESCRIPTION	DATE
REV		
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE
ATTACHMENT PLAN

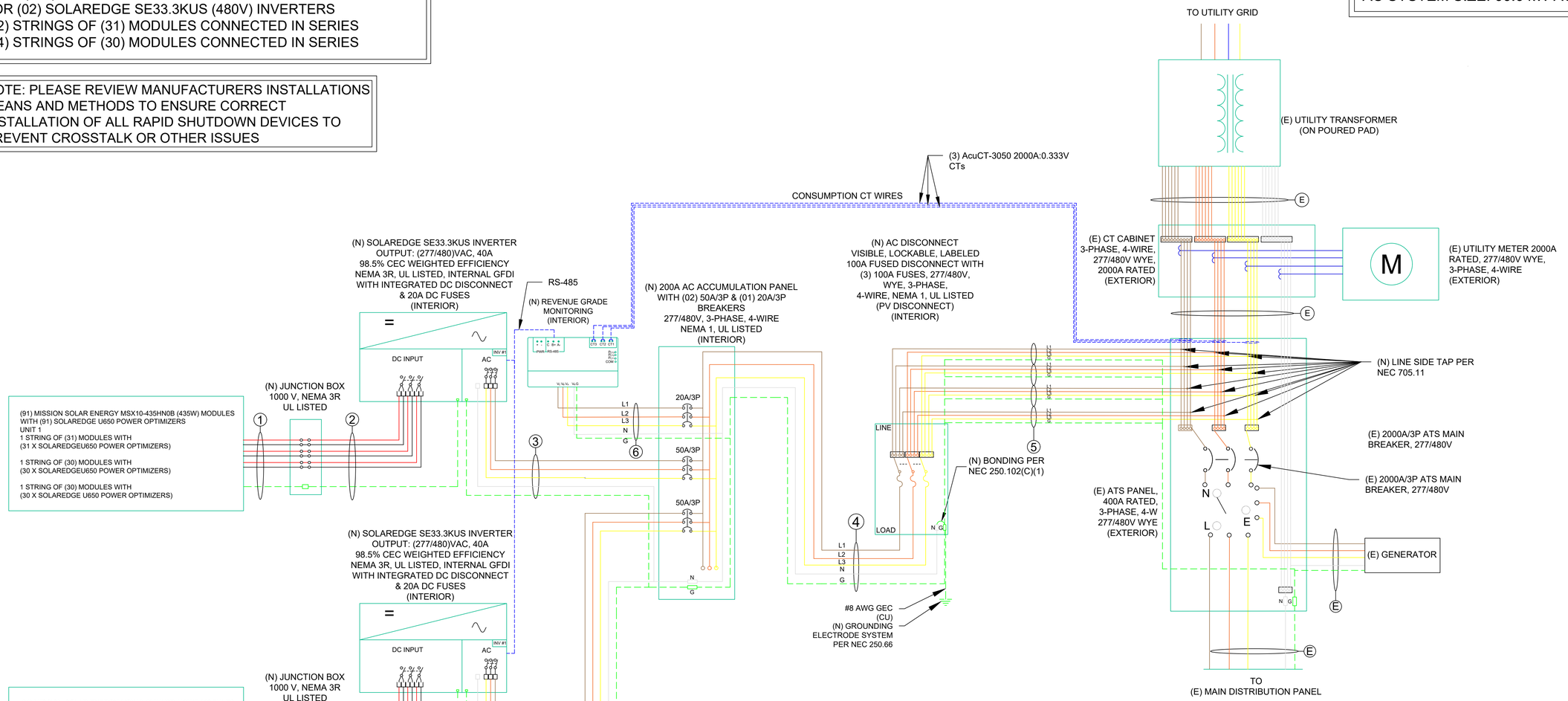
DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
A-103

(182) MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
WITH (182) SOLAREDGE U650 POWER OPTIMIZERS
FOR (02) SOLAREDGE SE33.3KUS (480V) INVERTERS
(02) STRINGS OF (31) MODULES CONNECTED IN SERIES
(04) STRINGS OF (30) MODULES CONNECTED IN SERIES

NOTE: PLEASE REVIEW MANUFACTURERS INSTALLATIONS MEANS AND METHODS TO ENSURE CORRECT INSTALLATION OF ALL RAPID SHUTDOWN DEVICES TO PREVENT CROSSTALK OR OTHER ISSUES

DC SYSTEM SIZE: 79.17 kW DC
AC SYSTEM SIZE: 66.6 kW AC



ID	PARALLEL FEEDER	PHASE CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT			NEUTRAL			GROUND CONDUCTOR QTY, SIZE AND TYPE PER CONDUIT			CONDUIT SIZE	CONDUIT TYPE
1	1	6	#10 AWG	PV-WIRE/USE-2KV, CU		N/A		1	AWG #6	BARE,COPPER EGC	N/A	FREE AIR
2	1	6	#10 AWG	PV-WIRE/USE-2KV, CU		N/A		1	AWG #10	THWN-2,COPPER EGC	3/4"	EMT
3	1	3	AWG #6	THWN-2,COPPER	1	AWG #10	THWN-2,COPPER	1	AWG #10	THWN-2,COPPER EGC	3/4"	EMT
4	1	3	AWG #2	THWN-2,COPPER	1	AWG #8	THWN-2,COPPER	1	AWG #8	THWN-2,COPPER EGC	1-1/4"	EMT
5	4	3	AWG #1/0	THWN-2,COPPER		N/A		1	AWG #8	THWN-2,COPPER EGC	(4)1-1/4"	EMT
6	1	3	AWG #10	THWN-2,COPPER	1	AWG #10	THWN-2,COPPER		NA		3/4"	EMT
E	EXISTING											

GREENTECH -RENEWABLES- DESIGN SERVICES
GREENTECH RENEWABLES

CONTRACTOR
WindSolarUSA CLEAN ENERGY SOLUTIONS
WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

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REVISIONS

REV	DESCRIPTION	DATE
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE
ELECTRICAL LINE DIAGRAM

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
E-601

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	MISSION SOLAR ENERGY MSX10-435HN0B (435W) MODULES
	STC
VMP	33.31V
IMP	13.07A
VOC	39.56V
ISC	13.79A
TEMP. COEFF. VOC	-0.25%/°C
PTC RATING	405.6W
MODULE DIMENSION	67.79×44.65×1.37 (In Inch)

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	SOLAREDGE SE33.3KUS (480V)INVERTERS
NOMINAL AC POWER	33300 W
NOMINAL OUTPUT VOLTAGE	480 VAC
NOMINAL OUTPUT CURRENT	40 A

OPTIMIZER: SOLAREDGE U650 POWER OPTIMIZERS	
MAXIMUM INPUT VOLTAGE	60 VDC
MAXIMUM OUTPUT CURRENT	15 A

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-17°C
AMBIENT TEMP (HIGH TEMP 2%)	34°C
CONDUIT HEIGHT	7/8"
ROOF TOP TEMP	34°C
CONDUCTOR TEMPERATURE RATE	90°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
0.80	4-6
0.70	7-9
0.50	10-20

DC WIRE CALCULATION

WIRE ID	PARALLEL FEEDERS	EXPECTED WIRE TEMP (In Celsius)	TEMP. CORRECTION PER TABLE 310.15(B)(1)	NO. OF CURRENT CARRYING CONDUCTORS	CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	CIRCUIT CONDUCTOR SIZE	CIRCUIT CONDUCTOR AMPACITY @75°(PER FEEDER SET)	CIRCUIT CONDUCTOR AMPACITY @90°(PER FEEDER SET)	REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A&B) 1.25 X Isc	DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16 TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY @90°(PER FEEDER SET)	DERATED AMPACITY OF CIRCUIT CONDUCTOR IS GREATER THAN REQUIRED	ESTIMATED DISTANCE (FT)	EXPECTED VOLTAGE DROP (%)
1	1	34°	0.96	6	1	#10 AWG	35A	40A	18.75A	38.4A	YES	180	0.80
2	1	34°	0.96	6	0.8	#10 AWG	35A	40A	18.75A	30.72A	YES	110	0.49
												TOTAL DC VOLTAGE DROP (FOR TAG 1 & 2) (%)	1.29

AC WIRE CALCULATION

WIRE ID	PARALLEL FEEDERS	EXPECTED WIRE TEMP (In Celsius)	TEMP. CORRECTION PER TABLE 310.15(B)(1)	NO. OF CURRENT CARRYING CONDUCTORS	CONDUIT FILL CORRECTION PER NEC 310.15(C)(1)	CIRCUIT CONDUCTOR SIZE	CIRCUIT CONDUCTOR AMPACITY @75°(PER FEEDER SET)	CIRCUIT CONDUCTOR AMPACITY @90°(PER FEEDER SET)	REQUIRED CIRCUIT CONDUCTOR AMPACITY PER NEC 690.8(A)(1)(e) TOTAL INVERTER OUTPUT CURRENT	MIN OCPD REQUIRED PER NEC 690.9(B) TOTAL INVERTER OUTPUT CURRENT X 1.25	DERATED AMPACITY OF CIRCUIT CONDUCTOR PER NEC TABLE 310.16 TEMP. CORRECTION PER TABLE 310.15(B)(1) X CONDUIT FILL CORRECTION PER NEC 310.15(C)(1) X CIRCUIT CONDUCTOR AMPACITY @90°(PER FEEDER SET)	DERATED AMPACITY OF CIRCUIT CONDUCTOR IS GREATER THAN REQUIRED	ESTIMATED DISTANCE (FT)	EXPECTED VOLTAGE DROP (%)
3	1	34°	0.96	3	1	#6 AWG	65A	75A	40A	50A	72A	YES	10	0.07
4	1	34°	0.96	3	1	#2 AWG	115A	130A	80A	100A	124.8A	YES	10	0.06
5	4	34°	0.96	3	1	#1/0 AWG	4x150A	4x170A	80A	100A	672A	YES	50	0.04
													TOTAL AC VOLTAGE DROP (%)	0.17

GREENTECH -RENEWABLES- DESIGN SERVICES
GREENTECH RENEWABLES

CONTRACTOR
WindSolarUSA CLEAN ENERGY SOLUTIONS
WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

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REVISIONS					
REV	DESCRIPTION	DATE			
A.0	PERMIT PLAN	04/06/2026			

SHEET TITLE
ELECTRICAL CALCULATIONS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
E-602

1

WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION: COMBINER PANEL, AC DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC 706.15(C)(4), NEC 690.13(B)

2

WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL LOCATION: COMBINER PANEL(S), MAIN SERVICE DISCONNECT
PER CODE: NEC 110.27(C), OSHA 1910.145(f)(7)

3

PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION: DC CONDUIT/RACEWAYS
PER CODE: NEC 690.31(D)(2)

4

SOLAR PV DC CIRCUIT

LABEL LOCATION: DC CONDUIT/RACEWAYS
PER CODE: NEC 690.31(D)(2)

5

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT: 80 A
NOMINAL OPERATING AC VOLTAGE: 480 V

LABEL LOCATION: AC DISCONNECT/POINT OF INTERCONNECTION
PER CODE: NEC 690.54

6

WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION: MAIN SERVICE DISCONNECT, PRODUCTION/NET METER
PER CODE: NEC 690.59, 705.12(C)

7

PV SYSTEM

DISCONNECT

LABEL LOCATION: AC DISCONNECT
PER CODE: NEC 690.13(B)

8

WARNING

THIS EQUIPMENT FED BY MULTIPLE SOURCES:
TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN POWER SUPPLY SHALL NOT EXCEED AMPACITY OF BUSBAR

LABEL LOCATION: AC DISCONNECT
PER CODE: NEC 705.12(B)(3)(3)

9

WARNING

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

LABEL LOCATION: POINT OF INTERCONNECTION
PER CODE: NEC 705.12(B)(3)(2)

10

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.56(C)

11

MAIN PHOTOVOLTAIC SYSTEM DISCONNECT

LABEL LOCATION: MAIN SERVICE DISCONNECT, UTILITY METER
PER CODE: NEC 690.13(B)

12

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION: RSD INITIATION DEVICE, AC DISCONNECT
PER CODE: NEC 690.56(C)(2)

13

CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 705.12(D), NEC 690.59

14

DO NOT DISCONNECT UNDER LOAD

LABEL LOCATION: MAIN SERVICE DISCONNECT
PER CODE: NEC 690.15(B) & NEC 690.33(D)(2)

15

MAXIMUM DC VOLTAGE

OF PV SYSTEM 1000V

LABEL LOCATION: DC DISCONNECT/INVERTER/PV DIST. EQUIPMENT
PER CODE: NEC 690.53

16

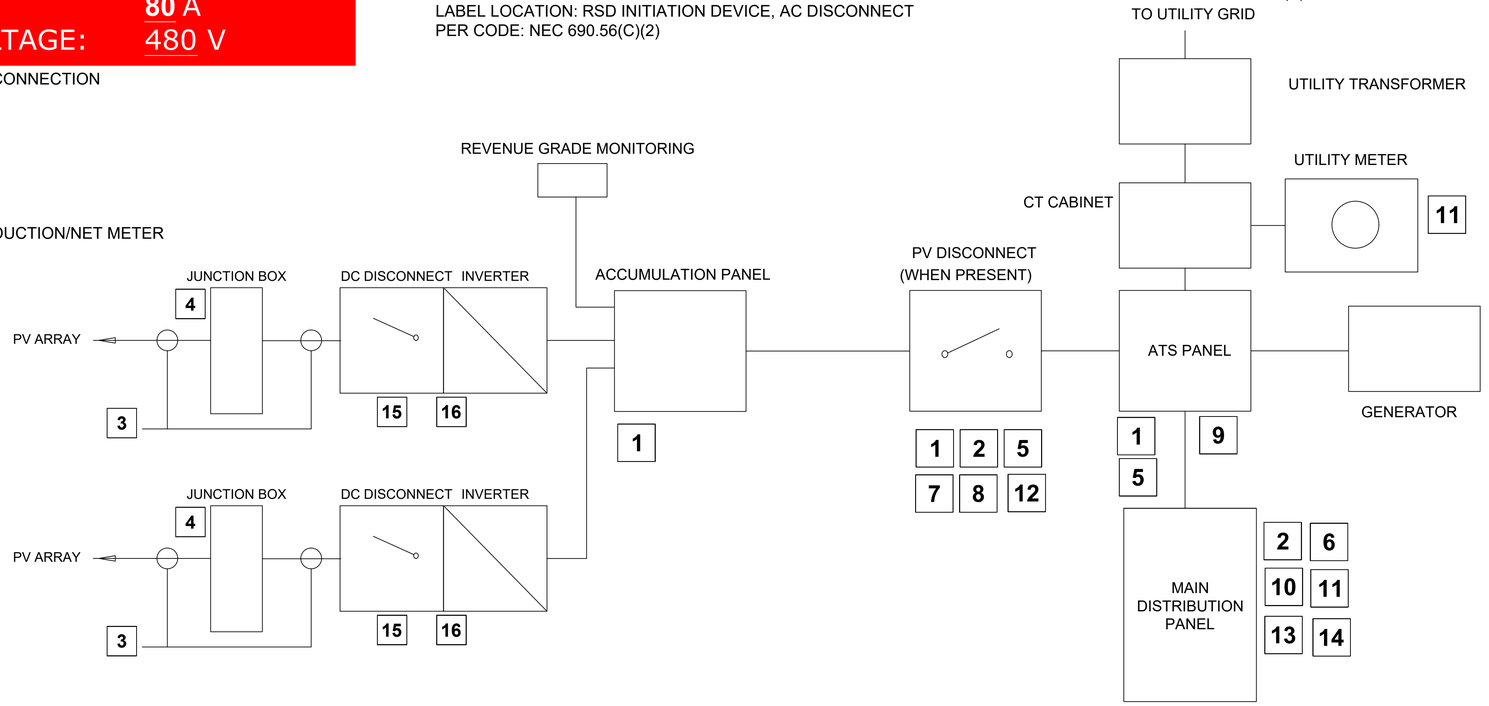
WARNING

ELECTRICAL SHOCK HAZARD

TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION: DC DISCONNECT
PER CODE: NEC 690.13(B)



GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

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REVISIONS	DESCRIPTION	DATE
REV	PERMIT PLAN	04/06/2026
A.0		

SHEET TITLE

WARNING LABELS

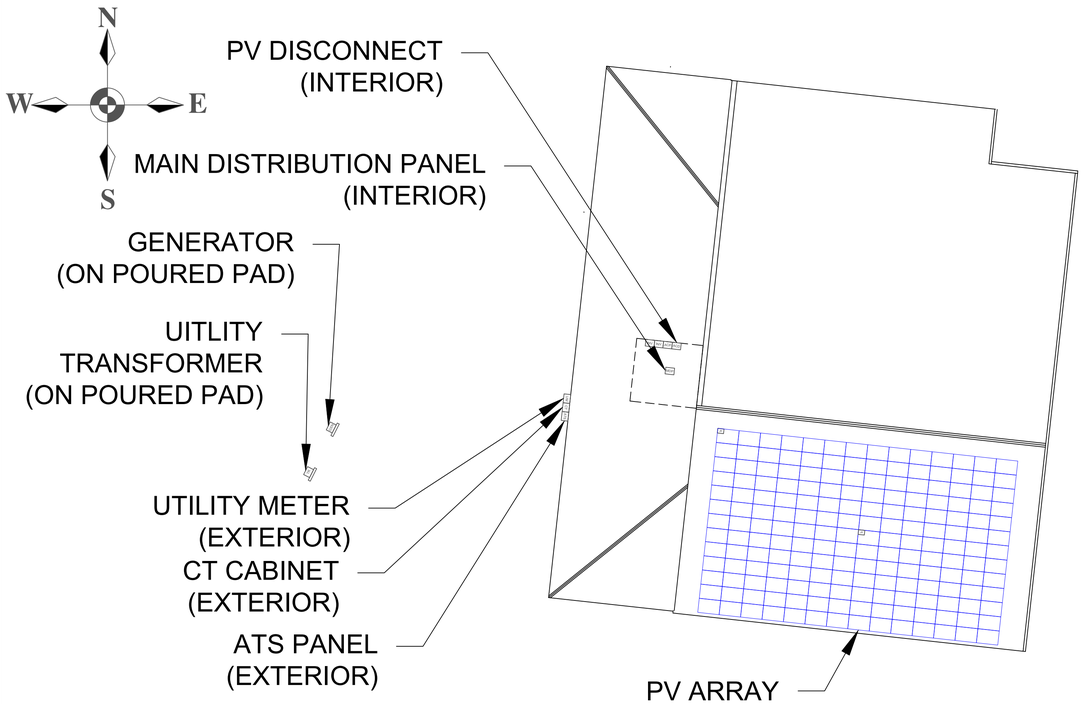
DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER

E-603

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN:



GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
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W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

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REV		
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE

PLACARDS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER

E-604

MSX N-Type 108HC

Mono-facial High Efficiency N-type

MISSION SOLAR ENERGY

435W Class leading power output

Positive Power Tolerance 0 to +3%



American Solar Built for the Long Haul

Mission Solar Energy, headquartered in San Antonio, Texas, offers high-quality, American-made solar modules designed specifically for residential and commercial rooftops. Engineered for maximum efficiency and durability in real-world conditions, our modules combine sleek aesthetics with best-in-class performance to power homes and businesses for decades to come.

America's Module Company®

High Power Output
- Achieves 22.3% efficiency with advanced high-density interconnect technology
- Multi-busbar design improves current flow and reduces resistance for better energy

Built for Tough Conditions
- Enhanced cell processing and material control for long-term durability
- Resists corrosion and degradation in harsh environments—salt spray, ammonia, sand, humidity, and high heat
- Certified for 5400 Pa front load and 5400 Pa back load for mechanical strength

More Energy, More of the Time
- Proven performance in low light and at challenging angles, verified by third-party testing
- Specialized glass design maintains output even in cloudy or shifting weather
- Low temperature coefficient (-0.29%)

BEST-IN-CLASS WARRANTY

Degradation guaranteed not to exceed 1% in year 1 and 0.45% annually from years 2 to 30 with 86.0% capacity guaranteed in year 30. For more information, visit www.missionsolar.com/warranty

WORKMANSHIP 25 YEAR WARRANTY

PRODUCTION 30 YEAR WARRANTY

MANUFACTURED IN THE USA

CERTIFICATIONS

TÜV SÜD

c UL us LISTED

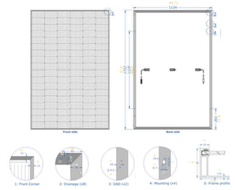
If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

Class Leading
435-445W

MSX N-Type 108HC

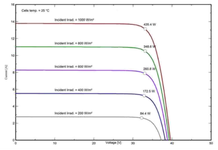
BASIC DIMENSIONS

[UNITS: MM/IN]



CURRENT-VOLTAGE CURVE

MSX10-xxxHN0B: 435W, 108 CELL SOLAR MODULE



WARRANTY INFORMATION

Module product workmanship warranty	25 years
Linear power performance warranty	30 years ≥99% end of 1st year ≥94.05 % end of 12th year ≥86.0% end of 30th year ≤80% end of 30th year

CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730

TÜV SÜD

c UL us LISTED

Mission Solar Energy
8303 S. New Braunfels Ave., San Antonio, Texas
78225 www.missionsolar.com | info@missionsolar.com

Mission Solar Energy reserves the right to make specification changes without notice.

ELECTRICAL SPECIFICATION

PRODUCT TYPE		MSX10-xxxHN0B (xxx = Pmax)		
Power Output	Pmax Wp	435	440	445
Module Efficiency	%	22.3	22.5	22.8
Tolerance	%	0/+3	0/+3	0/+3
Short Circuit Current	Isc A	13.79	13.9	14.02
Open Circuit Voltage	Voc V	39.56	39.62	39.69
Rated Current	Imp A	13.07	13.19	13.31
Rated Voltage	Vmp V	33.31	33.37	33.44
Fuse Rating	A	30	30	30
System Voltage	V	1,500	1,500	1,500

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	45°C
Temperature Coefficient of Pmax	-0.29%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	0.05%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,500 Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	30A
Fire Safety Classification	Type 1
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 5,400 Pa back load. Tested to UL 61730

*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the 'Fire Class Rating is designated for the fully installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

MECHANICAL DATA

Solar Cells	N-type i-TOPCon Monocrystalline
Cell Orientation	108 cells
Module Dimension	1722 mm x 1134 mm x 35 mm
Weight	46.96 lbs. (21.3 kg)
Front Glass	3.2 mm AR Coating Tempered Glass
Frame	35 mm Anodized Aluminum, Black
Encapsulant	Polyolefin Elastomer (POE)
Junction Box	IP 68 Rated
Cable	1.2 m, Wire 4 mm² (12AWG)
Connector	MC4 EVO2 / Staubli EVO-2A

SHIPPING INFORMATION

Truck Load	Ship To	Pallets	Modules	435W Bin
53'	Most States	28	840	365.4 kW

Double Stack: (Horizontal Orientation): 30 modules per pallet

PALLET [30 MODULES]

Weight	Height	Width	Length
1,360 lbs. (617 kg)	44.25 in (112.4 cm)	47.25 in (120 cm)	70 in (177.8 cm)

Three Phase Inverter for the 277/480V Grid

For North America

SE33.3KUS



INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Quick and easy inverter commissioning directly from a smartphone using SolarEdge SetApp
- Fixed voltage inverter for superior efficiency (98.5%) and longer strings
- Built-in type 2 DC and AC Surge Protection, to better withstand lightning events
- Small, lightest in its class, and easy to install outdoors or indoors on provided bracket
- Integrated arc fault protection and rapid shutdown for NEC 2014 – 2023, per articles 690.11 and 690.12
- Built-in module level monitoring with Ethernet, wireless, or cellular communication for full system visibility
- Integrated safety switch
- UL1741 SA and SB certified, for CPUC Rule 21 grid compliance

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Three Phase Inverter for the 277/480V Grid for North America

SE33.3KUS

MODEL NUMBER APPLICABLE TO INVERTERS WITH PART NUMBER	SE33.3KUS SEXXK-USX8IXXXX	UNITS
OUTPUT		
Rated AC Power Output	33300	W
Maximum Apparent AC Output Power	33300	VA
AC Output Line Connections	3W + PE, 4W + PE	
AC Output Voltage Minimum-Nominal-Maximum (L-N)	244 – 277 – 305	Vac
AC Output Voltage Minimum-Nominal-Maximum (L-L)	422.5 – 480 – 529	Vac
AC Frequency Min-Nom-Max	59.3 – 60 – 60.5	Hz
Maximum Continuous Output Current (per Phase)	40	Aac
GFDI Threshold	1	A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes	
Total Harmonic Distortion	≤ 3	%
Power Factor Range	+/- 0.85 to 1	
INPUT		
Maximum DC Power (Module STC)	58275	W
Transformer-less, Ungrounded	Yes	
Maximum Input Voltage DC + to DC-	1000	Vdc
Operating Voltage Range	840 – 1000	Vdc
Maximum Input Current	40	Adc
Maximum Input Short Circuit Current	55	Adc
Reverse-Polarity Protection	Yes	
Ground-Fault Isolation Detection	167kΩ Sensitivity[1]	
CEC Weighted Efficiency	98.5	%
Night-time Power Consumption	<4	W
ADDITIONAL FEATURES		
Supported Communication Interfaces	2 x RS485, Ethernet, Cellular (optional)	
Inverter Commissioning	With the SetApp mobile application using built-in access point for local connection	
Arc Fault Protection	Integrated, User Configurable (According to UL1699B)	
Rapid Shutdown	NEC 2014 – 2023, built-in	
RS485 Surge Protection Plug-in	Supplied with the inverter, built-in	
DC Surge Protection	Type II, field replaceable, built-in	
AC Surge Protection	Type II, field replaceable, built-in	
DC Fuses (Single Pole)	25A, built-in	
Smart Energy Management	Export Limitation	
VAR at Night[2]	Yes	
DC SAFETY SWITCH		
DC Disconnect	Integrated	
STANDARD COMPLIANCE		
Safety	UL 1741, UL 1741 SA, UL 1741 SB, UL 1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07	
Grid Connection Standards	IEEE 1547-2018, Rule 21, Rule 14 (HI)	
Emissions	FCC Part 15 Class A	
INSTALLATION SPECIFICATIONS		
AC Output Conduit Size / AWG Range	¾" or 1" / 6 – 10 AWG	
DC Input Conduit Size / AWG Range	¾" or 1" / 6 – 12 AWG	
Number of DC Inputs Pairs	4	
Dimensions with Safety Switch (H x W x D)	31.8 x 12.5 x 11.8 / 808 x 317 x 300	in / mm
Weight with Safety Switch	78.2 / 35.5	lb / kg
Cooling	Fans (user replaceable)	
Noise	< 62	dBA
Operating Temperature Range	-40 to +140 / -40 to +60[3]	°F / °C
Protection Rating	NEMA 3R	
Mounting	Bracket provided	

(1) Where permitted by local regulations.
(2) For details, see Set Volt-Ampere at Night – Application Note.
(3) For power derating information, refer to the Temperature Derating technical note for North America.

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CE

Power Optimizer

USA Domestic Content Eligible*

For North America

U650 / U650B



POWER OPTIMIZER

Made in the USA

SolarEdge's USA-manufactured offering for PV power optimization at the module level

- Eligible for domestic content: SolarEdge USA-manufactured Power Optimizers*, when paired with certain SolarEdge inverters, are intended to be eligible for the enhanced federal income tax credit for domestic content
- Specifically designed to work with SolarEdge inverters
- Supports high open circuit voltage (Voc) modules with U650B
- U650B provides improved design flexibility of multifaceted, complex roofs, with extended output voltage that reduces yield factor losses
- Superior efficiency (99.5%)
- Mitigates diverse types of module mismatch loss, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Faster installations with simplified wire management and easy assembly using a single bolt
- Compatible with a wide range of modules, including high-powered and bifacial PV modules
- Advanced safety:
  - Patented Sense Connect technology, designed to automatically detect and prevent potential electric arcs at the connector level before an arc is created
  - Patented SafeDC™ – module-level voltage shutdown, for installer and firefighter safety
  - Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

* Manufactured by SolarEdge with the intent to be eligible for inclusion under the elective safe harbor in calculating the Domestic Cost Percentage under the "Rooftop (MLPE)" category (under IRS Notice 2024-41). The PCBA, Electrical Parts, and Enclosure are domestically manufactured to meet the requirements of eligibility to be considered for the ITC domestic content bonus adder. SolarEdge does not provide tax and/or legal advice. You should consult with your own legal and/or tax advisor(s) regarding the eligibility of your project for the ITC or PTC, including the 10% domestic content bonus, to determine how the applicable rules apply to your particular project. The forward-looking statements in this datasheet are accurate as of the date herein and are subject to change. For more information, please contact your local SolarEdge sales representative.

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Power Optimizer

USA Domestic Content Eligible, for North America

U650 / U650B

	U650	U650B	Units
INPUT			
Rated Input DC Power[1]	650		W
Absolute Maximum Input Voltage (Voc)	60	100	Vdc
MPPT Operating Range	8 – 60	12.5 – 100	Vdc
Maximum Continuous Input Current	15		Adc
Maximum Short-Circuit Current (Isc) of Connected PV Module for SolarEdge Home Hub Single Phase Inverters	16.5		Adc
Maximum Short-Circuit Current (Isc) of Connected PV Module for SolarEdge Home Wave Single Phase Inverters	15		Adc
Maximum Short-Circuit Current (Isc) with Safety Factor[2]	21		Adc
Maximum Efficiency	99.5		%
Weighted Efficiency	98.6		%
Overvoltage Category	II		
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)			
Maximum Output Current	15		Adc
Maximum Output Voltage	60	80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR INVERTER OFF)			
Safety Output Voltage per Power Optimizer	1 ± 0.1		Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System	CSA C22.2#330, NEC 2014 – 2023		
EMC	FCC Part 15 Class B, IEC 61000-6-2, IEC 61000-6-3		
Safety	CSA C22.2#107.1, IEC 62109-1 (Class II safety), UL 1741		
Material	UL 94 V-0, UV Resistant		
RoHS	Yes		
Fire Safety	VDE-AR-E 2100-712:2013-05		
INSTALLATION SPECIFICATIONS			
Maximum Allowed System Voltage	1000		Vdc
Dimensions (W x L x H)	129 x 155 x 30 / 5.07 x 6.10 x 1.18	129 x 165 x 45 / 5.07 x 6.49 x 1.77	mm / in
Weight	720 / 1.6	790 / 1.74	gr / lb
Input Connector	MC4		
Input Wire Length	0.1 / 0.32		m / ft
Output Connector	MC4		
Output Wire Length	(+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range[3]	-40 to +85		°C
Protection Rating	IP68 / NEMA6P		
Relative Humidity	0 – 100		%

(1) The Rated Power of the module at STC will not exceed the power optimizer's Rated Input DC Power. Modules with up to +5% power tolerance are allowed.
(2) The Maximum Isc with Safety Factor is a 1.25 x the Maximum Isc of Connected PV Module. Adjusted for worst-case conditions of ambient temperature, irradiance, bifacial gain, and so on, in accordance with NEC and CSA.
(3) Power derating is applied for ambient temperatures above +85°C / +185°F for U650 and for ambient temperatures above +75°C / 167°F for U650B. Refer to the Power Optimizers Temperature Derating technical note for details.

PV System Design Using a SolarEdge Inverter		SolarEdge Home Hub Single Phase	Three Phase for 208V Grid	Three Phase for 277/480V Grid	Units
Minimum String Length (Power Optimizers)	U650	8	10[4]	18	
	U650B	6	8	14	
Maximum String Length (Power Optimizers)		25		50[5]	
Maximum Usable Power Delivered per String		5700	6000	12,750	W
Maximum Allowed Connected Power per String[6][7]	Inverters with Rated AC Power ≤ 5760W	Per the inverter's maximum input DC power[8]	One string: 7200 Two strings or more: 7800	15,000	W
	Inverters with Rated AC Power ≥ 7600W	One string: 5700 Two strings or more: 6800			
Parallel Strings of Different Lengths or Orientations		Yes			

(4) For the SE7.7KUS Three Phase Inverter and the SE10KUS Three Phase Inverter with Synergy Technology, the minimum string length is 11 Power Optimizers.
(5) A string with more than 27 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.
(6) For the 208V grid, the maximum is permitted only when the difference in connected power between strings is 1000W or less.
(7) For the 240V or 277/480V grids, the maximum is permitted only when the difference in connected power between strings 2000W or less.
(8) Refer to the Single String Design Guidelines application note for more details.

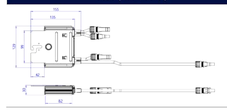
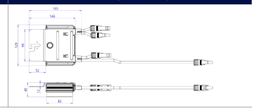
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ETL SEMKO RoHS

Power Optimizer

USA Domestic Content Eligible, for North America

U650 / U650B

U650 (Flat Bracket)	U650B (Bent Bracket)
	

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ETL SEMKO RoHS

GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

REVISIONS	DESCRIPTION	DATE
REV	PERMIT PLAN	04/06/2026
A.0		

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
R-001

S-5!®
The Right Way

S-5-U™ Clamp

The S-5-U clamp is by far our most popular and most versatile clamp. It fits about 85% of the standing seam profiles manufactured in North America—including most structural and architectural profiles. It can be used on vertically oriented seams and, by rotating the clamp 90 degrees, it can also be used on most horizontal 2" seam profiles.

Its simple design, generous dimensioning, and multiple hole orientations are what make the S-5-U clamp so versatile for use with the S-5!® snow retention products, such as ColorGard®, as well as with other heavy-duty applications.

Installation is as simple as setting the specially patented round-point setscrews into the clamp, placing the clamp on the seam, and tightening them to the specified tension. Then, affix ancillary items using the bolt provided with the product. Go to www.S-5.com/tools for information and tools available for properly attaching and tensioning S-5! clamps.

S-5-U Mini Clamp

The S-5-U Mini is a bit shorter than the S-5-U and has one setscrew rather than two. The mini is the choice for attaching all kinds of rooftop accessories: signs, walkways, satellite dishes, antennas, rooftop lighting, lightning protection systems, solar arrays, exhaust stack bracing, conduit, condensate lines, mechanical equipment—just about anything!*

*S-5! mini clamps are not compatible with, and should not be used with S-5! SnoRail™/SnoFence™ or ColorGard® snow retention systems.



The S-5-U clamp is our most popular and versatile clamp, fitting about 85% of the standing seam profiles in North America.

The Right Way!® **to attach almost anything to metal roofs!**

S-5-U and S-5-U Mini

888-825-3432 | www.S-5.com | Made in USA

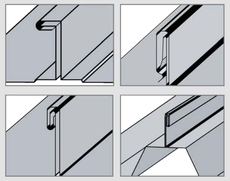
S-5!®
The Right Way

The strength of the S-5-U clamp is in its simple design. The patented setscrews will slightly dimple the metal seam material but not pierce it—leaving the roof manufacturer's warranty intact.

The **S-5-U and S-5-U Mini clamps** are each furnished with the hardware shown to the right. Each box also includes a bit tip for tightening setscrews using an electric screw gun. A structural aluminum attachment clamp, the S-5-U is compatible with most common metal roofing materials excluding copper. All included hardware is stainless steel. Please visit **www.S-5.com** for more information including CAD details, metallurgical compatibilities and specifications.

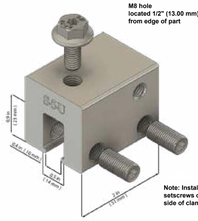
The S-5-U clamp has been tested for load-to-failure results on most major brands and profiles of standing seam roofing. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

Example Profiles



For horizontal seams under 0.65", do not use this clamp. Visit www.S-5.com for more detailed information and proper clamp usage.

S-5-U™ Clamp



Note: Install both setscrews on same side of clamp.

S-5-U Mini Clamp



Please note: All measurements are rounded to the second decimal place.

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. Visit the website at www.S-5.com for complete information on patents and trademarks. For maximum holding strength, setscrews should be tensioned and re-tensioned as the seam material compresses. Clamp setscrew tension should be between 90 and 110 inch pounds for all 24 gauge and 22 gauge stainless steels when used on 22 ga steel and between 130 and 150 inch pounds for all other metals and thinner gauges of steel. Consult the S-5! website at www.S-5.com for published data regarding holding strength.

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S-5! aggressively protects its patents, trademarks, and copyrights. Version 102925.

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BETTER SOLAR STARTS HERE

U-BUILDER® PROJECT REPORT
APPLICATION VERSION: 6.7.2
PROJECT VERSION: 0.0.72

PROJECT TITLE	PROJECT ID	LAST UPDATED
SOLARMOUNT Flush	F50A7016	Feb. 24, 2026
		ORIGINALLY CREATED: Feb. 24, 2026

NAME	W2E Treatment Plant Solar
ADDRESS	2505 Broster Rd
CITY, STATE	Grayville, IL
MODULE	Mission Solar Energy MSX10 455HNOB

Designed by michelleltknox
SOLARMOUNT
Mission Solar Energy
182 - MSX10-455HNOB
79.17 KW

NOTE: Designing on a "blank page" in the U-Builder® design tool may not provide accurate wind engineering results because the roof outline is not provided. It is the user's responsibility to verify building dimensions, site criteria, array distance from roof edges When designing a construction-ready project, it is always recommended to "Design On Map".

NOTE: Installation of the project is intended to happen within the year of project designed in U-Builder®. If it's past one year please rerun the design or contact Unirac Engineering Services.

ENGINEERING INPUTS

Plan Review

* Distributed Dead Load	2.78 psf
* Average Roof Point Dead Load	17.77 lbs
TOTAL NUMBER OF MODULES	182
TOTAL KW	79.17 KW
TOTAL MODULE AREA	~3825 ft²

Inspection

PRODUCT	SOLARMOUNT
MODULE MANUFACTURER	Mission Solar Energy
MODEL	182 - MSX10-455HNOB
MODULE WATTS	435 watts
MODULE LENGTH	67.79"
MODULE WIDTH	44.64"
MODULE THICKNESS	1.37"
MODULE WEIGHT	46.96 lbs
EXPANSION JOINTS	Every 40'
RAILS DIRECTION	CROSS-SLOPE
BUILDING HEIGHT	30.00 ft
SHORTEST BUILDING LENGTH	60.00 ft
ROOF TYPE	Other
RAFTER SPACING	24.00"
* TOTAL WEIGHT	10624.58 lbs
MID CLAMP	Pro Clamp
END CLAMP	Pro Clamp
DOMESTIC MLPE MOUNT	Yes

Loads Used for Design

BUILDING CODE	ASCE 7-16
BASIC WIND SPEED	115.00 mph
GROUND SNOW LOAD	30.00 psf
SEISMIC S_S	0.701
ELEVATION	451.00 ft
WIND EXPOSURE	C
RISK CATEGORY	II
TOPOGRAPHICAL FACTOR, K_{zt}	1.00
VELOCITY PRESSURE, Q_z	27.85 psf

* Calculated based on suggested quantity given on part list.

ENGINEERING OUTPUTS

Roof Area 1: Array 1

Landscape Modules - Rails Running Across Slope (for rails with attachments > 3)

SOLARMOUNT STANDARD RAIL SPANS [IN]	1_2E	2N_2R_1E	1R
DESIGN SPAN (NON-EXPOSED)	**48**	**48**	**48**
DESIGN SPAN (EXPOSED)	**48**	**48**	**48**
Max Cantilever (Non-Exposed)	16	16	16
Max Cantilever (Exposed)	16	16	16
Max Span (Non-Exposed)	117	107	97
Max Span (Exposed)	107	87	79

ZONES	1_2E	2N_2R_1E	1R
NO OF RAILS(EXPOSED)	**2**	**2**	**2**
NO OF RAILS(NON-EXPOSED)	**2**	**2**	**2**

DESIGN PRESSURES [PSF]	1_2E	2N_2R_1E	1R
Up (Non-Exposed)	-19.2	-29.5	-55.7
Up (Exposed)	-29.5	-45.0	-54.3
Down (Non-Exposed)	23.9	23.9	23.9
Down (Exposed)	23.9	23.9	23.9
Downslope	6.9	6.9	6.9
Lateral	0.9	0.9	0.9

MAXIMUM POINT LOADS [LBS]	1_2E	2N_2R_1E	1R
Up (Non-Exposed)	-162.9	-250.8	-303.5
Up (Exposed)	-250.8	-382.6	-461.6
Down (Non-Exposed)	202.9	202.9	202.9
Down (Exposed)	202.9	202.9	202.9
Downslope (Non-Exposed)	59.1	59.1	59.1
Downslope (Exposed)	59.1	59.1	59.1
Lateral (Non-Exposed)	7.2	7.2	7.2
Lateral (Exposed)	7.2	7.2	7.2
Tributary Area (Non-Exposed) [ft²]	8.5	8.5	8.5
Tributary Area (Exposed) [ft²]	8.5	8.5	8.5
ROOF PITCH:	18°		

Landscape Modules - Rails Running Across Slope (for rails with attachments <= 3)

SOLARMOUNT STANDARD RAIL SPANS [IN]	1_2E	2N_2R_1E	1R
DESIGN SPAN (NON-EXPOSED)	**48**	**48**	**48**
DESIGN SPAN (EXPOSED)	**48**	**48**	**48**
Max Cantilever (Non-Exposed)	16	16	16
Max Cantilever (Exposed)	16	16	16
Max Span (Non-Exposed)	117	107	97
Max Span (Exposed)	107	87	78

ZONES	1_2E	2N_2R_1E	1R
NO OF RAILS(EXPOSED)	**2**	**2**	**2**
NO OF RAILS(NON-EXPOSED)	**2**	**2**	**2**

DESIGN PRESSURES [PSF]	1_2E	2N_2R_1E	1R
Up (Non-Exposed)	-19.2	-29.5	-55.7
Up (Exposed)	-29.5	-45.0	-54.3
Down (Non-Exposed)	23.9	23.9	23.9
Down (Exposed)	23.9	23.9	23.9
Downslope	6.9	6.9	6.9
Lateral	0.9	0.9	0.9

MAXIMUM POINT LOADS [LBS]	1_2E	2N_2R_1E	1R
Up (Non-Exposed)	-178.2	-274.3	-331.9
Up (Exposed)	-274.3	-418.4	-504.8
Down (Non-Exposed)	221.9	221.9	221.9
Down (Exposed)	221.9	221.9	221.9
Downslope (Non-Exposed)	64.6	64.6	64.6
Downslope (Exposed)	64.6	64.6	64.6
Lateral (Non-Exposed)	7.9	7.9	7.9
Lateral (Exposed)	7.9	7.9	7.9
Tributary Area (Non-Exposed) [ft²]	9.3	9.3	9.3
Tributary Area (Exposed) [ft²]	9.3	9.3	9.3
ROOF PITCH:	18°		

Clamp Checks - Exposed zones

ZONES		1_2E			2N_2R_1E			1R		
CONNECTION TYPE		End-End	End-Mid	Mid-Mid	End-End	End-Mid	Mid-Mid	End-End	End-Mid	Mid-Mid
Up	Load	N/A	615	615	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK
Side	Load	N/A	146	146	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK
Lateral	Load	N/A	18	18	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK

Clamp Checks - Non-Exposed zones

ZONES		1_2E			2N_2R_1E			1R		
CONNECTION TYPE		End-End	End-Mid	Mid-Mid	End-End	End-Mid	Mid-Mid	End-End	End-Mid	Mid-Mid
Up	Load	N/A	N/A	399	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK
Side	Load	N/A	N/A	146	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK
Lateral	Load	N/A	N/A	18	N/A	N/A	N/A	N/A	N/A	N/A
	Check	OK	OK	OK	OK	OK	OK	OK	OK	OK

N/A stands for not applicable

SOLARMOUNT Flush Product Assumptions

Limitations of Responsibility: It is the user's responsibility to ensure that inputs are correct for your specific project.
Unirac is not the solar, electrical, or building engineer of record and is not responsible for the solar, electrical, or building design for this project.

Allowable spans and resulting point loads are subject to the following conditions:

1. Building Height ≤ 60.00 ft unless otherwise specified.
2. Roof Slope ≥ 1.2°
3. Maximum rail cantilever ≤ 1/3 of selected span.
4. ASCE 7-16; Basic Wind Speed: 85.00 mph - 190.00 mph (IBC 2018/ASCE 7-16), Wind Exposure: B, C or D.
5. Ground Snow Load: 0.00 psf - 100.00 psf, (Reduction can be input if this is acceptable with your local building authority). Results are based on uniform snow loading and do not consider unbalanced, drifting, and sliding conditions.
6. Dead Load ≤ 5.00 psf (includes PV Modules and Racking).
7. Maximum PV Module Length: 120.00".
8. Seismic: Installations must be in seismic site class A, B, C, or D as defined in IBC 2006/ASCE 7-05.
9. Intermediary Span Distances: Roof attachment point loads be reduced linearly if the installed distance between the attachments is less than the selected span. For example, if the spacing is half the amount shown in the results, then the point loads may also be reduced by half.
10. Spans greater than 96.00": While our products are valid for greater spans in many instances, we do not recommend this mounting configuration. Typical residential roofs are not designed for the larger point loads that might result from such excessive spans and we recommend final design by a licensed professional engineer of responsible charge.
11. U-BUILDER® does not consider the attachment to the roof structure. Ensure that the supporting roof, its rafters, connections, and any other structural support members can support the array under all code level loading conditions.
12. Ensure the attachment to the roof structure is adequate to support loads in your installation location.
13. Load combination considered for design -
    1. D
    2. D + S
    3. D + 0.7E
    4. 0.6D + 0.7E
    5. D + 0.75S + 0.75*0.7E
    6. D + 0.6W
    7. D + 0.75S + 0.75*0.6W
    8. 0.6D + 0.6W

    D - Dead load, S - Snow load, E - Seismic load,W - Wind load

Pitched Roof Solutions (Flush Mounted Solutions):

Modules are parallel to the roof surface and within 10.00". of it.
Allowable roof pitch: 1.2°-45°. (SM is not fire tested for sloped of < 2:12, please check with your AHJ if this is acceptable.)
Building has a monoslope roof with a slope ≤ 3°, a gable roof ≤ 45°, or a hip roof ≤ 27°.

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WindSolarUSA
CLEAN ENERGY SOLUTIONS

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PROJECT NAME & ADDRESS
W2E WATER TREATMENT PLANT
2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

REVISIONS	DESCRIPTION	DATE
	PERMIT PLAN	04/06/2026
REV	A.0	

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
R-002

Continental Control Systems, LLC

WattNode Wide-Range Modbus Meter



The WattNode® Wide-Range Modbus Meter measures bi-directional energy, power, voltage, current, etc. It communicates using Modbus® RTU over RS-485. The WattNode Wide-Range provides revenue-grade system accuracy when used with the CCS Accu-CT® family of revenue grade (C0.6 or better) current transformers.

Features

- One model can measure 100 to 600 Vac, single-phase or three-phase, wye or delta services
- Modbus registers can reverse CT polarity and change the assignment of CTs to voltage phases to correct wiring errors
- ANSI C12.20 class 0.5 and ANSI C12.1 accuracy
- Works with any 0.333 Vac current transformers and milliamp output CTs
- Line powered from 100 to 600 Vac
- Powered from line-to-neutral or line-to-line from any of: V_A to V_N, V_B to V_N, or V_A to V_B
- Includes support for external potential transformers

Links

- **Installation Guide:** http://ctlsys.com/wp-content/uploads/2018/12/WND-WR-MB-WattNode-Install-Manual.pdf
- **Reference Manual:** http://ctlsys.com/wp-content/uploads/2018/12/WND-WR-MB-Ref-Manual.pdf
- **Product Web Page:** http://ctlsys.com/product/wattnode-modbus-wide-range/

1 Models

Table 1: Models

Model	Communication	UL Listed
WND-WR-MB	Modbus/RTU	Yes

To get a certificate of calibration for the meter, separately order **WN-CAL-CERT**.

1.1 DIP Switches

The WND-WR-MB includes an eight-position DIP switch with the following switch functions. See the Installation Guide or Reference Manual for more details.

1) Modbus address bit 1: down (0) = 0, up (1) = 1
2) Modbus address bit 2: down (0) = 0, up (1) = 2
3) Modbus address bit 3: down (0) = 0, up (1) = 4
4) Modbus address bit 4: down (0) = 0, up (1) = 8
5) Modbus address bit 5: down (0) = 0, up (1) = 16
6) Modbus address bit 6: down (0) = 0, up (1) = 32
7) RS-485 termination resistor: down (0) = no termination, up (1) = 120Ω termination
8) Modbus baud rate: down (0) = 9,600 baud, up (1) = 19,200 baud

1.2 Options

1.2.1 Communications Options

The communications options may be used to configure the Modbus address, baud rate, and other communications parameters.

Note: The DIP switches are normally used to configure the Modbus address and baud rate, so these options should only be used for special circumstances such as baud rates that cannot be specified with the DIP

switches. If you order a meter with an address option or a baud rate option, then the DIP switch will no longer function to set the address or the baud rate.

Defaults: no parity, eight data bits, one stop bit

- **Option AD=xxx** – Set the Modbus slave address to **xxx**. This will prevent the DIP switch positions that set the address from functioning.
- **1.2K** - Set the baud rate to 1,200. This and the following baud rate options will prevent the DIP switch position that set the baud rate from functioning.
- **2.4K** - Set the baud rate to 2,400.
- **4.8K** - Set the baud rate to 4,800.
- **9.6K** - Set the baud rate to 9,600.
- **19K** - Set the baud rate to 19,200.
- **38K** - Set the baud rate to 38,400.
- **57K** - Set the baud rate to 57,600.
- **76K** - Set the baud rate to 76,800.
- **115K** - Set the baud rate to 115,200.
- **BAUD=xxx** - Set the baud rate to xxx, where xxx may be 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, or 115200. The abbreviated baud rate options, such as 9.6K, are preferred.
- **EP** - Enable even parity (the default is no parity)
- **8N2** - Select two stop bits. The default is one stop bit.
- **T1** - Install a fixed (non-switchable) 120Ω termination resistor and 1.2kΩ bias resistors (A- to Common and B+ to 3.3 Vdc). By default, the meter does not provide biasing. Selecting this option will remove the DIP switch position 7 switchable termination.

1.2.2 Meter Element Configuration Options

These are used to configure the ***ConnectionType*** or ***MeterConfig*** registers. By default, with none of these options specified, the WND-WR-MB meter elements will function like the WNC series of meters.

Only one of the following two options may be specified for a particular meter.

- **CTR=x** - Set the ***ConnnectionType*** register to x (the default is 1). See the reference guide for more information.

Connection Type	Name	Meter Element Mapping	CT Positions	Service Types	Notes	Meter Config1	Meter Config2	Meter Config3
0	Custom	Custom	Varies	Any	May not be used with the CTR=x option	-	-	-
1	**Wye**	**CT1-V_{AN} CT2-V_{BN} CT3-V_{CN}**	CT1 Phase A CT2 Phase B CT3 Phase C	**3-phase 4-wire wye**	**May also be used for delta and four-wire delta services**	**10**	**20**	**30**
2	Delta	CT1-V_{AC} CT2-V_{BC}	CT1 Phase A CT2 Phase B CT3 not used	3-phase 3-wire delta	CT3 is not used. Works for grounded delta with any phase grounded.	90	50	0
3	Branch circuits	CT1-V_{AN} CT2-V_{AN} CT3-V_{AN}	CT1 Phase A CT2 Phase A CT3 Phase A	1-phase, 2-wire with neutral	Use for monitoring 1-3 neutral connected branch circuits	10	10	10
4	House and Inverter	CT1-V_{AN} CT2-V_{BN} CT3-V_{AB}	CT1 Phase A CT2 Phase B CT3 Phase A	See notes	1-phase, 3-wire with neutral for CT1 and CT2; 1-phase, 2-wire without neutral for CT3	10	20	40
5	Line to Line	CT1-V_{AB}	CT1 Phase A CT2 not used CT3 not used	1-phase, 2-wire (no neutral)	CT2 and CT3 are not used	40	0	0

- **MCR=xx/yy/zz** - Set ***MeterConfig1*** to xx, ***MeterConfig2*** to yy, and ***MeterConfig3*** to zz. See the reference guide for more information

The mapping from current transformer inputs to line voltage inputs is controlled with the MeterConfig registers. There are one meter element and one configuration register for each current transformer. For each meter element (CT), you can select the line voltage to be associated with that CT from the following list:

- 0 = Disable meter element
- 10 = V_{AN} (also called V_A), mount CT around phase A conductor
- 20 = V_{BN} (also called V_B), mount CT around phase B conductor
- 30 = V_{CN} (also called V_C), mount CT around phase C conductor
- 40 = V_{AB}, mount CT around phase A conductor
- 50 = V_{BC}, mount CT around phase B conductor
- 60 = V_{CA}, mount CT around phase C conductor
- 70 = V_{BA} (equal to -V_{AB}), mount CT around phase B conductor
- 80 = V_{CB} (equal to -V_{BC}), mount CT around phase C conductor
- 90 = V_{AC} (equal to -V_{CA}), mount CT around phase A conductor

The default settings for the MeterConfig registers follow. These match the behavior of the older WNB and WNC meters:

- ***MeterConfig1*** = 10
- ***MeterConfig2*** = 20
- ***MeterConfig3*** = 30

1.2.3 Current Transformer Options

Either of the following CT= options are recommended for easier installation.

- **CT=xxx** - Pre-assign xxx as the global ***CtAmps*** value for the current transformers.
- **CT=xxx/yyy/zzz** - Pre-assign xxx to ***CtAmps1***, yyy to ***CtAmps2***, and zzz to ***CtAmps3***. This is used if non-matching CTs are connected to different inputs.

The following options are only for use with non-standard current transformers (CTs), such as milliamp output CTs, CTs with a full-scale output voltage other than 0.33333 Vac, or CTs that need some other adjustment.

- **MA** - Specify that the meter is designed for 40mA output CTs. Equivalent to "Opt R=10,V=0.4".
- **R=xxx** or **R=xxx/yyy/zzz** - Specify the addition of burden resistance for all three CT inputs or individually for each CT input. This means a burden resistor is installed in the meter to allow use of a milliamp output CT. If this option is not specified, then there are no burden resistors installed in the meter and the meter must be used with 0.333 Vac CTs (internally burdened millivolt output CTs). The **xxx**, **yyy**, and **zzz** values are the ohms of the burden resistors. Contact the factory for supported values.
- **V=xxx** or **V=xxx/yyy/zzz** - Specify the full-scale CT output voltage for all three CT inputs or individually for each CT input. If this option is not specified, then 0.33333 Vac is the default value. The **xxx**, **yyy**, and **zzz** values are in units of volts. This supports values from 0.1 to 0.5 Vac. Values below 0.25 Vac may affect the accuracy for low-current signals.
- **PA=xxx** or **PA=xxx/yyy/zzz** - CT phase adjustment in millidegrees. The second form uses xxx as the adjustment for all three CTs. This option determines the values that are written to the ***PhaseAdjust1***, ***PhaseAdjust2***, and ***PhaseAdjust3*** configuration registers. Use negative values to compensate for a phase lead in the CT.
- **L** - Factory look the CT amps rating, CT directions, CT gain adjust, CT phase adjust, PT ratio (starting with firmware version 33), and the creep limit configuration registers. The ***CT=xxx*** option must be used with this because it will not be possible to set the CT amps in the field. This option is recommended only if required due to security concerns.

2 Specifications

2.1 Accuracy

The following accuracy specifications do not include errors caused by the current transformer accuracy or phase angle errors. "Rated current" is the current that generates a CT output voltage of 0.33333 Vac or equivalent milliamp output.

Unless otherwise noted, all accuracy specifications assume the following conditions:

- **Line voltage:** 100 to 690 Vac
- **Power factor (PF):** 1.0

- **Frequency:** 48 - 62 Hz
- **Ambient Temperature:** 23°C ± 5°C
- **CT Current:** 1% - 100% of rated current

Parameter	Test Conditions	Typ	Max	Unit
EnergySum, Energy1, 2, 3[1] (active energy)	elapsed time[2] >= 30 s	±0.2	±0.5	%
EnergySum, Energy1, 2, 3; PF 0.5 to 0.9	elapsed time[2] >= 10 s	±0.4	±0.8	%
PowerSum, Power1, 2, 3 (active power)	averaging >= 1 s	±0.3	±0.5	%
PowerSum, Power1, 2, 3; PF 0.5 to 0.9	averaging >= 1 s	±0.5	±1.0	%
VoltAN, BN, CN, VoltAB, BC, CA (RMS voltage)	averaging >= 1 s	±0.3	±0.5	%
Current1, 2, 3 (RMS current)	averaging >= 1 s	±0.25	±0.5	%
Freq (frequency)	averaging >= 1 s	±50 ±3	±150 ±9	ppm mHz
PowerFactor1, 2, 3	averaging >= 1 s, PF > 0.5	±0.5	±1.0	%
EnergyReacSum, EnergyReac1, 2, 3 (reactive energy)	elapsed time[2] >= 30 s, PF < 0.9	±0.6	±1.5	%
PowerReacSum, PowerReac1, 2, 3 (reactive power)	averaging >= 1 s, PF < 0.9	±0.6	±1.5	%
EnergyAppSum, EnergyApp1, 2, 3 (apparent energy)	elapsed time[2] >= 30 s	±0.3	±0.5	%
PowerAppSum, PowerApp1, 2, 3 (apparent power)	averaging >= 1 s	±0.3	±0.5	%

[1] Note: when parameters are written like Energy1, 2, 3, this means Energy1, Energy2, and Energy3.

[2] Note: This indicates that energy accuracy should be evaluated over a period of 30 seconds or longer.

All models

- Meet the ANSI C12.1-2008 and ANSI C12.20-2010 class 0.5 accuracy requirements, excluding errors caused by attached current transformers.
- Meet the ANSI C12.1-2008 standard for revenue metering with CTs with class 0.6 or better current transformers.
- Meet the ANSI C12.20-2010 class 0.5 standard for revenue metering with class 0.2 and class 0.3 current transformers.

2.2 Measurement

- **Update Rate:** Approximately 0.1 second, adjusted to an integer number of AC line cycles. All measurements are performed at this rate. All measurement registers except the energy registers can update as fast as every 0.1 seconds depending on the configuration of the ***Averaging*** register. The energy registers are updated from the internal values every 1.0 second.
- **Start-Up Time:** ≤ 1 second after the supply voltage is applied.
- **Default CT Phase Angle Correction:** 0.0 degrees.
- **Creep Limit:** 0.04% (1/2500th) of full-scale.

2.3 Modbus Communication

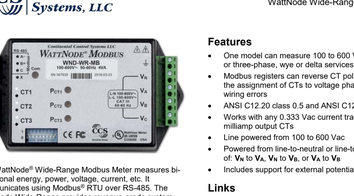
- **Protocol:** Modbus RTU (binary)
- **Baud Rates:** 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, and 115200
- **Duplex:** Half (two-wire plus common)
- **Parity:**
  - **Standard:** N81 (no parity, eight data bits, one stop bit)
  - **Optional:** E81 (even parity, eight data bits, one stop bit)
  - **Optional:** N82 (no parity, eight data bits, two stop bits)
- **Modbus Buffer:** 256 bytes
- **Communication Response Time:** 5 - 25 milliseconds (may be longer immediately after a Modbus write command, while values are saved to non-volatile memory).

2.4 Electrical

2.4.1 Power Supply

- **Nominal Power Supply Voltage:** 100 to 600 Vac
- **Power Supply Input Terminals:** Vn, Va, Vb (the meter supply can operate line-to-neutral or line-to-line)
- **Power Supply Minimum Operating Voltage:** 85 Vac

- **Power Supply Absolute Maximum Voltage:** 690 Vac. Exceeding this limit can damage the WattNode and void the warranty.
- **Power Supply Typical Watts:** see graph below
- **Power Supply Typical Voltage-Amperes:** see graph below
- **Power Supply Typical Power Factor:** 0.6



2.4.3 Current Transformer Inputs:

- **Voltage Mode:**
  - **Nominal Input Voltage (At CT Rated Current):** 0.33333 Vac RMS
  - **Absolute Maximum Input Voltage:** 5.0 Vac RMS
  - **Input Impedance at 50-60 Hz:** 23 kΩ
- **Current Mode:**
  - **Nominal Input Current (At CT Rated Current):** 40 mA RMS
  - **Absolute Maximum Input Current:** 200 mA RMS
  - **Input Impedance at 50-60 Hz:** 10 Ω

2.4.4 EIA RS-485 Interface

- **RS-485 Output Isolation:** 4500 Vac RMS
- **Driver Output:**
  - **Voltage (Open Circuit):** ±6 Vdc maximum
  - **Voltage (54 Ω load):** ±1.5 Vdc minimum
  - **Current (54 Ω load):** ±60 mA typical
  - **Rise Time (54 Ω || 50 pF load):** 900 nS typical
- **Receiver:**
  - **Common-Mode Range:** -7 Vdc to +12 Vdc max
  - **Sensitivity:** ±200 mV
  - **Bus Load:** 1/8 unit load (up to 256 WattNode meters per subnet)
  - **Failsafe Modes:** bus open, shorted, and idle

2.5 Regulatory

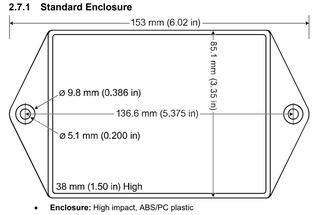
- **Safety:** meets European Parliament Directive 2014/35/EU: Low Voltage Directive
  - UL Listed (U.S. and Canada), file number E359088
  - UL / IEC 61010-1, 3rd Edition
  - CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition
- **FCC:** Class B, FCC Part 15, radiated and conducted emissions
- **EMC:** meets European Parliament Directive 2014/30/EU: Electromagnetic Compatibility
  - **EMC Requirements:** EN 61326-1: 2013, Industrial locations
  - **Radiated Emissions:** CISPR / EN 55011, Class B
  - **Conducted Emissions:** CISPR / EN 55011, Class B
  - **Electrostatic Discharge:** EN/IEC 61000-4-2: (B) Self-Recovering
  - **Radiated RF Immunity:** EN/IEC 61000-4-3: (A) No Degradation
  - **Electrical Fast Transient / Burst:** EN/IEC 61000-4-4: (A) No Degradation
  - **Surge Immunity:** EN/IEC 61000-4-5: (A) No Degradation
  - **Conducted RF Immunity:** EN/IEC 61000-4-6: (A) No Degradation
  - **Power Frequency H-field Immunity:** EN/IEC 61000-4-8: (A) No Degradation
  - **Voltage Dips, Interrupts:** EN/IEC 61000-4-11: (B) Self-Recovering
- **RoHS Compliant:** European Parliament Directive 2011/65/EU: Hazardous Substances

2.6 Environmental

- **Operating Temperature:** –40°C to +80°C (–40°F to 176°F)
- **Operating Humidity:** non-condensing, 5 to 90% relative humidity (RH) up to 40°C, decreasing linearly to 50% RH at 55°C.
- **Operating Altitude:** Up to 3000 m (9842 ft)
- **Pollution:** POLLUTION DEGREE 2 - Normally only non-conductive pollution; occasionally, a temporary conductivity caused by condensation must be expected
- **Degree of Protection:** IP40 (>1 mm solids, no protection from liquids)
- **Indoor Use:** Suitable for indoor use
- **Outdoor Use:** Suitable for outdoor use if mounted inside an electrical enclosure (Hammond Mfg., Type EJ Series or equivalent) rated NEMA 3R or 4 (IP 66)

2.7 Mechanical

2.7.1 Standard Enclosure



- **Enclosure:** High impact, ABS/PC plastic
  - **Flame Resistance Rating:** UL 94V-0, IEC FV-0
  - **Overall Size:** 6.02 in. × 3.35 in. × 1.50 in. (153 mm × 85.1 mm × 38.0 mm)
- **Weight:** 233 g (8.2 oz)

2.7.2 Connectors

- **Connectors:** Euroblock pluggable terminal blocks
  - **Green:** up to 12 AWG or 2.5 mm², 600 V, screw torque: 3.5 lbf·in (0.4 N·m)
  - **Black:** up to 12 AWG or 2.5 mm², 300 V, screw torque: 3.5 lbf·in (0.4 N·m)

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CONTRACTOR

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LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

REVISIONS	DESCRIPTION	DATE
REV	PERMIT PLAN	04/06/2026
A.0		

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
R-003

BUSBAR CURRENT TRANSFORMERS

New!



Large, Custom Sizes, UL Listed, 800 to 6000 amps

Overview

Current transformers are devices used to measure current by converting primary alternating current to a safe low voltage (0.333 Vac) output for the measurement of power and energy. Split-core CTBLs allow for installation without disconnecting the primary conductor, a large advantage for bus bar or multi-conductor electrical services.

The CTBL series CTs do not require shorting blocks because they contain an internal secondary burden resistor, so there is no possibility of high voltage on the secondary. The internal burden resistor converts the secondary current (mA) into a safe 0.333 Vac output. The full-scale rated current of the CTBL is determined during calibration by the internal burden resistor. CTBL CTs are intended for energy monitoring with accuracies of 1% of reading from 10% to 100% of rated current.

Bus bar current transformers are designed for large diameter and high current installations. The CTBL series CTs are offered in five standard models and available in custom designs: Sizes up to 12" x 24" windows, up to 6000 amps. The new CTBL Series is UL Listed for field installation in accordance with UL 2808 (XOBA).

Specifications

- **Accuracy:** 1.5% from 10% to 100% of rated current
- **Standard Primary Rating:** 800A, 1200A, 2000A, 3000A
- **Line Frequency:** 50 to 60 Hz
- **Output:** voltage at rated amps: 0.33333 Vac
- **Operating Temperature:** -40°C to +70°C
- **Safe:** integral burden resistor, no shorting block needed
- **Core Material:** silicon-iron
- **Standard Lead Length:** 8 ft, 18 AWG twisted pair, 600 Vac
- **Nylon screws** for secure split-core installation
- UL Listed, XOBA, UL 2808, CAN/CSA-C22.2 No. 61010-1. E363660
- CE, RoHS Compliant, EU Directive 2011/65/EU
- **Custom Designs:** sizes to 12" x 24" windows, to 6000 amps

Models

Model Number	Rated Amps	Opening Width	Opening Height
CTBL-1.5x3.5-0800	800	1,5 inches (38 mm)	3,5 inches (89 mm)
CTBL-4.0x4.0-0800	800	4,0 inches (102 mm)	4,0 inches (102 mm)
CTBL-4.0x4.0-1200	1200	4,0 inches (102 mm)	4,0 inches (102 mm)
CTBL-4.0x4.0-2000	2000	4,0 inches (102 mm)	4,0 inches (102 mm)
CTBL-4.0x4.5-3000	3000	4,0 inches (102 mm)	4,5 inches (114 mm)
CTBL-WxL-Amps (custom)	100 to 6000	1,0 to 12 inches	2,5 to 24 inches

Note: the custom models are specified with the width (W) and height (H) in inches, and the amps (Amps). For example, for 8 inch width, 10 inch height, and 5000 amps: CTBL-8.0x10.0-5000

WARNING

This product can expose you to chemicals including Diisononyl Phthalate (DINP), which is known to the State of California to cause cancer. For more information go to: www.P65Warnings.ca.gov

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Soconnec Group

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CTBL-2021-08-24 Specifications are subject to change

ACCUENERGY

AcuCT mV Series

333mV Split-Core Current Transformer



DATASHEET

AcuCT mV Series

AcuCT-3050

333mV Split-Core Current Transformer Datasheet



Ideal for gathering high-precision measurements in commercial or industrial electrical panels or switchgear, the AcuCT mV Series is a revenue grade current transformer with a safe, 333mV output. The AcuCT mV is compatible with a range of meters or other instrumentation and the pull-apart, split-core design helps facilitate fast installation without cable or wire disconnection.

Features

- Revenue grade accuracy: IEC 61869-2 Class 0.5 (from 5% - 120% of rated current)
- Safe, 333mV output
- Split-Core design for quick installation
- UL Recognized

Accuenergy Inc.
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Web: www.accuenergy.com
Email: marketing@accuenergy.com

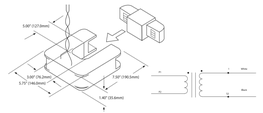
Revision Date: February 2025 Version: 1.0.4
Specs Subject To Change Without Notice

ACCUENERGY

Specifications

RATED CURRENT	400A, 600A, 1000A, 1500A, 2000A, 3000A, 5000A
Current Range	5% - 120% of rated current
Output	333mV
Accuracy	IEC 61869-2 Class 0.5
MECHANICAL/ENVIRONMENTAL	
Form Factor	Split-Core CT
Window Size	76.2mm x 127.0mm (3.00" x 5.00")
Exterior Dimensions	146.0mm x 190.5mm x 35.6mm 5.75" x 7.50" x 1.40"
Case Material	Epoxy Encapsulated Housing, UL 94V-0
Lead Wires	2.5m (8ft) twisted pair, 22AWG
Operating Temperature	-20°C to 55°C / -4°F to 131°F
Operating Humidity	Non-condensing, 0 to 95% RH
Installation Conditions	Indoor Use
ELECTRICAL	
Wire Polarity	White=Positive, Black=Negative
Phase Orientation	Arrow Points Towards Load
Frequency Range	50/60Hz
Output Resistance (Voltage Output)@333mV	400A: 6.25Ω / 600A: 4.16Ω / 1000A: 2.5Ω / 1500A: 1.66Ω / 2000A: 1.25Ω / 3000A: 0.83Ω / 5000A: 0.5Ω
SAFETY/COMPLIANCE	
Withstand Voltage	3.0KV/1mA/1min
Insulation Voltage	600Vac, Category III
Rated Voltage	600VAC
Certifications	CE, RoHS, cURus (E359521)

Dimensions



Ordering Information

			Rated Input	*Rated Output*
Ordering Number	AcuCT- 3050	-	:	:333
Ordering Example	**AcuCT- 3050**	**-**	**1000**	**:** **:333**

400: 400A
600: 600A
1000: 1000A
1500:1500A
2000: 2000A
3000: 3000A
5000: 5000A

GREENTECH -RENEWABLES- DESIGN SERVICES

GREENTECH RENEWABLES

CONTRACTOR

WindSolarUSA CLEAN ENERGY SOLUTIONS

WIND SOLAR USA
104 N 6TH STREET, SUITE 300,SPRINGFIELD, ILLINOIS, 62701, USA
LICENSE NO: D6791-228-4
PHONE NO: (217) 827-2325

PROJECT NAME & ADDRESS

W2E WATER TREATMENT PLANT

2505 BROSTER RD, GRAYVILLE, IL 62844, USA

SIGNATURE WITH SEAL

REVISIONS

REV	DESCRIPTION	DATE
A.0	PERMIT PLAN	04/06/2026

SHEET TITLE
RESOURCE DOCUMENTS

DRAWN DATE	04/06/2026
DRAWN BY	SK
REVIEWED BY	MM

SHEET NUMBER
R-004

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to install and test all buried piping, fittings, and specials.

B. The Work includes, but is not limited to, the following:

1. All types and sizes of buried piping, except where specified under other Sections.

2. Buried piping beginning at the outside face of structures or foundations, including piping beneath structures, and extending away from structures.

3. Work on or affecting existing buried piping.

4. Installation of jointing and gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, cathodic protection, supports, restraints, and thrust blocks.

5. Pipe encasements except piping embedded in structural concrete.

6. Field quality control, including testing.

7. Cleaning and disinfecting of potable water mains.

8. Incorporation of valves, hydrants, tapping sleeves, tapping valves, meters, and special items into piping systems.

9. Installation of water mains under roadways and driveways by bore and jack where shown.

10. Installation of tracer wire systems.

C. Coordinate installation procedures with related Sections and trades.

1.02 RELATED SECTIONS

A. Section 01 78 39 – Project Record Documents

B. Section 03 30 00 - Cast-in-Place Concrete

C. Section 31 23 16 – Excavation

D. Section 33 05 19 – Ductile Iron Pipe

E. Section 33 05 31 – Thermoplastic Utility Pipe

F. Section 33 12 16 - Tapping Sleeves and Valves

G. Section 40 05 64 - Valves for Actuator Control

1.03 REFERENCES

A. Standard Specifications for Construction of Water and Sewer Main in Illinois, 8th Edition, 2020.

B. Illinois Pollution Control Board – Rules and Regulations for Public Water Supplies.

C. ASTM A48 – Standard Specification for Gray Iron Castings.

D. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E. ASTM C924 – Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.

F. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

G.

H. ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping.

I. ASTM F1417 – Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.

J. ANSI/AWWA C105/A21.5 – Polyethylene Encasement for Ductile-Iron Pipe Systems.

K. ANSI/AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

L. ANSI/AWWA C206 – Field Welding of Steel Water Pipe.

M. ANSI/AWWA C500 – Metal-Seated Gate Valves for Water Supply Service.

N. ANSI/AWWA C502 – Dry-Barrel Fire Hydrants.

O. ANSI/AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.

P. ANSI/AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

Q. ANSI/AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

R. ANSI/AWWA C606 – Grooved and Shouldered Joints.

S. ANSI/AWWA C651 – Disinfecting Water Mains.

T. AWWA Manual M9 – Concrete Pressure Pipe.

U. AWWA Manual M11 – Steel Pipe: A Guide for Design and Installation.

V. AWWA Manual M23 – PVC Pipe – Design and Installation.

W. AWWA Manual M41 – Ductile-Iron Pipe and Fittings.

X. ASCE 37 – Design and Construction of Sanitary and Storm Sewers.

Y. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.04 SUBMITTALS

A. Shop Drawings:

1. Laying schedules for concrete pipe and restrained joints.

2. Details of piping, specials, joints, thrust blocks, and connections.

3. Bore and jack details including casing, spacers, and end seals.

B. Product Data:

1. Pipe and fittings (DIP, PVC, PVC YM, HDPE).

2. Valves, hydrants, check valves.

3. Tapping sleeves and valves.

4. Tracer wire materials.

C. Testing Procedures:

1. Submit proposed testing methods, apparatus, sequencing, and forms.

D. Certificates:

1. Manufacturer certifications of compliance with referenced standards.

E. Field Test Reports:

1. Hydrostatic, air, deflection, and disinfection reports.

F. Record Documentation:

1. Record drawings showing actual pipe locations, elevations, offsets, and profiles.

1.05 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction.

B. Obtain permits for work in roadways, rights-of-way, railroads, and easements.

C. Maintain required separation between potable water mains and sewers:

1. Minimum 10 feet horizontal separation.

2. Minimum 18 inches vertical separation unless otherwise approved.

D. Testing shall be conducted in the presence of the Engineer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to ensure uninterrupted progress.

B. Inspect materials upon delivery; remove damaged materials from site.

C. Store materials off ground and protect from deterioration.

D. Pipe and fittings other than PVC and CPVC may be stored outdoors without cover. Cover PVC and CPVC pipe and fittings stored outdoors.

E. Handle pipe and fittings in accordance with manufacturer recommendations.

F. Protect linings and coatings from damage.

G. Keep pipe interiors free from dirt and foreign matter.

1.07 GUARANTEE

A. Repair or replace defective materials and workmanship in accordance with Contract requirements.

B. Contractor shall repair damage to existing utilities occurring prior to new system operation at no additional cost to Owner.

PART 2 PRODUCTS

2.01 GENERAL

A. Piping materials shall be as specified on the Contract Drawings and related specifications.

B. Each pipe and fitting shall be clearly marked with material, diameter, and class.

C. Minimum cover shall be 42 inches unless noted otherwise.

2.02 TRACER WIRE

A. #12 AWG copper clad steel, minimum 450 lb break load, 30 mil HDPE insulation.

B. Installed continuously along top of pipe and secured at 5-foot intervals.

C. Lockable dielectric silicon-filled connectors only; non-locking connectors prohibited.

D. Provide access boxes at hydrants, valves, laterals, and dead ends.

E. Ground tracer wire at dead ends using magnesium ground rod with insulated grounding wire.

F. Install tracer wire through all borings.

2.03 IRON CASTINGS

A. Conform to ASTM A48.

B. Castings shall be sound, smooth, and free from defects.

C. Machine surfaces as required for proper fit.

2.04 CASING PIPE FOR BORES

A. ASTM A53 Grade B steel pipe unless noted otherwise.

B. Minimum wall thickness of 0.250 inches unless otherwise required by permit.

C. Bituminous tar lined inside and coated outside.

D. Provide watertight end seals and casing spacers.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify trench excavation, alignment, and grade prior to pipe installation.

B. Excavate trench to required lines and grades shown on the Drawings or as directed in writing by the Engineer. Excavation shall not proceed more than is necessary for orderly pipe installation.

C. Minimum cover over buried water mains shall be 42 inches, measured from finished grade to top of pipe barrel, unless otherwise shown.

D. Maintain groundwater a minimum of 24 inches below pipe invert during installation. Provide pumping, drainage, and dewatering as required.

E. Shape trench bottom to provide firm, stable, and uniform support for the full length of pipe.

F. Where unstable subgrade is encountered, over-excavate to depth directed by Engineer and refill with approved material at no additional cost to Owner.

G. Where rock is encountered, provide granular bedding:

1. 3 inches minimum for pipe less than 4 inches diameter.

2. 6 inches minimum for pipe 4 inches diameter and larger.

H. Stockpile excavated material to prevent obstruction of drainage, sidewalks, driveways, hydrants, valve boxes, and other utilities.

I. Provide temporary support and protection for existing utilities encountered. Coordinate relocation or reconstruction with utility owners.

J. Implement temporary erosion control measures in accordance with Storm Water Pollution Prevention Plan and applicable standards.

3.02 INSTALLATION

A. Lay pipe true to line and grade. No deviation permitted without written approval of the Engineer.

B. Maintain continuous positive or negative grade to eliminate high points and abrupt elevation changes.

C. Lower pipe, fittings, valves, and accessories into trench using proper equipment. Dropping or dumping materials into trench is prohibited.

D. Clean interior of pipe prior to installation. Keep pipe clean during installation. Plug open ends at end of each workday.

E. Do not install pipe under unsuitable trench or weather conditions as determined by Engineer.

F. Cut pipe neatly and square. Deburr and bevel ends per manufacturer recommendations. Flame cutting prohibited unless approved.

G. Install fittings, valves, hydrants, and accessories at required locations with stems plumb.

H. Where existing utilities obstruct alignment or grade, permanently support, relocate, or reconstruct obstruction in coordination with utility owner.

I. Any pipe that has floated due to water accumulation shall be removed and bedding restored prior to reinstallation.

3.03 INSTALLATION UNDER ROADWAYS AND DRIVEWAYS

A. Install water mains under permanent roadways and driveways by bore and jack unless otherwise permitted. Open trench construction shall not be permitted within traveled surfaces except where surface is dirt or rock.

B. Minimum pipe length installed in bores shall be 40 feet.

C. Casing pipe shall conform to ASTM A53 Grade B steel, minimum 0.250-inch wall thickness or as required by permit.

D. Provide casing spacers and watertight end seals.

E. Support water main in bore pits and recovery pits.

F. Restore damaged pavement equal to or better than original condition.

G. Open-cut roadway repairs shall include:

1. Sand compacted in 8-inch lifts to within 6 inches of surface.

2. 6 inches compacted CA-6 aggregate surface.

H. Comply with all permit requirements at no additional cost unless otherwise specified.

3.04 INSTALLATION UNDER CREEKS AND RIVERS

A. Install water mains by boring without disturbing creek or river beds and banks.

B. Comply with Department of Natural Resources and drainage district permits.

C. Provide adequate support for pipe within bore pits.

3.05 JOINTING PIPE

A. Ductile Iron Mechanical Joint Pipe:

1. Immediately before making joint, wipe clean the socket, plain end, and adjacent areas. Taper cut ends and file off sharp edges to provide smooth surface.

2. Lubricate plain ends and gasket with soapy water or manufacturer's recommended pipe lubricant, in accordance with ANSI/AWWA C111, just prior to slipping gasket onto plain end of the joint assembly.

3. Place gland on plain end with lip extension toward the plain end, followed by gasket with narrow edge of gasket toward plain end.

4. Insert plain end of pipe into socket and press gasket firmly and evenly into gasket recess. Keep joint straight during assembly.

5. Push gland toward socket and center gland around pipe with gland lip against gasket.

6. Insert bolts and hand-tighten nuts.

7. If deflection is required, make deflection after joint assembly and prior to tightening bolts. Alternately tighten bolts approximately 180 degrees apart to seat gasket evenly. Bolt torque shall be as follows:

Pipe Diameter (in)	Bolt Diameter (in)	Range of Torque (ft-lbs)
3	5/8	45 – 60
4 – 24	¾	75 – 90
30 – 36	1	100 – 120
42 - 18	1.25	120 - 150

Table 1: Mechanical Joint Torque Specifications

8. Bolts and nuts, except those of stainless steel, shall be coated with two coats, minimum dry film thickness of eight mils each, of high build solids epoxy or bituminous coating manufactured by Tnemec, or equal.

9. Restrained mechanical joints shall be in accordance with Section 33 05 19, Ductile Iron Pipe.

B. Ductile Iron Proprietary Joints:

1. Install pipe that utilizes proprietary joints for restraint specified in Section 33 05 19, Ductile Iron Pipe, or other such joints, in accordance with manufacturer's instructions.

C. Thermoplastic Pipe Joints:

1. Solvent Cement Welded Joints:

a. Bevel pipe ends and remove all burrs before making joints. Clean pipe and fittings thoroughly. Do not attempt to make solvent cement joints if temperature is below 40 degrees F. Do not make solvent cement welded joints in wet conditions.

b. Use solvent cement supplied or recommended by pipe manufacturer.

c. Apply joint primer and solvent cement and assemble joints in accordance with recommendations and instructions of manufacturer of joint materials and pipe manufacturer.

d. Take appropriate safety precautions when using joint primers and solvent cements. Allow air to circulate freely through pipelines to allow solvent vapors to escape. Slowly admit water when flushing or filling pipelines to prevent compression of gases within pipes.

2. Bell and Spigot Joints:

a. Bevel pipe ends, remove all burrs, and provide a reference mark at correct distance from pipe end before making joints.
b. Clean spigot end and bell thoroughly before making the joint. Insert O-ring gasket while ensuring that gasket is properly oriented. Lubricate spigot with manufacturer's recommended lubricant. Do not lubricate bell and O-ring. Insert spigot end of pipe carefully into bell until reference mark on spigot is flush with bell.

3. Mechanical Coupling Joints:

a. Mechanical couplings include: sleeve-type flexible couplings, split flexible couplings, ANSI/AWWA C606 grooved or shouldered end couplings, plasticized PVC couplings, and other mechanical couplings.

b. Prior to installing and assembling mechanical couplings, thoroughly clean joint ends with wire brush to remove foreign matter.

c. For mechanical couplings that incorporate gaskets, after cleaning apply lubricant to rubber gasket or inside of coupling housing and to joint ends. After lubrication, install gasket around joint end of previously installed piece and mate joint end of subsequent piece to installed piece. Position gasket and place coupling housing around gasket and over grooved or shouldered joint ends. Insert bolts and install nuts tightly by hand. Tighten bolts uniformly to produce an equal pressure on all parts of housing. When housing clamps meet metal to metal, the joint is complete and further tightening is not required.

d. For plasticized PVC couplings, loosen the stainless-steel clamping bands and remove clamps from coupling. Slide coupling over plain ends of pipes to be joined without using lubricants. Place clamps over each end of coupling at grooved section and tighten with torque wrench to torque recommended by manufacturer.

3.06 SEPARATION OF SEWERS AND POTABLE WATER PIPING

A. Horizontal Separation:

1. Where possible, existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten (10) feet.

2. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undisturbed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.

3. Exception:

a. Where it is not possible to provide minimum horizontal separation described above, both the water and sewer main shall be constructed of water main quality pipe, either ductile iron, PVC, or HDPE, and shall possess slip on or mechanical joint connections.

The sewer shall be pressure tested to the maximum expected surcharge head before backfilling.

B. Vertical Separation:

1. A watermain shall be separated from a sewer so that its invert is a minimum of eighteen (18) inches above the crown of the sewer whenever water mains cross storm sewers, sanitary sewers, or sewer service connections. Vertical separation shall be maintained for ten (10) feet horizontally from the outside casing of the sewer being crossed.

2. Center a section of potable water main pipe at least 17.5 feet long over sewer so that sewer joints are equidistant from potable water main joints.

3. Provide adequate structural support where potable water main crosses under sewer. At minimum, provide compacted select backfill for ten (10) feet on each side of crossing.

4. Exceptions:

a. Where it is not possible to provide minimum vertical separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe. Hydrostatically test water main and sewer as specified in this Section, prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.

b. Encase either potable water main or sewer in watertight carrier pipe extending ten (10) feet on each side of crossing, measured perpendicular to potable water main.

3.07 PLUGS

A. Temporarily plug installed pipe at end of each day of work or other interruption of pipe installation to prevent entry of animals, liquids, and persons into pipe, and entrance or insertion of deleterious materials into pipe.

B. Install standard plugs in bells at dead ends, tees, and crosses. Cap spigot and plain ends.

C. Fully secure and block plugs, caps, and bulkheads installed for testing to withstand specified test pressure.

D. Where plugging is required for phasing of the Work or subsequent connection of piping, install watertight, permanent type plugs, caps, or bulkhead acceptable to Engineer.

3.08 HYDRANT INSTALLATION

A. Install hydrants plumb with lowest nozzle minimum 18 inches above finished grade.

B. Provide minimum 1/4 cubic yard coarse stone around base to 12 inches above weep holes.

C. Set hydrant on concrete block to provide firm bearing.

D. Provide thrust blocking minimum 1/4 cubic yard bearing against undisturbed soil. Do not obstruct weep holes.

E. Install auxiliary gate valve with each hydrant.

F. Field inspect hydrants upon delivery prior to installation.

3.09 THRUST RESTRAINT AND REACTION BLOCKING

A. Provide thrust blocking or restrained joints at hydrants, valves, bends, tees, reducers, and dead ends.

B. Thrust blocks shall bear against undisturbed soil.

C. Install restrained joint systems, tie rods, clamps, or harness assemblies where indicated or required.

D. Provide thrust restraint at all capped or plugged dead ends.

3.10 TRACER WIRE INSTALLATION

A. General

1. All piping installed outside of the plant shall have tracer wire.

2. Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

3. Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

4. Any damage occurring during installation of the tracer wire must be immediately repaired by removing the damaged wire and installing a new

section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

5. Tracer wire shall be installed at the top of the pipe and secured (taped/tied) at 5' intervals.

6. Tracer wire must be properly grounded as specified.

7. Tracer wire on all service laterals/stubs must terminate at an approved tracer wire access box located directly above the utility, at the edge of the road right-of-way but out of the roadway. (See Tracer wire Termination/Access)

8. At all mainline dead-ends, tracer wire shall go to ground using an approved connection to a drive-in magnesium ground rod, buried at the same depth as the tracer wire. (See Grounding)

9. Mainline tracer wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end and ground using an approved waterproof connection to a ground rod buried at the same depth as the tracer wire.

10. All service lateral tracer wires shall be a single wire, connected to the mainline tracer wire using an approved mainline to lateral lug connector, installed without cutting/splicing the mainline tracer wire.

11. In occurrences where an existing tracer wire is encountered on an existing utility that is being extended or tied into, the new tracer wire and existing tracer wire shall be connected using approved splice connectors and shall be properly grounded at the splice location as specified.

B. Connectors:

1. All mainline tracer wires must be interconnected in intersections, at mainline tees and mainline crosses using appropriate connectors.

2. Direct bury wire connectors - Shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground tracer wire installation.

3. Non-locking friction fit, twist on or taped connectors are prohibited.

C. Termination/Access

1. All tracer wire termination points must utilize an approved tracer wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.

2. All grade level/in-ground access boxes shall include a dual terminal switchable lid, be appropriately identified with applicable utilitity cast into the cap, and color coded per APWA standard for the specific utility being marked.

3. A minimum of 2 ft. of excess/slack wire is required in all tracer wire access boxes after meeting final elevation.

4. All tracer wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the tracer wire connection and the terminal for the ground rod wire connection.

5. Ground wire shall be connected to the identified (or bottom) terminal on all access boxes.

D. Grounding

1. Tracer wire must be properly grounded at all dead ends/stubs.

2. Grounding of tracer wire shall be achieved by use of a drive-in magnesium ground rod with a minimum of 20ft of #12 red HDPE insulated copper clad steel wire connected to anode (minimum 1.5 lb.) specifically manufactured for this purpose and buried at the same elevation as the utility.

3. When grounding the tracer wire at dead ends/stubs, the ground rod shall be installed in a direction 180 degrees opposite of the tracer wire, at the maximum possible distance.

4. When grounding the tracer wire in areas where the tracer wire is continuous and neither the mainline tracer wire or the ground rod wire will be terminated at/above grade, install ground rod wire directly beneath and in-line with the tracer wire. Do not coil excess wire from ground rod wire. In this installation method, the ground rod wire shall be trimmed to an appropriate length before connecting to tracer wire with a mainline to lateral lug connector.

5. Where the ground rod wire will be connected to a tracer wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

3.11 PIPE BEDDING

A. Provide uniform and continuous pipe support in accordance with:

1. ANSI A21.1 Field Conditions A, B, E, or F.

2. ASTM D2774.

3. ASCE Manual 37 / WPCF Manual 9 Class B, C, or D bedding.

B. Bedding material shall be placed and compacted as required to prevent settlement and maintain alignment.

C. Trench excavation and backfill, and bedding materials shall conform to the Standard Specification for Water and Sewer Construction in Illinois.

D. Where Engineer deems existing bedding material unsuitable, remove and replace existing bedding with approved granular material furnished, placed, and compacted in accordance with the Standard Specification for Water and Sewer Construction in Illinois.

E. Where pipe is installed in rock excavation, provide minimum of three inches of granular bedding material underneath pipe smaller than four-inch nominal diameter, and minimum of six inches of granular bedding material underneath pipes four-inch nominal diameter and larger.

F. Excavate trenches below bottom of pipe by amount shown and indicated in the Contract Documents. Remove loose and unsuitable material from bottom of trench.

G. Carefully and thoroughly compact pipe bedding with handheld pneumatic compactors.

H. Do not lay pipe until Engineer approves bedding condition.

I. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.

3.12 BACKFILLING

A. Place select material by hand to one (1) foot above top of pipe.

B. Balance of backfill may be machine placed and shall contain no large stones, frozen material, or debris.

C. Trenches under pavements, sidewalks, and roads shall be compacted to 90 percent density per AASHTO T99. ~~Trench backfill in these areas shall be paid for in accordance with IDOT standards~~. **Trench backfill in these areas shall be Incidental to the price of the buried pipe installation**.

D. Supply additional backfill material if necessary to fill depressions caused by settlement.

3.13 FIELD QUALITY CONTROL

A. Pressure and Leakage Testing

1. Place sufficient backfill prior to testing to prevent pipe movement.

2. Minimum curing time for thrust blocks:

   a. 7 days for Type I Portland cement.

   b. 3 days for Type III high-early-strength cement.

3. Slowly fill pipeline and expel air at high points.

4. Test pressures:

   a. Simultaneous Pressure and Leakage Test

      1) 150% of working pressure (not less than 125% of normal working pressure at highest elevation).

      2) Duration: 2 hours.

   b. Separate Pressure Test

      1) 150% of working pressure (not less than 125% of normal working pressure at highest elevation).

      2) Duration: 1 hour.

   c. Separate Leakage Test

      1) 150% of normal average working pressure.

      2) Duration: 2 hours.

5. Leakage defined as quantity of water required to maintain pressure within 5 psi of specified pressure.

6. Allowable leakage:

   a. Contractor shall furnish gauges, pumps, connections, and apparatus required.

   b. Repair defects and retest until acceptable.

c. Contractor shall coordinate flushing and testing with Owner. Water supply may be limited. No additional compensation for delays due to water availability.

d. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified leakage test pressure after the pipe has been filled with water and the air in the pipeline has been expelled.

e. No installation will be accepted if the leakage is greater than that determined by the formula:

$$L = ND\sqrt{P} / 7400$$

Where:

L = gallons per hour

N = number of joints

D = nominal pipe diameter (inches)

P = average test pressure (psi)

B. Leakage values determined by the above formula are to found in the table below:

Nominal Pipe Size, inches	Average Pressure in Line – P.S.I.				
	50	100	150	200	250
	Allowable Leakage Per 1000 Feet or 50 Joints				
4	0.19	0.27	0.33	0.38	0.43
6	0.29	0.41	0.50	0.57	0.64
8	0.38	0.54	0.66	0.76	0.85
10	0.48	0.68	0.83	0.96	1.07
12	0.57	0.81	0.99	1.15	1.28

Table 2: Allowable Leakage for PVC Plastic Pipe with Elastomeric Joints in US Gallons per Hour

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the contract unit price for ALL PAY ITEMS INVOLVING BURIED PIPE INSTALLATION in plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 33 05 05

PART 1 GENERAL

1.01 SUMMARY

A. Work under this Section includes furnishing all labor, materials, equipment, and services necessary to provide, install, test, and place into service all tapping sleeves, tapping saddles, and tapping valves as indicated on the Drawings and as specified herein.

B. Work includes:

1. Stainless steel tapping sleeves.
2. Ductile iron tapping sleeves.
3. Fabricated steel tapping sleeves.
4. Tapping saddles.
5. Tapping valves.
6. Bolting and appurtenances.
7. Hydrostatic testing of sleeve and valve assemblies.
8. Protective coatings and polyethylene encasement.

C. Tapping sleeves and valves shall be suitable for connection to existing water mains under pressure where indicated.

1.02 RELATED SECTIONS

A. Division 01 – General Requirements and Conditions of the Contract.

B. Section 01 33 00 – Submittals.

C. Section 33 05 05 – Buried Pipe Installation.

1.03 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C110 – Ductile-Iron and Gray-Iron Fittings.
2. AWWA C111 (ANSI A21.11) – Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

3. AWWA C207 – Steel Pipe Flanges for Waterworks Service.

4. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.

5. AWWA C550 – Protective Epoxy Interior Coatings for Valves and Hydrants.

6. AWWA C800 – Underground Service Line Valves and Fittings.

7. AWWA M9 – Concrete Pressure Pipe Manual.

B. ASTM International:

1. ASTM A36 – Carbon Structural Steel.

2. ASTM A240 – Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip.

3. ASTM A285 Grade C – Pressure Vessel Plates, Carbon Steel.

4. ASTM A380 – Cleaning and Descaling Stainless Steel Parts.

5. ASTM A743 – Castings, Iron-Chromium, Iron-Chromium-Nickel.

C. ANSI Standards:

1. ANSI B16.1 – Cast Iron Pipe Flanges and Flanged Fittings.

2. ANSI B18.2 – Square and Hex Bolts and Screws.

3. ANSI B2.1 – Pipe Threads (NPT).

D. MSS SP-60 – Connecting Flange Joint Between Tapping Sleeves and Tapping Valves.

1.04 SUBMITTALS

A. Submit manufacturer’s current product data, technical specifications, and installation instructions for all tapping sleeves, saddles, valves, bolts, coatings, and accessories in accordance with Section 01 33 00.

B. Submit evidence of compliance with NSF 61 for products in contact with potable water.

C. Submit shop drawings indicating:

1. Size range and pipe outside diameter compatibility.

2. Pressure ratings.

3. Materials of construction.

4. Coating systems.

D. Submit hydrostatic test procedures.

1.05 QUALITY ASSURANCE

A. All products shall be manufactured by firms regularly engaged in the production of tapping sleeves and valves for water utility service.

B. All pressure-containing components shall be designed for the working pressures specified herein.

C. All components in contact with potable water shall comply with NSF 61.

D. Tapping operations shall be performed by personnel experienced in pressure tapping of water mains.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened containers with manufacturer's identification intact.

B. Store materials off the ground and protect from dirt, moisture, and mechanical damage.

C. Handle sleeves and valves carefully to prevent coating damage or distortion. Bent or damaged units will be rejected.

1.07 GUARANTEE

A. Guarantee tapping sleeves, saddles, valves, and associated appurtenances for a period of one (1) year from date of acceptance against defects in materials and workmanship.

B. Repair or replace defective materials at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GENERAL

A. All tapping sleeves, saddles, and valves 12-inch and smaller shall be designed for a minimum working pressure of 250 psi.

B. Valves shall have a minimum differential pressure rating of 250 psi and a minimum internal test pressure of 500 psi unless otherwise indicated.

C. Size-on-size taps up to and including 12-inch by 12-inch may utilize ductile iron or stainless steel tapping sleeves.

D. For taps greater than 12-inch by 12-inch, tapping sleeves and valves are not permitted. A tee and valve assembly shall be cut into the main as indicated on the Drawings.

2.02 STAINLESS STEEL TAPPING SLEEVES (4-INCH THROUGH 14-INCH)

A. Construction:

1. Entire fitting shall be Type 304 (18-8) stainless steel.

2. Body, lugs, and gasket armor plate: ASTM A240.

3. Flange: Cast stainless steel meeting ASTM A743.

4. Mechanical joint outlet: One-piece stainless steel casting.

B. Flange:

1. Conform to AWWA C207, Class D.

2. ANSI B16.1 drilling.

3. Recessed for tapping valve per MSS SP-60.

C. Gasket:

1. 360-degree sealing surface.

2. Vulcanized natural or synthetic rubber with antioxidant and antiozonant additives.

3. No reclaimed rubber permitted.

4. Heavy-gauge Type 304 stainless steel armor plate vulcanized into gasket.

D. Lugs:

1. Heliarc welded (GMAW) to shell.

2. Pass-through bolt design.

3. Finger lug designs not permitted.

4. Bolts shall not be integrally welded to sleeve.

E. Bolting:

1. Type 304 stainless steel.

2. Teflon coated or as specified in Article 2.08.

F. Test Plug:

1. 3/4-inch NPT per ANSI B2.1.

2. Lubricated or coated to prevent galling.

G. Finish:

1. All stainless surfaces passivated per ASTM A380.

H. Marking:

1. Permanent, water-resistant identification of size range.

2.03 STAINLESS OR CARBON STEEL TAPPING SLEEVES (16-INCH AND LARGER)

A. Body:

1. ASTM A285 Grade C or ASTM A36.

B. Working pressure rating: 200 psi minimum.

C. Flange:

1. AWWA C207, Class D drilling.

D. Gasket:

1. Vulcanized natural or synthetic rubber.

2. No reclaimed rubber.

E. Bolting:

1. High strength, corrosion resistant, low alloy steel per AWWA C111.

F. Coating:

1. Electrostatically applied baked epoxy or polyurethane.

G. For concrete steel cylinder pipe, provide load-bearing setscrews on gland flange to transfer outlet loads to sleeve.

H. Marking: Permanent size identification.

2.04 DUCTILE IRON TAPPING SLEEVES

A. Dual compression type when specified.

B. Two-piece construction assembled around main.

C. Outlet flange conforming to AWWA C110.

D. NSF 61 compliant.

E. Where indicated, provide corrosion-resistant sleeves and polyethylene encasement for corrosive soil conditions.

F. Verify existing pipe type and outside diameter prior to fabrication.

2.05 FABRICATED STEEL TAPPING SLEEVES

A. Conform to AWWA C207.

B. Minimum 3/8-inch carbon steel meeting ASTM A285 Grade C.

C. Outlet flange: AWWA C207, Class D, ANSI 150 lb drilling, recessed for tapping valve.

D. Gasket: Vulcanized natural or synthetic rubber.

E. Coating: Manufacturer-applied fusion bonded epoxy, minimum 12 mil thickness.

F. Mechanical joint outlet compatible with resilient wedge gate valves per AWWA C509 and NSF 61 approved.

2.06 TAPPING SADDLES

A. Conform to AWWA C800, High-Pressure Class.

B. Ductile iron outlet casting.

C. Stainless steel straps.

D. O-ring seals.

E. ANSI A21.10 flanged outlets counterbored for tapping valves and equipment.

2.07 TAPPING VALVES

A. Conform to AWWA C509.

B. Sizes 3-inch through 12-inch.

C. Ductile iron body.

D. Resilient-seated, non-rising stem.

E. Nut-operated, open left.

F. Suitable for buried service.

G. Flanged inlet with mechanical joint outlet.

H. Factory epoxy coating per AWWA C550 (6–8 mil average, 4 mil minimum).

I. Enclosed bevel gears, bypass valve, rollers, tracks, and scrapers where required.

2.08 BOLTS

A. Bolts shall conform to ANSI B18.2 heavy hex dimensions.

B. Bolts shall be Xylan or FluoroKote #1 coated and suitable for direct burial in corrosive soils.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify existing pipe material, diameter, and outside diameter prior to installation.

B. Confirm working pressure of existing main prior to tapping operations.

C. Clean pipe surface to ensure proper gasket sealing.

3.02 INSTALLATION

A. Install tapping sleeves, saddles, and valves in accordance with Section 33 05 05 and manufacturer’s written instructions.

B. Align sleeve to ensure outlet is properly oriented.

C. Tighten bolts uniformly to manufacturer's recommended torque.

D. Tapping procedure shall follow tapping machine manufacturer's instructions.

E. For installations with polyethylene encasement, encase entire sleeve and valve assembly up to operating nut.

3.03 PROTECTION

A. After installation, coat all external bolts except operating nut with tape coating or approved rubberized-bitumen spray-on undercoating prior to backfill.

B. Repair damaged coatings in accordance with manufacturer's recommendations.

3.04 PRELIMINARY TESTING

A. Perform hydrostatic test after installation of sleeve and valve but prior to tapping.

B. Test with valve open using tapped mechanical joint cap.

C. No leakage permitted.

D. Maintain test pressure for minimum 15 minutes.

E. Test tapping saddles in accordance with AWWA C800.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the contract unit price for CONNECT TO EXISTING, TAPPING SLEEVE AND VALVE for Contract 1 in plans titled W2E WATER TREATMENT PLANT.

4.02 The above work shall include all equipment, material, and labor; and shall be incidental to the contract unit price for RAW WATER MAIN CONSTRUCTION for Contract ~~2~~ **5** in plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 33 12 16

PART 1 GENERAL

1.01 SUMMARY

A. This section describes the design and construction of the circular precast, wire-wound prestressed concrete tank, AWWA D110, Type III, complete with steel diaphragm. The selection of the prestressed concrete tank is predicated upon the design criteria and construction methods specified. Deviations from the requirements of this section will not be considered. In the case of conflict between this and other sections, the requirements of this section shall govern.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 31 23 16 – Excavation

C. Section 33 05 05 - Buried Pipe Installation

D. Section 33 05 19 - Ductile Iron Pipe

E. Section 33 05 31 - Thermoplastic Utility Pipe

F. Section 40 73 26 - Gauge Pressure Indicating Transmitters

1.03 REFERENCES

A. When an edition or effective date of a reference is not given, it shall be understood to be the current edition or latest revision published.

B. The following documents may be referenced in this section:

1. American Concrete Institute (ACI):

a. 301 Specifications for Structural Concrete

b. 305 Hot Weather Concreting

c. 306 Cold Weather Concreting

d. 309R Guide for Consolidation of Concrete

e. 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary

f. 350.3 Seismic Design of Liquid Containing Concrete Structures and Commentary

g. 350.5 Specification for Environmental Concrete Structures

h. 372R Guide to Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures

i. 506R Guide to Shotcrete

2. American Society of Testing and Materials (ASTM):

a. A185/185M Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

b. A416/A416M Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete

c. A475 Standard Specification for Zinc Coated Steel Wire Strand

d. A615/615M Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

e. A821/821M Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks

f. A1008/1008M Standard Specification for Steel, Sheet, Cold-Rolled Carbon Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

g. C31/31M Standard Practice for Making and Curing Concrete Test Specimens in the Field

h. C33/33M Standard Specification for Concrete Aggregates

i. C39/39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

j. C42/42M Standard Test Method for Obtaining and Testing Drilled Cores and sawed Beams of Concrete

k. C618/618M Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

l. C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

m. C920 Standard Specification for Elastomeric Joint Sealants

n. D1056/1056M Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber

o. C1140 Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels

p. C1385 Standard Practice for Sampling Materials for Shotcrete

q. C1604 Standard Test Method for Obtaining and Testing Drilled Cores of Shotcrete

r. D1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

s. D1556 Standard Test Method for Density and Unity Weight of Soil in Place by the Sand-Cone Method

t. D2000 Classification System for Rubber Products in Automotive Applications

u. D2240 Standard Test Method for Rubber property – Durometer Hardness

3. American Society of Civil Engineers (ASCE):

a. ASCE 7-16 Minimum Design Loads for Buildings and Other Structures

4. American Water Works Association (AWWA):

a. C652 Standard Disinfection of Water-Storage Facilities

b. D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks

5. US Army Corps of Engineers (USACE):

a. CRD-C572 Specification for Polyvinylchloride Waterstop

1.04 SUBMITTALS

A. Prequalified Tank Contractor Declaration:

1. The following shall be included with Bid Submittal:

   a. All tank contractors are to be prequalified. The bidder is required to state on the face of their sealed proposal the NAME of the prequalified tank contractor. Sealed proposals which do not state the name of a prequalified tank contractor will be returned to the bidder unopened.

   b. Completed and executed Certification of Tank Design Professional form, included with this specification, shall be submitted as part of the bidder's sealed proposal at time of bid.

B. Prequalification Submittals:

   1. All tank contractors must be prequalified. Tank contractors not specifically listed in Article 1.05.B shall submit to the Engineer the following supporting documents at least fifteen (15) days prior to the date set for receipt of bids:

      a. Detailed design drawings and calculations, of the tank specified, signed and sealed by a Professional Engineer registered in the State of Illinois. The signing Engineer shall certify the tank design is in conformance with the AWWA Standard D110 for a Type III tank.

      b. A detailed description of construction procedures.

      c. A complete list of tank contractor's experience, in the company's own name, in the design and construction of precast wire-wound prestressed concrete tanks conforming to AWWA Standard D110, Type III. The tank contractor shall indicate the size of the tank, the location, the year of construction, and the name of the Owner for each project included on the list.

      d. A complete list of AWWA D110, Type III precast wire-wound prestressed concrete tanks designed by the Tank Design Professional in accordance with the requirements of Article 1.05.A.2. The Tank Design Professional shall submit verification affirming that they acted in the capacity of Engineer of Record.

C. Design: The following items shall be submitted for review and approval by the Engineer prior to the start of construction:

   1. Drawings: Provide complete plan, elevation, and sectional views of the wire-wound prestressed concrete tank which detail the tank geometry, materials of construction, and primary dimensions. Construction

drawings shall be signed and sealed by a licensed design professional in the State of Illinois. Construction drawings should clearly show the following:

a. Details of foundation preparation.

b. Thickness of all concrete sections.

c. Details of reinforcement in concrete sections including location, spacing, splice dimensions, and fabrication dimensions.

d. Required number of prestressing wires as well as a detailed schedule of application including the initial force and number of wires in each increment.

e. All pipe penetrations in the tank wall as well as under floor piping and encasement details.

f. Details of accessories as well as their location on the tank structure.

2. Design Calculations: Provide complete design calculations which meet the requirements of Article 2.01.E. The design calculations shall be signed and sealed by a licensed tank professional meeting the requirements of Article 1.05.A.2.

D. Construction: The following items shall be submitted for review by the Engineer and approved prior to use in the construction of the finished product:

1. Concrete and Shotcrete Mix Designs: Provide mix design and strength data for each concrete and shotcrete mix proposed for individual portions of the work. Mix designs shall clearly show ingredient proportions and quantities of admixtures which are used and shall meet Articles 2.02 and 2.03.

2. Quality Control Plan: Provide a written quality control plan for compliance and monitoring of quality on the project.

3. Accessories: Provide product data for all accessories required which demonstrate compliance with this specification.

4. Coatings: Provide product data for all coatings which demonstrate compliance with this specification.

5. Disinfection Procedure: Provide a disinfection plan and procedure.

E. Project Close Out Documents:

1. Quality Control Reports: The following quality control reports shall be submitted to the engineer for record purposes prior to final inspection of the project:

a. Concrete and Shotcrete Testing Reports: Submit test reports from an independent laboratory demonstrating concrete and shotcrete quality which meets this specification.

b. Quality Control Checklist: Submit completed quality control checklists for each portion of the work.

c. Prestressing Logs: Submit summary of logs of the completed prestressing demonstrating compliance with the design. Complete at least one wire stress reading for every coil or a minimum of one per foot of wall height for each wire phase.

2. Record Drawings: Record actual locations and final configuration of the tank and accessories on the shop drawings.

3. Warranty Document: Submit warranty document in Owner's name in accordance with Article 1.06.

1.05 QUALITY ASSURANCE

A. Qualification of Bidders:

1. Tank contractors must be prequalified to bid on the design and construction of the AWWA D110, Type III tank specified and shall meet with the following minimum requirements for prequalification:

a. Tank contractor shall be a specialist in the design and construction of AWWA D110, Type III precast wire-wound prestressed concrete tanks with the skill and financial stability to construct and guarantee the tank in accordance with this specification. The tank contractor shall have constructed (in the company's own name) a minimum of twenty (20) AWWA D110, Type III precast wire-wound prestressed concrete tanks with steel shell diaphragm of 2.0 MG or greater which have been in successful service a minimum of five (5) years.

b. Each tank contractor shall have in its employ a full-time Tank Design Professional who is licensed as a Professional Engineer in the State of Illinois with a minimum of 10 years' experience designing AWWA D110, Type III precast wire-wound prestressed

concrete tanks with a steel shell diaphragm. The Tank Design Professional shall have designed and acted in the capacity of Engineer or Record on a minimum of twenty (20 AWWA D110, Type III tanks, with a capacity equal or greater than 2.0MG, in the last ten (10) years. The Tank Design Professional shall have signed and sealed the tank construction drawings and calculations for the tanks included in their experience record.

c. Each tank contractor shall have in its employ a project team consisting of a Project Manager along with the following key persons: a leadtank builder, erection foreman, a nozzleman, and a wire-winding specialist. Each member of the project team shall have constructed a minimum of five (5) AWWA D110, Type III tanks with a capacity equal to or greater than 2.0MG.

d. Equipment: The qualified firm shall own and maintain all specialty equipment used in the turn-key construction of the prestressed concrete tank as specified herein including the following:

1) A specially designed machine for fabrication of the steel shell diaphragm which is capable of forming the material with the proper profile to provide a mechanical lock between the inside and outside concrete or shotcrete.

2) A specially designed machine for wire- wrapping the prestressed concrete tank which is capable of meeting the performance and tolerance requirements specified herein.

e. Singular Responsibility: It is the express intent of this specification to create a singular responsibility for the design and construction of the prestressed concrete tank. The design and construction of all aspects of the floor slab, wall, prestressing, shotcrete, and dome roof of the prestressed concrete tank must be performed by the tank contractor and shall not be subcontracted with the exception of labor only for reinforcing steel installation and concrete placement, which may be performed under the direct supervision of the tank contractor.

2. Preload, LLC, Louisville, KY is prequalified to perform the design and construction of wire-wound prestressed concrete tanks as it pertains to this project. Additional companies wishing to be considered shall submit in accordance with Section 01 25 00 - Substitution Procedures to the Engineer at least 15 days prior to the date set for receipt of bids.

1.06 GUARANTEE

A. Workmanship and Material Guarantee: The tank contractor shall provide a written warranty covering the workmanship and materials on the tank structure for a 1-year period from the date of acceptance of the work. In the event that any defects occur in workmanship or materials within the warranty period they shall be replaced or repaired by the tank contractor at its own expense upon written notification by the Owner.

B. Design Warranty: The tank contractor shall warrant its design of the proposed tank structure to be structurally and functionally suitable to serve the intended use of the projected work. Such intended use is exemplified by the criteria of design, workmanship, and material expressed by the requirements of the specifications and drawings prepared by the Engineer. The Owner's or Engineer's review of the tank contractor's design, or the Owner's acceptance and final payment for the work shall not relieve the tank contractor of design responsibility. The Owner shall be the direct beneficiary of the warranty.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Wire-Wound Prestressed Concrete Tank: The wire-wound prestressed concrete tank shall consist of a cast in place reinforced concrete floor, a precast wire-wound prestressed concrete wall with a mechanically bonded steel diaphragm and a cast-in-place, clear-span concrete dome roof. The dimensions of the wire-wound prestressed concrete tank shall be in accordance with this specification and the project drawings.

B. Accessories: The tank shall include accessories as specified in this specification.

C. Painting and Coating: The tank shall include coatings as required by this specification.

D. Design Requirements: The tank shall be designed in accordance with the applicable requirements of: AWWA D110 Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks; ACI 350 Code Requirements for Environmental Engineering Concrete Structures; ACI 372R Design and Construction of Circular Wire- and Strand-Wrapped Prestressed Concrete Structures; and currently accepted engineering principles and practices for the design of such structures. An intrinsic feature of that standard and this specification is the use of continuous, circumferential, wire-wound prestressing. The use of circumferential tendon prestressing is not permitted.

E. Design Criteria: Loads and conditions to be considered in the design of the tank shall include; internal liquid pressure, backfill, seismic loads, prestressing, edge

restraint, temperature and moisture gradients and dead and live loads. Geotechnical subsurface investigation report is included with these specifications and shall be used for design purposes. The following criteria is a summarization of attached report:

1. Storage Capacity: 1MG

2. Dimensions:

    a. Inside Diameter: 68 ft

    b. Liquid Depth: 37 ft

3. Liquid Unit Weight: 62.4 lbs/ft3

4. Maximum Liquid Fill/Withdraw Rates:

    a. Fill Rate: 2.16 MGD

    b. Withdraw Rate: 2.16 MGD

5. Wind Load:

    a. Basic Wind Speed, V: 113 mph

    b. Importance Factor: 1.5

    c. Exposure Category: C

6. Seismic Load:
    a.
    b. Seismic design shall be in accordance with the requirements of the ASCE 7-16 and AWWA D110 with the most stringent requirements controlling with the following design loads. Tank Contractor shall provide summary of seismic calculations and results. Mapped Spectral Response Accelerations

        1) 1 Second Mapped Response Acceleration, S1: 0.21g

        2) Short Period Mapped Response Acceleration, Ss: 0.639g

            a) Site Classification: Type D

            b) Importance Factor: 1.25

7. Allowable Soil Bearing Pressure: 2000 psf

8. Dome Rise: 1:8 to 1:12

F. Loads to be considered in the tank design shall include internal liquid pressure, backfill, seismic effects, prestressing, end restraints, temperature and moisture gradients, dead loads, and live loads.

G. Floor: The floor shall be a highly reinforced, cast-in-place, membrane slab designed to transfer the load of the liquid contents directly to the subgrade. The floor shall be watertight and shall meet the following requirements:

1. The wall footing shall be an integral part of the membrane slab and designed to resist loads imposed by the tank wall and dome as well as any stresses caused by anticipated differential settlement between the footing and the membrane slab.

2. The minimum floor thickness shall be 4”.

3. The minimum floor thickness at pipe encasements, sumps, and under baffle walls shall be 8” and shall include two layers of reinforcement. Reinforcement shall be designed to accommodate anticipated differential settlement in these areas.

4. The minimum ratio of mild reinforcement shall be 0.6 % of the concrete area in each direction. 0.8 percent should be used for tanks over 150’ in diameter. The minimum cover over the reinforcing steel shall be 1-¼”. Maximum spacing of steel reinforcement shall be two times the floor thickness.

H. Wall Design: The prestressed tank wall design shall be based on elastic cylindrical shell analysis and shall meet the following requirements:

1. Sloshing Height & Freeboard: Shall be calculated using both ASCE 7 and AWWA D110 and the more conservative value shall be utilized. Freeboard is defined as the vertical distance between the springline and the top of water elevation. The “sloshing wave” shall be accommodated by increasing the freeboard between the normal operating surface and the underside of the roof; or the roof shall be designed to resist the uplift due to such a wave. Any confined portion of the convective (sloshing) mass shall be calculated and applied as an additional impulsive mass. A minimum freeboard height of 6 inches for cast-in-place domes, and 11 inches for precast domes shall be utilized.

2. Precast Core Wall: The core wall shall be constructed of precast panels, with vertical joints between panels filled with shotcrete or cast-in-place

concrete, and shotcrete cover over the diaphragm on precast panel. The minimum design requirements shall be as follows:

a. The minimum core wall thickness shall be 4 ½".

b. The maximum allowable compressive stress in the core wall extreme fiber shall not exceed:

1) 0.55 f'_{ci} initial where f'_{ci} represents the concrete strength at time of prestressing.

2) 0.45 f'_{c} final where f'_{c} represents the 28-day concrete strength at a time after prestressing is complete and losses have taken place.

c. Place concrete for each panel in one continuous operation.

d. The prestressing force applied to the core wall shall result in a minimum of 200 psi residual compression for the aboveground portion of the wall tapering to 50 psi at 6 feet below grade.

e. Reduction in hoop tension due to edge restraint shall not be allowed.

f. A minimum ½" layer of shotcrete shall be applied over the diaphragm.

g. Backfill loads shall not be used in the design of the core wall to counteract hydraulic loads or provide residual compression in the wall. The thickness of the core wall shall be calculated to accept the initial compressive force of the backfill.

h. The core wall shall be reinforced using nonprestressed, mild reinforcement as necessary to account for edge effects as well as the effects due to shrinkage, differential drying and temperature and moisture gradients where required. Reinforcing steel shall be designed in accordance with the requirements of the Alternate Design Method of ACI 350. The strength requirements of ACI 350 shall also be satisfied. The minimum concrete or shotcrete clear cover over steel reinforcement shall be 1 inch. At a minimum, the following nonprestressed, mild reinforcement shall be incorporated into the core wall:

1) Inside Face: The inside face of the wall shall contain vertical nonprestressed reinforcement in the minimum amount of 0.25 percent of the core wall concrete area.

2) Outside Face: The outside face of the wall shall contain vertical nonprestressed reinforcement in the minimum amount of 0.25 percent of the core wall concrete area.

3) Steel Shell Diaphragm: The cross-sectional area of the steel diaphragm may be considered as part of the required vertical nonprestressed reinforcement.

3. Steel Shell Diaphragm: Provide full length continuous watertight, mechanically bonded, steel diaphragm which is continuous the full wall height to within 2 inches of the top without horizontal splices. The minimum design requirements shall be as follows:

a. Mechanically seam vertical diaphragm joints except where located between wall panels, where sealing with polysulfide or other suitable sealant shall be employed.

b. Seal all vertical diaphragm joints to be watertight.

c. Do not allow form ties to pierce the diaphragm.

4. Prestressing: The prestressing shall be designed to resist the forces due to internal loads after accounting for stress losses and residual compression and shall meet the following requirements:

a. The maximum permissible initial stress in the prestressing wire immediately after application to the wall shall not exceed:

1) 0.75 fpu, where fpu represents the ultimate strength of the wire.

b. Stress losses due to shrinkage, creep and relaxation shall be calculated; however, the value used for the total of the losses shall not be less than 25,000 psi.

5. Wire Cover: The minimum clear cover over the prestressing wire shall be as follows:

a. The minimum clear cover over prestressing wires measured to the outside face of the wall shall be 1”.

b. The minimum clear cover at penetrations in the tank wall measured from the edge of the penetration to the wire shall be 2”.

c. The minimum clear cover at the base of the tank wall measured from the top of footing to the wire shall be 3”.

I. Dome Roof: The design of the dome roof shall be based on elastic shell analysis with a circumferentially prestressed dome ring to counteract the horizontal component of the thrust caused by the dome load and shall meet the following requirements:

1. The edge regions of the dome shall be designed for bending moments caused by loads and the restraint of the dome.

2. The minimum thickness of the dome shell shall be proportioned to resist buckling but in no case shall be less than 3 inches for cast-in-place and 4 inches for precast domes.

3. Nonprestressed mild steel reinforcement shall be provided to control shrinkage and temperature effects as well as edge effects as follows:

a. Typical Dome Shell: A minimum of 0.25% of the net cross-sectional area shall be placed in two perpendicular directions with two layers required when the typical shell thickness is greater than 6 inches in thickness.

b. Dome Edge: A minimum of 0.25% of the net cross-sectional area with two layers of reinforcing steel where required by analysis.

4. The minimum clear cover over steel reinforcement shall be 1 inch.

2.02 CONCRETE

A. General Requirements: Concrete shall conform to ACI 301 except as modified herein:

1. Cement shall be Portland Type I or Type II

2. Air-entraining and water reducing admixtures shall be permitted. No other admixtures shall be used in the concrete mix unless approved by the engineer.

3. Concrete in direct contact with prestressed reinforcement shall not contain water-soluble chloride ions in excess of 0.06 % by weight of cement.

B. Pipe Encasement: Concrete used for pipe encasement shall have minimum 28-day strength of 3500 psi. The course and fine aggregate shall meet the requirements of ASTM C33.

C. Floor and Footing: Concrete used for the floor and footing shall have a minimum 28-day compressive strength of 3500 psi and shall have the following properties:

1. Air Content: 0%

2. Maximum Water-Cementitious Material Ratio: 0.42

3. Fine and Course Aggregate: Meeting requirements of ASTM C33

4. Fibers: Concrete for floor and footing construction shall contain polypropylene fibrillated fibers, (Grace Fibers™ or equal) or polypropylene monofilament fibers (Grace MicroFiber™ or equal), at a minimum addition rate of 1.0 lb. per cubic yard.

D. Core Wall: Concrete used for precast wall panels shall have a minimum 28-day compressive strength of 4000 psi at 28 days with the following properties:

1. Air Content: 4½% +/- 1½%

2. Maximum Water-Cementitious Material Ratio: 0.42

3. Fine and Course Aggregate: Meeting requirements of ASTM C33

E. Dome: Concrete used for precast wall panels shall have a minimum 28-day compressive strength of 4000 psi with the following properties:

1. Air Content: 4½% +/- 1½%

2. Maximum Water-Cementitious Material Ratio: 0.42

3. Fine and Course Aggregate: Meeting requirements of ASTM C33

2.03 SHOTCRETE

A. General Requirements: Shotcrete shall be wet mix or dry mix conforming to ACI Standard 506 except as modified herein.

1. Cement shall be Portland Type I or Type II.

2. Shotcrete in direct contact with prestressed reinforcement shall not contain water-soluble chloride ions in excess of 0.06 % by weight of cementitious material.

B. Wire Coat: Shotcrete used for the wire coat shall have a minimum compressive strength equal to that for which the core wall is design but not less than of 4500 psi at 28 days with the following properties:

1. Shotcrete covering the prestressing wire shall consist of not more than three parts sand to one part cementitious material by weight. Additional coats of shotcrete shall consist of not more than four parts sand to one-part cementitious material by weight.

2. Air Content: Entrained air may be used in wet mix shotcrete to facilitate placement in the amount of 6% +/- 1½%

C. Cover coat: Shotcrete used for the cover coat shall have a minimum 28-day compressive strength of 4500 psi at 28 days with the following properties:

1. The shotcrete cover coat shall consist of not more than four parts sand to one part cementitious material by weight.

2. Air Content: Entrained air may be used in wet mix shotcrete to facilitate placement in the amount of 6% +/- 1½%

3. Maximum Water-Cementitious Material Ratio: 0.42

2.04 NON-PRESTRESSED REINFORCEMENT

A. Non-prestressed deformed bar reinforcement shall conform to the requirements of ACI 350, Grade 60 steel meeting the requirements of ASTM A615.

B. Non-prestressed welded wire reinforcement shall be plain and shall conform to the requirements of ASTM A185.

C. Strand for seismic cables shall be galvanized and shall conform to the requirements of ASTM A416 prior to galvanizing.

D. Protect reinforcing steel and wire fabric from damage and from dirt, oil, grease, other foreign matter, and rust-causing conditions.

2.05 PRESTRESSED REINFORCEMENT

A. Prestressed reinforcement shall conform to the requirements of ASTM A821.

B. The diameter of prestressed reinforcement may be 0.162” or 0.192”.

C. Splices for prestressed reinforcement shall be ferrous material compatible with the reinforcement and shall develop the full ultimate strength of the wire.

2.06 STEEL DIAPHRAGM

A. The steel shell diaphragm shall conform to ASTM A1008 and shall be a minimum thickness of 0.017 “ (26 gauge).

B. The steel diaphragm shall be vertically ribbed with adjacent and opposing channels. The base of the channels shall be wider than the throat with reentrant angles which provide a mechanical lock to the inner and outer concrete or shotcrete.

2.07 BASE RESTRAINT CABLES

A. Base restraint cables shall be galvanized, meeting the requirements of ASTM A416 for grade 250 or 270 before galvanizing and ASTM A475 after galvanizing.

2.08 ELASTOMERIC MATERIALS

A. Bearing Pad: Bearing pads shall be neoprene or natural rubber meeting the following requirements:

1. Neoprene Bearing Pads shall be 40 or 50 durometer hardness with a minimum ultimate tensile strength of 1500 psi, a minimum elongation of 500% and a maximum compressive set of 50% complying with ASTM D2000 Line Call Out M2BC410 A14 B14 or M2BC510 A14 B14.

2. Natural Rubber Bearing Pads shall comply with D2000 Line Call Out M4AA414 A13 or M4AA514 A13.

B. PVC Waterstop: Waterstops shall be composed of polyvinylchloride (PVC) meeting the requirements of CRD-C-572. Splices shall be made in accordance with the manufacture’s recommendations. Waterstop shall be manufactured by Sika-Greenstreak or equal.

C. Polysulfide Sealants: Polysulfide sealants used to seal diaphragm joints between precast wall panels shall be a two-component elastomeric compound meeting the requirements of ASTM C920, type M and must have permanent characteristics of bonding to metal surfaces, flexibility, and resistance to extrusion due to hydrostatic pressure. Air-cured sealants shall not be used.

D. Epoxy Sealants: Epoxy sealants shall be a two component, 100% solids, moisture insensitive material meeting the requirements of ASTM C 881, Type III, Grade 1.

E. Sponge Filler: Sponge filler shall be closed-cell neoprene or rubber conforming to ASTM D1056, Type 2, Class A and Grade 1. Compression deflection limited to 25% at 2 to 5 psi.

F. Epoxy Adhesives: Epoxy adhesives shall be 100% solids, moisture insensitive, two component systems conforming to ASTM C 881, Type II, Grade 2

2.09 DECORATIVE COATING

A. A decorative coating shall be applied to all exterior above grade surfaces. The exterior coating shall be an elastomeric system specifically developed for application on concrete surfaces. Acceptable products are as follows:

1. Loxon XP, The Sherwin Williams Company, Cleveland, Ohio

2. Series 156 Enviro-Crete, Tnemec Inc., Kansas City, Missouri

3. AC 403S-Smooth, Induron Protective Coatings, Birmingham, Alabama

4. Tammscoat Smooth, Euclid Chemical Company, Cleveland, Ohio

2.10 ACCESSORIES

A. The tank construction company shall provide and install all appurtenances as shown on the drawings. Appurtenances shall include the following:

1. Influent/Effluent Piping: Influent and effluent piping shall be cement lined ductile iron. Pipe brackets fabricated from 304SS or concrete encasement of the pipe shall be included in sufficient number to secure pipe to the tank wall as required.

2. Overflow Piping: Overflow piping shall be cement lined ductile iron. Pipe brackets fabricated from 304SS or concrete encasement of the pipe shall be included in sufficient number to secure pipe to the tank wall as required.

3. Wall Manhole: The tank shall have a minimum of one manhole for access to the interior of the tank. The manhole shall be fabricated using 304SS and shall have a minimum 31” outside diameter and a minimum clear opening of 24”.

4. Roof Vent: The roof vent shall be manufactured from fiberglass or aluminum with 316SS fasteners and shall be sized to comply with the venting requirements of Article 1.04.E. The vent shall be screened with 24 x 24 mesh insect screen.

5. Interior Ladder: The interior ladder shall be fabricated from fiberglass or aluminum with 316SS fasteners and a safety climbing device conforming to applicable OSHA standards.

6. Exterior Ladder: The exterior ladder shall be fabricated from 6061-T6 aluminum with gate, and a safety climbing device conforming to applicable OSHA standards. Ladder shall be equipped with anti-climb security measures.

7. Roof Hatch: The roof hatch shall be fabricated from 6061-T6 aluminum, or fiberglass, with a minimum opening of 3'-6" x 3'-6". Roof hatch must meet requirements set forth in IAC Title 35, Section 604.

8. Handrail: The handrail shall encircle the roof hatch and shall be manufactured from 6061-T6 aluminum with 316SS fasteners and a 316SS chain gate at each access point. The handrail shall include an access point for the exterior ladder and the dome.

9. Dome Sleeves: Dome sleeves shall be formed and cast monolithic with the dome. Dome penetrations shall be fabricated of 304SS or PVC with flanged end and blind flange.

PART 3 EXECUTION

3.01 SAFETY

A. Tank contractor shall conform to all Local & Federal Safety rules & regulations.

B. Tank contractor shall have a detailed, written safety program specific to the construction of wire-wound prestressed concrete tanks.

C. During the prestressing operations, extreme caution shall be taken to ensure the safety of the prestressing crew and others working on the construction site. During prestressing operations, a distance of 100' exterior of the tank walls shall remain clear of personnel. Only personnel actively assisting with the prestressing operation shall be permitted within this area.

3.02 SITE PREPARATION

~~A. Clearing and Grubbing: All trees, shrubs and other vegetation in the tank area and temporary work areas designated for construction shall be removed as follows:~~

~~1. All trees and vegetation will be disposed of offsite in an approved landfill.~~

~~2. All approved topsoil deemed suitable by the Engineer for finished grading may be stockpiled on the site as directed by the Engineer~~

B. Excavation:

1. The site shall be excavated to an elevation and width as necessary to provide adequate work room for tank construction. A minimum radius 12' larger than the radius of the foundation at the subgrade elevation shall be provided.

2. The tank site shall be dewatered when required. The dewatering method shall prevent disturbance of the foundations soils.

C. Subgrade Preparation

1. Subgrade material which is disturbed or over excavated during the preparation of the site or loose foundation material shall be removed and replaced with compacted select fill.

2. After the excavation is complete, the site shall be proof rolled in the presence of the Owner's geotechnical professional prior to placement of any compacted select fill to determine the suitability of the subgrade for the tank foundation. Select fill shall consist of a clean, well graded angular or subangular material as directed by the Owner's geotechnical professional.

D. Granular Subbase

1. A minimum 6-inch thick layer of a granular leveling base shall be placed beneath the tank foundation prior to construction of the tank floor. The leveling base material shall be a clean, densely-graded crushed stone material with a balanced fine content to produce an easily constructed, low friction surface meeting the requirements of ASTM C33 with 100% of the material passing the 1" US Sieve size and not more than 8% passing the #200 Sieve size.

2. The leveling base material shall be fine graded to produce a subgrade elevation that is within a tolerance of +0", - ½" over the entire tank subgrade.

3. Compaction shall be by capable vibratory roller with a minimum of two passes in each direction.

4. Prior to construction of the floor, a 6-mil polyethylene vapor barrier shall be placed over the granular subbase. Edges of the polyethylene shall be overlapped a minimum 6 inches.

3.03 INSTALLATION

A. Concrete: All concrete shall be placed and cured as required to meet applicable ACI standards and the following requirements:

1. Curing shall be by membrane-forming curing compound, by covering exposed surfaces with polyethylene sheets, or by water curing.

2. Environmental Requirements: The following shall be required when placing concrete:

a. Cold Weather: Concrete shall not be placed without special protection when the ambient temperature drops below 35 degrees Fahrenheit and the concrete is likely to be subjected to freezing temperatures before the initial set has occurred and the concrete strength has reached 500 psi. Concrete shall be protected in accordance with ACI 306R. The temperature of the concrete shall be maintained in accordance with the requirements of ACI 301 and ACI 306R.

b. Hot Weather: In periods of high ambient temperature, low relative humidity, and high wind, concrete shall be placed in accordance with the requirements of ACI 305R.

B. Shotcrete: All shotcrete shall be placed and cured as required to meet applicable ACI standards and the following requirements:

1. Shotcrete Placement: Shotcrete shall be placed in accordance with the requirements of ACI 506.

2. Placement of shotcrete may start without special protection when the ambient temperature is 35□F and rising, but shall be suspended when the ambient temperature is 40□F and falling. Special protection for cold weather shotcreting shall be in accordance with the requirements of ACI 306R.

3. Hot-weather shotcreting shall be in accordance with the requirements of ACI 305R. Shotcrete shall not be placed when shotcrete temperature exceeds 95□F.

4. Each layer of circumferential prestressing shall be protected by a shotcrete wire coat of a thickness not less than ¼". Each prestressing wire shall be individually encased in shotcrete. The outer wire layer shall be protected by the wire coat plus two or more additional coats of shotcrete, totaling at least 1 inch in thickness over the outer layer of wire.

5. Dust, efflorescence, oil and other foreign material shall be removed from surfaces to be shotcreted. The nozzle distance from the prestressing wires shall be such that shotcrete does not build up or cover the front face of the wire until the spaces between the prestressing elements are filled.

6. Vertical shooting wires shall be installed under tension and spaced no more than 3 feet apart to maintain a uniform and correct coating thickness. Wires of 18 or 20 gauge high tensile steel or monofilament shall be used.

7. All exposed shotcrete coatings shall be kept moist for at least three days. Moist curing shall be started as soon as possible without damaging the shotcrete. Curing shall be by fog spraying or sprinkling. Curing may be interrupted for subsequent application of prestressing and concreting. After completion of the final coat, wet cure for seven days.

8. Exterior shotcrete shall have a natural gun/nozzle finish.

C. Floor: The floor and footings shall be cast monolithically, where practicable without cold joints to the dimensions shown on the construction drawings and shall incorporate the following:

1. Concrete floors or floor sections shall be cast monolithically with no cold joints.

2. The floor shall be vibratory screeded to effect consolidation of the concrete and ensure proper encasement of the reinforcement.

3. The floor shall be cured by fogging during the placement of concrete. The floor shall be wet cured for a minimum of seven days, and then continue to be kept moist during the duration of the construction. An NSF-61 approved membrane forming curing compound may be used in conjunction with water.

4. The floor slab shall receive a fresno finish.

D. Waterstop: A PVC Waterstop shall be embedded in the concrete at the floor to wall joint and provide a water tight seal. The waterstop shall meet the requirements of Article 2.07.B and shall meet the following criteria:

1. The vertical waterstop shall be placed and supported so that the bottom of the center bulb is at the elevation of the top of the footing. The vertical tolerance of the waterstop shall be less than +/- ¼”. The radial tolerance of the waterstop shall be less than +/- ½”.

2. The waterstop shall be supported in a secure manner that ensures proper positioning and consolidation of concrete around the waterstop and prevents displacement during concrete casting.

3. The waterstop shall be secured using pre-manufactured holes or rings supplied by the manufacturer and shall not be punctured in the field.

4. The waterstop shall be spliced using a thermostatically controlled splicing iron. Each splice shall be electronically spark tested prior to concrete encasement and any defects shall be repaired prior to installation.

E. Precast Core Wall: The tank wall shall incorporate a steel diaphragm which meets the requirements of Article 2.05 and shall meet the following criteria:

1. The core wall shall be constructed of precast panels and vertical joints filled with shotcrete, mortar, or cast-in-place concrete.

2. A continuous watertight steel diaphragm shall be provided throughout and within the tank wall, and shall be located between the stored tank contents and the prestressing wires. The steel diaphragm shall be full length without horizontal joints. Vertical diaphragm joints shall be mechanically seamed except where located between wall panels, in which case joints shall be sealed with polysulfide or other suitable sealant. All vertical diaphragm joints shall be sealed to be fully watertight. Piercing of the diaphragm shall not be permitted except by design.

3. The steel diaphragm shall be protected from damage before, during and after placement. Holes for form ties, nails, or punctures will not be permitted unless they are predetermined due to penetrations.

4. The tolerance requirements for the construction of the tank wall shall be as follows:

   a. Tank Radius: The maximum out-of-round tolerance of the wall shall be +/- ½ inch per 100-feet diameter.

   b. Wall Thickness: The core wall thickness should not vary more than + ½” or – 0” from the specified thickness.

5. After each precast panel has firmed sufficiently, it shall be covered with polyethylene sheet for curing.

6. The interior of precast wall panels shall be given a fine broom finish.

7. The precast panels shall be erected around the circumference of the tank and aligned to proper tolerances.

8. Bearing pads shall be located and held in their proper position prior to erection of wall panels. Nailing of pads shall not be permitted.

9. Sponge filler pads shall be properly secured. All voids around sponge which will be beneath the wall base curb shall be caulked with an approved nontoxic sealant to prevent mortar seepage.

10. The steel diaphragm shall be covered with a minimum of ½" of shotcrete prior to prestressing.

F. Dome Roof: The dome shall be cast to the dimensions shown on the construction drawings and shall incorporate the following:

1. The dome shall be cast-in-place concrete constructed to proper spherical curvature. Circumferential and radial construction joints, if required, shall be configured with a vertical joint above the reinforcement while that point below the reinforcing steel shall be sloped at approximately 45 degrees. Joints that become cold due to concrete hardening shall be cleaned and coated with a thixotropic fresh cement grout prior to placement off the adjacent fresh concrete.

2. Dome forms shall be designed to resist all forces acting with respect to its sloped surface. No portion of formwork for domes shall be removed until the concrete has attained sufficient strength, and until the full circumferential prestressing force has been applied to the dome ring, unless otherwise directed by the Tank Design Professional.

3. The dome reinforcement shall be supported using non-corrosive bolsters spaced at a maximum of 36" center to center.

4. The average radius of curvature of any dome surface imperfection should not exceed 1.4 times the radius of the dome.

5. The dome form shall be left in place a minimum of 7 days or until a sufficient amount of prestressing force has been applied to the dome ring to support anticipated dome dead and live loads, whichever is greater.

6. The exterior surface of the dome shall receive a fine broom finish. The dome soffit shall be a form finish.

7. The exterior dome surface shall receive a coat of membrane-forming curing compound immediately after completion of the final finishing operation.

G. Prestressing: Circumferential prestressing of the tank shall be achieved by the application of prestressing wire meeting the requirements of Article 2.04 as follows:

1. Circumferential prestressing shall be accomplished by the application of high tensile steel wire. An essential feature of the wire-wound stressing system is the proper application of tension to the prestressing element before it is placed on the wall. Stressing may be performed by die-drawing or another process that results in continuous, uninterrupted elongation of the wire, thereby assuring a uniform stress throughout its length.

2. The stressing system shall be capable of consistently producing a stress at any point around the wall, within a +/- 7 percent tolerance of the specified initial stress, f□si. A calibrated stress-measuring device which can be easily recalibrated shall be used to determine wire stress levels frequently throughout the wrapping process. At least one stress reading for every coil or foot of wall height shall be taken immediately after application on the wall, and all such readings shall be on straight lengths of wire. A written record of stress readings shall be maintained.

3. If the measured wire stress falls below design f□si, additional prestress wire shall be applied. If the applied stress in the wire exceeds 1.07 f□si, the wrapping operation shall be discontinued immediately upon discovery and satisfactory adjustment made to the stressing equipment before resuming. The total prestress force measured on the wall per vertical foot of height shall not be less than the design force, nor more than 5 percent greater.

4. Each coil of prestressing wire shall be temporarily anchored. Ends of the individual coils shall be joined by suitable steel splicing devices capable of developing the full strength of the wire.

5. The wire winding schedule shall be prepared for minimum spacing between the prestressing elements of 3/8 inch, and the average minimum clear space between wires on the wall shall be 5/16 inch or 1.5 wire diameters, whichever is greater. Wires in areas adjacent to openings or inserts shall be uniformly spaced in accordance with the above.

6. A properly designed stress plate shall be used at all permanent wall penetrations that are located above the final backfill elevation and are greater than 24 inches in height. The stress plate shall accommodate a portion of the prestressing wires normally required over the height of the penetration. The remaining prestressing wires normally required shall be relocated into circumferential bands immediately above and below the

penetration. The effect of banded prestressing shall be taken into account in the design.

H. Wire Coat and Cover Coat:

1. Subsequent layers of circumferential prestressing and shotcrete shall proceed when the underlying layer has developed sufficient bond and compressive strength.

2. Visible cover coat surfaces shall be uniform and even textured. Finishing techniques shall be used includes a natural gun or nozzle finish.

3. After completion, the cover coat shall be moist cured by wrapping the tank with a polyethylene film or other means conforming to the requirements of ACI 308R.

I. Coating Applications:

1. Clean all concrete surfaces to be coated to remove dust, laitance, efflorescence or other foreign matter.

2. Repair any surface defects prior to the application of coatings with materials which are compatible with the coating. Repair materials shall provide a consistent finish with the exterior finish of the tank surfaces and shall be applied in accordance with the recommendations of the manufacturer.

3. Apply coatings in accordance with the recommendations of the manufacturer.

3.04 QUALITY CONTROL:

A. Testing: All concrete and shotcrete used in the construction of the tank shall be tested in accordance with the following requirements by an independent testing laboratory at the tank construction company's expense:

1. Concrete: Concrete shall be tested in accordance with ASTM C31 and C39 by an independent testing laboratory. A minimum of one sample for each 50 cubic yards shall be taken as follows:

a. Concrete Cylinders: A minimum of two sets of four cylinders for 6 x 12 cylinders or three sets of four cylinders for 4 x 8 cylinders. Test one cylinder at 7 days and 28 days and hold two

b. Slump and Air: Slump and air content shall be tested once for each 50 cubic yards of material placed.

2. Shotcrete: Shotcrete shall be tested in accordance with the requirements of ACI 506 as follows:

   a. Panels: One panel shall be constructed and tested in accordance with the requirements of ACI 506 for the wire coat and the cover coat. The panel should be stored on the site and cured in the same manner as the shotcrete. The panels shall be cored or sawn to obtain 3 in. diameter cores or 3 in. cubes. Three cores or cubes should be tested at 7 days, three shall be tested at 28 days and three shall be held as spares.

B. Quality Program: The tank contractor shall employ, within its normal construction practices, a first-time quality control program which includes but is not limited to:

1. Written quality control program.

2. Inspection checklists which ensure the quality of construction practices, materials, and equipment.

3. Detailed inspection reports with critical hold points

4. Detailed procedures for the control of any identified deficiencies during construction.

5. Retention of quality control measures through a cloud-based database.

3.05 CLEANUP

A. Tank Interior:

1. Remove all construction debris and thoroughly clean interior floor and wall surfaces, and piping, using a low-pressure wash.

B. Exterior Site:

1. Remove and dispose of all construction debris, materials and equipment prior to leaving site. Dispose of all construction waste in an approved landfill.

3.06 DISINFECTION

A. Disinfection shall be performed using Method 3 in accordance with AWWA C652 and shall meet the requirements of local and state agencies.

B. A bacteriological test shall be performed prior to placing the tank into service.

3.07 WATERTIGHTNESS TESTING

A. Upon completion of the tank, it shall be filled to overflowing with water furnished to the tank by the ~~Owner~~. **Contractor for Contract 1, the Contractor for Contract 3 shall coordinate with the Contractor for Contract 1 for water delivery.** The tank shall remain filled for a period of at least 24 hours to allow for absorption and initial settlement.

B. Measure the drop in liquid level over the next 72 hours. The net drop in liquid level shall not exceed the maximum allowable of 0.05 of 1 percent per 24-hour period.

C. If the net drop in liquid level exceeds the maximum allowable, the liquid level test shall be extended to a total of 5 days. If at the end of 5 days, the average net drop in liquid level does not exceed the maximum allowable, the test shall be considered satisfactory. If the net liquid loss exceeds the maximum allowable, the test shall be considered unsuccessful, the source of leakage shall be corrected, and the tank shall be retested.

D. Damp spots on the exterior wall surface shall not be permitted. Damp spots are defined as spots where moisture can be picked up on a dry hand. The source of water movement through the wall shall be located and permanently sealed in an acceptable manner. No leakage that includes visible flow through the wall-floor joint shall be permitted. Damp spots on the footing are permissible.

E. Water for the initial watertightness test shall be furnished to the tank by the Owner. Water for any subsequent tests which are required will be at the expense of the tank contractor.

3.08 TANK BACKFILL

A. Backfill material around the tank shall be placed in uniform layers and compacted as specified for the material and site conditions. Asymmetrical backfill placement, except as may be required by the design and site conditions, shall be avoided.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the contract unit price for ALTERNATE ~~1A~~ **3A**, PRESTRESSED CONCRETE 1MG GST related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 33 16 36

PART 1 GENERAL

1.01 SUMMARY

A. Section includes manual and electric actuators for process valves and gates, complete with motors, gearing, controls, accessories, and appurtenances, in accordance with the Contract Documents.

B. Work includes actuators for gate, butterfly, plug, ball, globe valves, and slide/sluice gates as indicated on the Drawings.

C. Unit Responsibility: The valve or gate manufacturer shall be responsible for coordination of actuator sizing, mounting, assembly, and factory testing. The Contractor shall be responsible for complete compliance with the Contract Documents.

D. Single Manufacturer: Where two or more actuators of the same type or size are required, they shall be produced by the same manufacturer.

E. Basis of Design: Electric actuators shall be as manufactured by AUMA Actuators, Inc., Pittsburgh, Pennsylvania.

1.02 RELATED SECTIONS

A. Section 40 05 64 – Valves for Process Control.

B. Section 09 96 00 – High-Performance Coatings.

C. Section 01 33 00 – Submittals.

D. Section 01 43 33 – Manufacturer’s Field Services.

1.03 REFERENCES

A. American Water Works Association (AWWA):

1. AWWA C540 – Power-Actuating Devices for Valves and Slide Gates.

2. C504 – Rubber-Seated Butterfly Valves.

3. AWWA C509 – Resilient-Seated Gate Valves for Water Supply Service.

B. National Electrical Manufacturers Association (NEMA) MG Standards.

1.04 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

B. Product Data:

1. Manufacturer, model number, and size.

2. Motor data including voltage, phase, frequency, insulation class, torque, and enclosure.

3. Gear ratios and output torque ratings.

4. Limit and torque switch data.

5. Electrical schematics and wiring diagrams.

6. Mounting details and dimensional drawings.

C. Calculations:

1. Actuator sizing calculations including seating, unseating, and dynamic torque.

2. For modulating actuators, verification that required dynamic torque does not exceed 60 percent of rated breakaway torque.

D. Operation and Maintenance Manuals.

1.05 QUALITY ASSURANCE

A. Actuators shall conform to AWWA C540 unless otherwise specified.

B. Electric actuators shall be specifically designed for valve and gate service in water and wastewater treatment facilities.

C. Manufacturers shall have a minimum of five (5) years documented experience manufacturing actuators for similar applications.

D. Field Services: Provide services of manufacturer’s authorized representative for inspection, adjustment, startup, and training.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver actuators fully assembled and tagged for identification.

B. Store in a clean, dry location protected from weather and construction damage.

C. Protect machined surfaces, wiring compartments, and flange faces from corrosion and contamination.

D. Handle actuators in accordance with manufacturer's written recommendations.

1.07 GUARANTEE

A. Provide manufacturer's standard warranty, minimum one (1) year from date of Substantial Completion.

B. Warranty shall cover defects in materials and workmanship under normal service conditions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Actuators shall be complete assemblies including motor, gearing, manual override, limit switches, torque switches, drive coupling, integral motor controls (where specified), wiring terminals, and position indication devices.

B. Actuators shall have torque ratings equal to or greater than required for valve seating and dynamic conditions and shall be capable of holding any intermediate position without creeping or fluttering.

C. Fasteners external to the actuator housing shall be stainless steel. Fasteners on limit switch and terminal compartments shall be captured to prevent loss.

D. Actuator enclosures shall be NEMA 4 watertight unless otherwise indicated.

2.02 MANUAL ACTUATORS

A. General

1. Manual gear operators shall be furnished where indicated for gate, butterfly, plug, and ball valves.

2. Gearboxes shall be the product of the valve manufacturer unless otherwise approved.

3. Manual actuators shall comply with applicable provisions of AWWA C504 and AWWA C509.

B. Gear Requirements

1. Gearing shall be enclosed, grease lubricated, and designed to withstand full rated valve torque.

2. Gear units shall have non-rising stems where applicable.

C. Rim Pull

1. Butterfly valve gear operators shall be sized to meet AWWA C504 rim pull requirements without exceeding 60-pound rim pull.

2. Maximum handwheel diameters:

3. 12 inches or less: 12-inch handwheel.

4. 14 inches and larger: 18-inch handwheel.

D. Position Indication

1. Provide mechanical dial or pointer-type position indicators.

2. “OPEN” direction shall be permanently marked on actuator or handwheel.

2.03 ELECTRIC MOTOR ACTUATORS

A. General

1. Electric actuators shall comply with AWWA C540 and be specifically designed for water and wastewater service.

2. Basis of Design: AUMA Actuators, Inc., Pittsburgh, Pennsylvania.

3. Actuators shall be furnished and sized by the valve or gate manufacturer for required seating, unseating, and dynamic torque conditions.

4. Actuators shall be complete with motor, reduction gearing, torque and limit switches, manual override, drive coupling, integral controls (where specified), position indication, and mounting hardware.

5. Actuators shall be capable of holding any intermediate position without creeping or fluttering.

6. Enclosure shall be NEMA 4, watertight. External fasteners shall be stainless steel.

B. Motor

1. Induction type, totally enclosed non-ventilated (TENV).

2. Class F insulation with embedded thermal protection.

3. Voltage requirements:

   a. 460V, 3-phase, 60 Hz for gate valves and sluice gates.

   b. 460V, 3-phase, 60 Hz for quarter-turn valves over 16 inches.

   c. 120V, single-phase, 60 Hz for quarter-turn valves 16 inches and smaller.

4. Motors shall operate satisfactorily within ±10 percent of rated voltage.

5. Ambient temperature rating:

   a. -20°F to +175°F without integral controls.

   b. -20°F to +160°F with integral controls.

C. Gearing

1. Spur, helical, bevel, or worm type; grease lubricated in sealed housing.

2. Worm gears shall be bronze; helical gears hardened alloy steel.

3. Gearing shall withstand full motor stall torque.

4. Anti-friction bearings throughout.

5. Modulating actuators shall have zero backlash between motor and output.

D. Manual Override

1. Handwheel operated through power gearing.

2. Manual operation shall not rotate motor; electric operation shall not rotate handwheel.

3. Automatic return to electric mode upon motor start.

4. Manual operation shall be possible with failed motor.

E. Switches and Protection

1. Limit switches at each end of travel; adjustable without affecting manual operation.

2. One normally open and one normally closed contact at each end of travel where indicated.

3. Contacts shall be silver and suitable for low-voltage control circuits.

4. Mechanically operated torque switches at each end of travel, calibrated in engineering units.

5. Torque accuracy ±5 percent.

6. Motor shall de-energize upon torque trip.

7. Provide jam protection and anti-nuisance torque feature.

F. Open/Close Service Actuators

1. Integral controls shall include reversing starter, control transformer, phase monitor, and monitor relay.

2. Provide Open–Stop–Close pushbuttons and Local–Off–Remote selector switch.

3. Provide red and green position indicator lights.

4. Provide optical isolation between external control signals and internal circuitry.

5. Provide padlockable local disconnect switch.

6. -turn actuators: 60-second closing time unless noted otherwise.

7. Gate and sluice gate actuators: 12 inches per minute operating speed unless noted otherwise.

G. Modulating Service Actuators

1. Actuator shall be sized so required dynamic torque does not exceed 60 percent of rated breakaway torque.

2. Provide integral positioner accepting 4–20 mADC signal.

3. Provide internal feedback potentiometer.

4. Positioner shall compare command signal to valve position and modulate accordingly.

5. Fail position on signal loss shall be field adjustable to fail open, fail closed, or fail last position.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install actuators in accordance with manufacturer’s written instructions.

B. Mount actuators securely with manufacturer-supplied brackets and hardware.

C. Locate actuators for safe access and maintenance; do not mount to handrails, piping, or equipment supports.

D. Install floor boxes, extension stems, guides, and supports as required.

3.02 FIELD QUALITY CONTROL

A. Manufacturer’s authorized representative shall:

1. Inspect installation.

2. Adjust limit and torque switches.

3. Witness startup and operational testing.

4. Certify proper operation.

B. Demonstrate correct operation including open, close, stop, local, and remote functions.

3.03 FIELD PAINTING

A. Exposed actuators shall receive coatings in accordance with Section 09 96 00.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item in CONTRACT 1 for PROVIDE AND INSTALL ALL PROCESS PIPING, VALVES, FITTINGS AND RELATED APPURTANANCES and VALVE, MECHANICAL JOINT, 12" and VALVE, MECHANICAL JOINT, 16" and VALVE, MECHANICAL JOINT, 18" related to plans titled W2E WATER TREATMENT PLANT.

4.02 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item in CONTRACT ~~3~~ **5** for RAW WATER MAIN CONSTRUCTION related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 40 05 57

PART 1 GENERAL

1.01 SUMMARY

A. This section consists of the requirements for valves with manual actuation, valves with automatic actuation, excluding solenoid control, and actuator brackets and mounting hardware.

B. Like items of equipment provided hereunder, although for different services, shall be the end products of one manufacturer (ie. Butterfly; plug; gate; etc.) in order to achieve standardization for appearance, operation, maintenance, spare parts and manufacturer's service, unless specifically specified otherwise.

1.02 RELATED SECTIONS

A. See Conditions of the Contract and Division 1 – General Requirements, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

B. See Division 9, Section 09 96 00 – High-Performance Coatings that contains surface preparation and painting requirements.

1.03 REFERENCES

A. American Water Works Association (AWWA).

1. AWWA C509: ANSI/AWWA C509-01, AWWA Standard for Resilient-Seated Gate Valves for Water Supply Service

2. AWWA C517: Resilient-Seated, Cast-Iron Eccentric Plug Valves

3. AWWA C550: ANSI/AWWA C550-05, AWWA Standard Protective Interior Coatings for Valves and Hydrants.

4. AWWA C600: ANSI/AWWA C600-93, AWWA Standard for Installation of Ductile-Iron Water Mains and their Appurtenance

B. Manufacturers Standardization society of the valve and Fittings Industry (MSS).

1. MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

1.04 SUBMITTALS

A. Submittals shall be made in accordance with Section 01 33 00 – Submittal Procedures, Division 1 – General Requirements.

B. The manufacturer shall furnish certified shop drawings, installation, operation and maintenance manuals, in accordance with the latest revision of AWWA C500 through C540 as applicable.

C. Submit copies of the ordering schedule before ordering valves. The schedule shall include make, model, type, size, pressure rating and location.

D. An affidavit of compliance in accordance with the latest revision of AWWA C500 through 540 as applicable, and certification of performance testing of each valve shall be furnished to the Engineer.

E. The shop drawings shall include:

1. Custom drawings showing how each valve operator is to be connected electrically (where applicable) in accordance with the schematics on the drawings.

2. Valve torques used to size the operator.

3. Valve operator orientation and dimensions and clearances (to adjacent surfaces within three feet) for each valve.

4. Materials of construction.

5. For manual actuators, provide force requirements for hand wheels, cranks, etc.

6. Valve seating/unseating torque, maximum required torque, valve stem diameter at actuator mounting, and maximum allowable torque.

7. Full open Cv values.

8. Quality control procedures and system documents.

9. Certification that the manufacturer has been engaged in the design, and manufacture or the specified valves for a minimum of ten (10) years.

1.05 MANUFACTURER'S SERVICE

A. A factory manufacturer's representative for the equipment specified herein shall be present at the jobsite designated by the Owner for a period of time if specified in Division 1, Section 01 43 33 – Manufacturer's Field Services.

1.06 GUARANTEE

A. The manufacturer/Contractor shall warrant the equipment to be free of material or workmanship defects for a period of two (2) years from the date of substantial completion established by the Owner.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide adjustable cast iron valve boxes and lids marked “Water” for all buried potable water valves.

2.02 NON-AWWA BALL VALVES (3-inch and smaller)

A. Ball valves 3-inch and smaller shall be of two-piece construction, with standard port diameter, and FNPT end connections.

B. Manufacturers and Model/Style/Series:

1. Milwaukee BA-150C

2. Engineer approved equal

C. All non-AWWA ball valves shall be furnished in accordance with MSS-SP-110 and with the performance features as follows:

1. Body Construction – Bronze.

2. Actuator – The valve shall be designed to permit installation of a steel zinc plated vinyl covered lever actuator.

3. Valve Ball – Bronze with hard chrome plating.

4. Valve Rating – Valves shall be rated for 600 PSI WOG cold service.

5. Ball Seats – Reinforced TFE.

6. Stem Packing – Valves shall be furnished with a stuffing-box and adjustable packing gland.

D. All non-AWWA ball valves shall provide minimum Cv values as follows:

VALVE PIPE SIZE	Cv	VALVE PIPE SIZE	Cv
½”	9.8	1 ½”	81
¾”	25	2”	105
1”	35	2 ½”	440
1 ¼”	47	3”	390

2.03 AWWA BALL VALVES (6-INCH THROUGH 48-INCH)

A. Ball valves shall be metal-to-metal seated, trunnion mounted, with 100% circular port opening and shall conform to ANSI/AWWA C507 (latest revision).

B. Valve body shall be cast iron meeting ASTM A48 Class 35 (150 lb class).

C. Flanges shall conform to ANSI B16.1 Class 125. Body shall include integrally cast bronze bushed trunnions and support actuator without external supports.

D. Ball shall be one-piece cast iron or ductile iron with full port opening equal to valve size. Seats shall be Type 304 stainless steel. Trunnions shall be bronze or stainless steel bushed. Maximum seat bearing pressure: 1,000 psi.

E. Bearings shall be sleeve type, bronze (low zinc) or stainless steel, designed for maximum 2,000 psi bearing pressure.

F. Operating shaft shall be integral with trunnion and constructed of ASTM A564 17-4 stainless steel, machined to 32 micro-inch finish or better.

G. Manufacturers:

1. GA Industries – Series 507

2. Apco Willamette – Series 2600

3. Engineer approved equal

2.04 PLUG VALVES

A. Valves shall be of the non-lubricated eccentric type with an elastomer covering all seating surfaces. The elastomer shall be suitable for the service intended. Flanged valves shall be manufactured in accordance with ANSI B16.1 Class 125/150 including facing, drilling and flange thickness. Mechanical joint ends shall be in compliance with AWWA / ANSI C-111- 92. Grooved ends shall be manufactured to the dimensions of ANSI / AWWA C606 for ductile or steel pipe as required. Ports shall be round on sizes 2-1/2"-12" and rectangular port design

on valves 14" and larger. All valves shall be capable of being “pigged” with a soft pig when required.

B. Valve bodies shall be of ASTM A-126 Class B cast iron and thickness in accordance with AWWA C-517 Section 4.4.1.4. The interior of the valve bodies shall be covered with a suitable elastomer with a minimum thickness of 1/8". The elastomer shall extend through the valve flow way and onto the flanges to ensure a positive seal.

C. Plugs shall be of ASTM A-536-Grade 65-45-12 for all sizes in compliance with AWWA C-517 Section 4.3.3.2. The plugs shall be of one piece solid construction with PTFE thrust bearings on the upper and lower bearing journals to reduce torque and prevent dirt and grit from entering the bearing and seal area.

D. Valves shall be furnished with replaceable sleeve type bearings conforming to AWWA C-517, Section 4.3.3.6. Bearings shall be of sintered, oil impregnated type stainless steel. Valve shaft seals shall be of the “U” cup type in accordance with AWWA C-517 Section 4.4.7. Seals shall be self-adjusting and repackable without removing the bonnet from the valve.

E. Worm gear operators shall be of the heavy duty construction with the ductile iron quadrant supported on the top and bottom by oil impregnated bronze bearings. The worm gear and shaft shall be manufactured of hardened steel and run on high efficiency roller bearings. All worm gear operators shall be sized for bi-directional shutoff at the valves design pressure rating.

F. Valves shall be designed and manufactured to shut off bubble tight at 175 psi for valves 2-1/2"-12" and 150 psi for valves 14" and larger. Each valve shall be given a hydrostatic and seat test with the test results being certified when required by the customer. Certified copies of Proof-of-Design test reports shall be furnished as outlined in AWWA C-517 Section 5.2.2 when requested

G. Manufacturers and Model/Style/Series:

1. Mueller Co. (Pratt) – Ballcentric

2. Kennedy – Port Eccentric

3. GA – Series A517

4. Engineer approved equal

2.05 BUTTERFLY VALVES

A. Valves shall conform to AWWA C504, Class 150B and NSF 61. Manufacturer shall have minimum five (5) years experience.

B. Valve bodies:

1. Flanged: ASTM A126 Class B

2. Wafer: ASTM A48 Class 40

3. Flanges per ANSI B16.1 Class 125

C. Seats shall be one-piece molded rubber bonded to valve body. Wafer style seats shall function as flange gaskets.

D. Bearings shall be self-lubricating nonmetallic. Metal-to-metal bearings in flow stream are not allowed.

E. Disc shall be lens-shaped for low headloss:

1. Cast iron with Type 316 stainless steel edge

2. Retained with stainless steel pins

3. No disc stops in flow stream

F. Shaft: Type 304 stainless steel with chevron packing. O-ring/U-cup packing not allowed.

G. Coating:

1. Interior: Asphalt varnish per TT-C-494 and AWWA C504

2. Exterior: Primer compatible with field coating

H. Testing: Hydrostatic and leakage per AWWA C504.

I. Provide proof-of-design test reports upon request.

J. Manual actuators:

1. Traveling nut, self-locking type

2. Max 80 lb input force

3. With mechanical stops

4. Rated for 450 ft-lb input

5. Conform to AWWA C504

K. Manufacturers:

1. Mueller Co. (Pratt)

2. Kennedy

3. Engineer approved equal

2.06 KNIFE GATE VALVES

A. Valves shall be bonnetless wafer type per MSS SP-81, rated 150 psi CWP. Bodies shall be ductile iron or stainless steel (CF8/CF8M). Flanges per ANSI B16.5 Class 150.

B. Gate: 304 stainless steel, designed to resist deflection, with rounded bottom edge.

C. Seat: Replaceable resilient seat (Natural Rubber, EPDM, or Neoprene), bubble-tight shutoff, debris-resistant design with molded steel reinforcement.

D. Packing:

1. Teflon-lubricated synthetic

2. Minimum four rows

3. Stainless steel hardware

E. Yoke: Ductile iron, flat-top design for actuator mounting.

F. Stem:

1. 304 stainless steel with ACME threads

2. Bronze stem nut

3. Enclosed ductile iron retainer

G. Actuation:

1. Handwheel standard

2. Bevel gears for ≥14-inch or high-pressure service

H. Coating: Heat-cured powder coating on all components.

I. Testing: Per MSS SP-81.

J. Manufacturers:

1. Pratt LVC Fig. 53

2. Engineer approved equal

2.07 AWWA GATE VALVES

A. Gate valves shall be equipped with a buried nut for manual operation as shown on the drawings. Gate valves have corrosion-resistant fasteners and Class 125 flanged end connections. Valves shall be provided with a fusion bonded epoxy coating complying with ANSI/AWWA C550 on all internal and external surfaces of the valve body and bonnet.

B. AWWA Gate valves shall conform to the following:

1. Resilient seat/wedge, NRS type rated for 250 p.s.i.g. cold water working pressure.

2. In full accordance with ANSI/AWWA C515 for 30inch through 36-inch sizes or ANSI/AWWA C509 for 4-inch through 16-inch sizes or in accordance with all applicable provisions of ANSI/AWWA C509 for 18-inch through 24-inch sizes.

3. Fitted with ductile-iron valve body, bonnet and gate.

4. Marked with the words “D.I.” or “Ductile Iron” cast on the valve or stamped on a permanently attached corrosion resistant metal tag.

5. Provided with wedge gate that is encapsulated with rubber, symmetrical, and seals equally well with flow in either direction.

6. Provided with O-ring stem seals.

7. Certified to ANSI/NSF Standard 61 by either underwriters Laboratory or NSF International.

8. Valves shown on the Drawings to be attached to a flanged hydrant shoe, tapping valve, tapping saddle or flanged branch of a tee or cross shall have one flanged end compatible with the mating flange.

9. Valve shall open counterclockwise unless noted otherwise.

C. Manufacturers and Model/Style/Series:

1. Kennedy – Series 4500.

2. Mueller Co. (Pratt) – Series VE.

3. GA – Series 6000

4. Engineer approved equal.

2.08 MOUNTING HARDWARE

A. Mounting hardware shall be 316 stainless steel nuts, bolts and washers unless specifically noted otherwise.

2.09 MOUNTING BRACKETS

A. Mounting brackets may be fabricated from ASTM A36 steel plates, shapes and/or bars. The minimum material thickness shall be ¼-inch.

PART 3 EXECUTION

3.01 SHOP TESTING

A. All valves shall be hydro-tested in accordance with AWWA specifications by the valve manufacturer.

3.02 VALVE AND ACTUATOR ASSEMBLY

A. The valve and actuators shall be completely factory assembled and shipped as a unit. The assemblies shall be packaged and tagged in a manner that will protect the equipment from damage and facilitate the final identification in the field.

3.03 WELDING

A. All shop welding shall be in accordance with AWS D1.1.

B. Welding symbols on shop drawings shall be per AWAS A2.0.

3.04 TESTING

A. All valves shall be hydraulically tested to the pressures shown on the Valve Schedule.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item in CONTRACT 1 for PROVIDE AND INSTALL ALL PROCESS PIPING, VALVES, FITTINGS AND RELATED APPURTANANCES and VALVE, MECHANICAL JOINT, 12" and VALVE, MECHANICAL JOINT, 16" and VALVE, MECHANICAL JOINT, 18" related to plans titled W2E WATER TREATMENT PLANT.

4.02 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item in CONTRACT ~~3~~ **5** for RAW WATER MAIN CONSTRUCTION related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 40 05 64

PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, materials, equipment and incidentals required, and install, place in operation and field test variable frequency drives.

B. The adjustable frequency controller shall be a space vector Pulse-Width Modulated (PWM) design. The final responsibility of distributor or packager modifications to a third-party standard product will reside with the VFD manufacturer. All drives shall be supplied by one manufacturer. The VFD will be manufactured within the United States of America to alleviate concerns of future serviceability and parts availability.

C. The VFD system must fit in the space indicated on the drawings.

1.02 QUALITY ASSURANCE

A. The entire VFD system as described in Article 2.01 shall be factory assembled and system tested by the VFD manufacturer to assure a properly coordinated system.

B. Codes: Provide equipment in full accordance with the latest applicable rules, regulations, and standards of:

1. Local Laws and Ordinances.

2. State and Federal Laws.

3. National Electric Code (NEC).

4. Underwriters Laboratories (UL).

5. American National Standards Institute (ANSI).

6. National Electrical Manufacturers Association (NEMA).

7. Institute of Electrical and Electronics Engineers (IEEE).

C. The complete drive system shall be UL listed.

1.03 SUBMITTALS

A. Submittals shall conform in all respects to Section 01 33 00.

B. Submittals shall be custom prepared by the VFD manufacturer for this specific application.

C. Submittal information shall include, but not be limited to:

1. Equipment dimensions, including stub-up locations, shipping splits and shipping weights.

2. Catalog cuts of major components.

3. Spare parts list, per Paragraph 3.03.

4. Certifications, including:

a. Warranty, per Article 1.04.

b. Efficiencies, per Article 2.02.A.

1.04 GUARANTEE

A. All equipment furnished under this section shall be warranted for parts and labor by the contractor and the equipment manufacturers for a period of one (1) year after completion of startup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer and Model:

1. Danfoss VLT

2. ABB Model ACQ580

3. Engineer approved equivalent.

B. All drives shall be supplied by a single manufacturer. Any modifications to a standard product required to meet this specification shall be performed only by the VFD manufacturer or the manufacturer’s authorized representative. Distributor or system integrator changes to the VFD manufacturer’s product are specifically disallowed.

2.02 MATERIAL AND EQUIPMENT

A. Provide an input circuit breaker interlocked with the enclosure door and equipped with a through-the-door handle to provide positive disconnect of incoming AC power. The circuit breaker shall be rated in accordance with NEC and UL requirements.

B. The VFD system shall maintain a power factor of 0.95 or better throughout the entire speed range.

2.03 VARIABLE FREQUENCY DRIVES

A. Ratings

1. Efficiency. The drive system shall be 97 percent efficient at full load and full speed and 96 percent efficient at 51 percent load and 80 percent speed. Losses utilized in the efficiency calculation shall include input transformer, harmonic filter, power factor correction components if applicable, VFD converter, output filter if applicable, and auxiliary controls including internal control boards, cooling fans, and pumps.

2. Rated Input Power. 460 to 480 volts, 60 Hz, plus 10 percent, minus 10 percent at rated load, three-phase.

a. Voltage Dip Ride-Through. The VFD shall sustain continued operation with a 20 percent dip in nominal line voltage. Output speed may decline only if the current limit rating is exceeded.

b. Power Loss Ride-Through. The VFD shall provide a minimum three-cycle power loss ride-through without fault activation.

3. Output Power. Horsepower, RPM, 460-volt motor voltage, 60 Hz, and motor current (amps) shall be as indicated on the Drawings for each motor served.

4. Ambient Temperature Range. 0 to 40 degrees C.

5. Elevation. Up to 3,300 feet above mean sea level without derating. Drives above 150 HP shall operate up to 6,600 feet without derating.

6. Atmosphere. Non-condensing relative humidity up to 95 percent.

7. AC Line Frequency Variation. 47 to 63 Hz.

8. Power Unit Rating Basis. 110 percent rated current for one minute or 150 percent for 10 seconds at rated temperature for variable torque applications; 150 percent rated current for one minute at rated temperature for constant torque applications.

B. Construction

1. The controller shall produce an adjustable AC voltage and frequency output and include an output voltage regulator to maintain proper V/Hz ratio despite incoming voltage variations.

2. Continuous output current rating shall be not less than 100 percent of motor nameplate current.

3. Converter section shall be six-pulse utilizing diodes.

4. The inverter output shall be generated by IGBTs using space vector PWM to generate a sine-coded output voltage. Drives rated 150 HP or greater shall be capable of providing 97 percent of input voltage at the output.

5. The worst-case RMS motor line current at rated speed, torque, and voltage shall not exceed 1.05 times the rated RMS motor current for pure sine wave operation.

6. The controller shall be suitable for use with standard NEMA-B squirrel-cage induction motors with 1.15 service factor or with existing motors as shown on the Drawings. Future substitution of equivalent standard motors shall be possible.

7. Control logic shall be fully digital and shall not require analog adjustment potentiometers or fixed selector resistors. Power failure shall not require reload of drive parameters.

C. Basic Features

1. Provide a door-mounted membrane keypad with integral 240 x 64 pixel LCD display capable of controlling the VFD and setting parameters. Display and menu functions shall be in plain English engineering units. Three levels of password security shall be provided.

2. The keypad shall include numerical keys, increase/decrease keys, LOCAL/REMOTE selector, RUN light, ALARM light, FAULT light, manual START and STOP pushbuttons, and FAULT RESET functionality.

3. Displayed parameters shall include speed (RPM), output current (amps), output frequency (Hz), DC bus voltage, output voltage, total three-phase output power (kW or HP), torque (Nm), and elapsed time running meter.

4. Provide customer-selectable automatic restart programmable for up to ten attempts within a programmable period up to 600 seconds.

5. Provide MODBUS communication via onboard Ethernet port. VFD parameters, fault log, and diagnostic log shall be downloadable via RS-232 or Ethernet port.

6. Provide integral PID algorithm and configurable function blocks including logic, mathematical operations, and storage elements.

D. Enclosure

1. All VFD components shall be factory mounted and wired within a dead-front, grounded, NEMA 1 filtered enclosure. Free-standing enclosures shall be suitable for mounting on a concrete housekeeping pad.

E. Protective Features and Circuits

1. The Provide instantaneous overcurrent and overvoltage trip; undervoltage and power loss protection; overtemperature alarm and protection; ground fault protection; electronic motor overload protection; motor temperature detector input; catch-a-spinning-load capability; and protection from output short circuit, open circuit, loss of input phase, and loss of input power without requiring an output contactor.

F. Parameter Settings

1. Field-adjustable parameters shall include motor nameplate data, acceleration and deceleration rates, maximum and minimum speed, voltage boost settings, V/Hz ratio, overspeed and overload trip settings, PID control settings, critical speed avoidance bands, auto start functions, and programmable speed profile functions.

2. All drive settings shall be stored in a parameter log accessible via keypad display and RS-232, RS-485, or Ethernet port. The controller shall provide a slot for downloading parameters to a compact flash memory card using the keypad.

G. Input/Output Features

1. Two programmable analog inputs (0-20mA/0-10V), optionally isolated.

2. Two programmable analog outputs (0-20mA), optionally isolated.

3. Minimum nine programmable digital inputs (24VDC).

4. Minimum three programmable digital outputs.

5. Temperature senor input (PTC or KTY84).

6. System Program providing built-in drive control or application specific configuration capability.

H. Diagnostic Features and Fault Handling

1. The Provide a microprocessor-based diagnostic system monitoring control functions and displaying faults and operating conditions in English text.

2. Provide a fault log recording the 64 most recent events with time stamp and fault type accessible via keypad and serial communications.

3. Provide Windows-based software for startup, commissioning, monitoring, optimization, and diagnostics supporting all supplied drives. Software shall include guided commissioning wizards, configurable I/O, setpoint channels, speed control, logic and mathematical functions, diagnostics, self-optimization, and trace functions.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. The VFD manufacturer shall perform incoming inspection of components and raw materials based on strategic supplier base and experience.

B. All products shall be subject to 100 percent testing and final inspection. Sampling plans are not permitted.

3.02 STARTUP AND TRAINING

A. VFD manufacturer shall provide the services of a factory trained technician for startup assistance and training.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the contract unit price for the BELOW LISTED PAY ITEMS related to plans titled W2E WATER TREATMENT PLANT.

1. ALBION DISTRIBUTION PUMPS AND APPURTENANCES

2. GRAYVILLE DISTRIBUTION PUMPS AND APPURTENANCES

3. TRANSFER PUMPS AND APPURTENANCES

4. BACKWASH PUMPS AND APPURTENANCES

5. ALL REMAINING ITEMS RELATED TO CONTRACT 1 OF W2E WATER TREATMENT PLANT NOT COVERED UNDER OTHER BID ITEMS OR CONTRACTS

END OF SECTION 40 97 00

PART 1 GENERAL

1.01 SUMMARY

A. Furnish, factory assemble, test, deliver, and place into service a complete skid-mounted Bulk Bag-Handling Batching Equipment system as specified herein and as shown on the Contract Documents.

B. The system shall be a completely integrated chemical feed package consisting of standard equipment of a manufacturer regularly engaged in the design and manufacture of similar bulk bag chemical batching systems.

C. Equipment included as part of this Section shall include, but not be limited to:

1. Bulk bag hoist and spreader assembly.
2. Bulk bag support frame.
3. Bulk bag untie box with iris valve.
4. Quick-disconnect flexible transition.
5. Volumetric feeder with 1.5 cubic foot hopper.
6. Wetting cone assembly.
7. Eductor assembly.
8. Local control panel with PLC and VFD.
9. All interconnecting piping and wiring within skid limits.

D. The entire batching system shall be factory skid-mounted with all mechanical, electrical, and control components interconnected and tested prior to shipment.

1.02 RELATED SECTIONS

A. Section 40 60 00 – Supervisory Control and Data Acquisition (SCADA).

B. Section 01 33 00 – Submittal Procedures.

C. Section 01 43 00 – Quality Assurance.

1.03 REFERENCES

A. NFPA 70 – National Electrical Code (NEC).

B. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).

C. ANSI/ISA standards applicable to instrumentation and control devices.

1.04 SUBMITTALS

A. Product Data:

1. Detailed description of the complete scope of supply.

2. Complete bill of materials identifying all major components.

3. Annotated manufacturer’s specification sheets for all mechanical and electrical components.

B. Shop Drawings:

1. Dimensioned layout drawings including plan, elevation, shaded isometric, and orthogonal views.

2. System dimensions and shipping weights.

3. Piping and instrumentation diagram (P&ID).

4. Complete wiring diagrams, control schematics, and control logic diagrams.

C. Operation and Maintenance Manuals:

1. Storage and handling instructions.

2. Installation procedures.

3. Start-up and commissioning procedures.

4. Operating instructions.

5. Preventative maintenance requirements.

6. Safety precautions and hazard warnings.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years documented experience producing bulk bag chemical batching systems of similar size and complexity.

2. Equipment shall be standard catalogued products of the manufacturer.

B. Electrical Components:

1. All electrical equipment shall be UL listed where applicable.

2. Control panel shall comply with NFPA 70.

C. Hazardous Location Requirements:

1. Equipment installed in Class II, Division I areas shall be rated accordingly.

2. Control panels installed within Class II, Division I rated areas shall be pressurized and purged to prevent arcing or sparking from contacting hazardous dust atmospheres.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment fully assembled to the maximum extent practical.

B. Protect equipment from damage, moisture, and contamination during shipment and storage.

C. Store equipment indoors in a dry, temperature-controlled environment until installation.

1.07 WARRANTY

A. Provide manufacturer's standard warranty, minimum twelve (12) months from date of startup or eighteen (18) months from shipment, ~~whichever occurs first.~~ **whichever provides the longest warranty period.**

B. Warranty shall cover defects in materials and workmanship.

1.08 TRAINING

A. Provide a qualified factory representative at the project site for a minimum of two (2) days for system startup assistance and training of Owner's personnel in operation and maintenance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Velocity Dynamics Inc. (VeloDyne).

1. The system shall be as manufactured by Velocity Dynamics Inc., Louisville, Colorado.

B. Substitution of equipment by other manufacturers shall require prior written approval by the Engineer in accordance with Division 01 requirements. Proposed substitutions shall demonstrate complete compliance with performance, materials, construction, controls, and hazardous location requirements of this specification.

2.02 SYSTEM DESCRIPTION

A. Provide a completely integrated bulk bag chemical feed and batching system designed for handling and feeding soda ash or powder activated carbon from bulk bags (super sacks) weighing up to 2,000 pounds.

B. The system shall:

1. Support and discharge bulk bag contents into a volumetric feeder.

2. Meter dry chemical at controlled rates.

3. Wet and slurry the chemical in a wetting cone.

4. Convey slurry via eductor to the Owner's injection point.

5. Interface with plant control system for remote start/stop and feed rate pacing.

2.03 BULK BAG SUPPORT FRAME ASSEMBLY

A. Provide a Bulk-bag frame system designed to position and support bulk-bags weighing up to 2,000 pounds over the dry Feeder hopper inlet.

B. The frame system shall be constructed of 3" structural steel tubing with a minimum of 1/4" wall thickness. Each corner shall have gusset reinforced construction, with the exception of the travel zone of the big-bag.

C. The entire bag support system shall be a powder coated finish.

D. Provide a bag-lifting/hanging adaptor. The adaptor shall be constructed with bag loop positioning tabs to position the bag loops at the end of each bar arm.

E. Provide a Bag untie box complete with hinged gasketed doorway and Iris valve for safe untying of the bulk bag.

F. Provide a quick disconnect flexible transition manufactured by BFM

2.04 VOLUMETRIC FEEDER

A. A VeloDyne. Series Barracuda 1500A volumetric feeder shall be connected to the untie box by means of a flexible connection. The feeder shall be provided to feed chemical at up to 1.2 ft3 per hour.

B. Feeder shall have an inlet opening of at least 144 square inches to insure a positive flow of chemical out of the Super Sack and through the feeder.

C. Feeder shall have a repeatable accuracy of plus or minus 2%.

D. The volumetric feeder body shall be fabricated of not less than 10-gauge 304 stainless steel 1/4" drive end plates, and wetted parts with the exception of the screw, which will be 304 heat-treated stainless steel. The lower portion of the hopper shall be not less than 70 degrees to facilitate flow of the dry product with varying degrees of angle of repose to the ensuing screw feeder.

E. All welds shall be ground & polished smooth and passivated.

F. The drive shall be mounted to the feeder body with a stainless-steel adapter having a double lip seal to seal the feed section of the hopper from the feeder drive.

G. Feeder shall be of the closed screw type for handling powder activated carbon material.

H. Feeder shall have up to a 1" dia. screw discharging through a stainless steel spout, attached to a sanitary clamp, which will allow for optional auger sizes for future use.

I. The feeder shall be equipped with an anti-flooding drip lip system to eliminate chemical over-run or flooding on a stop command.

J. The feeder shall be constructed with heavy-duty gear reducer drives.

K. Auger shall be connected to the hollow drive shaft via reverse threading the auger directly to the drive shaft.

L. The auger and spout shall be easy to remove from the face of the feeder without any tools.

M. In order to optimize accuracy and repeatability of the feed, the auger shall maintain even flow of Soda Ash to the metering screw by a concentric conditioning helix.

N. The volumetric feeder design shall allow the motor, gear reducer and auger to be removed as a single unit. Accessing the hopper from the storage section shall not be required.

O. The feeder shall be provided with a hermetically sealed mechanical variable speed drive, providing a 60:1 turn down of feed rate.

P. The feeder drive motor shall be a 1/2 HP 230 VAC TENV motor Rated for Class II Div I rated area.

Q. Feeder variable speed control shall be provided by an Allen Bradley Powerflex 40 VFD drive. The feeder shall be paced by a local potentiometer in manual mode, and paced in remote mode via a 4-20 ma input signal. A digital speed indicator shall be mounted on the control panel door and provide a corresponding 4-20 ma output signal of actual feed rate.

2.05 WETTING CONE

A. A 316 stainless steel wetting cone will be installed to promote down-flow into the mouth of the eductor.

B. The wetting cone will be mounted between the drop tube discharge and the eductor.

C. Water will be added tangentially to the wetting cone, which will form a vortex to sweep the inner surfaces of the wetting cone, preventing bridging and subsequent blockages.

D. Side wall wash down shower shall also be required via flexible tubing surrounding the inner wall of the cone.

E. The wetting cone assembly will have a piped overflow equipped with a conductivity switch which will immediately trip the dosing system if the presence of a fluid is sensed, indicating a high water level in the wetting cone.

2.06 EDUCTOR

A. An eductor will be installed to mix and convey the slurry to the Purchaser's injection point.

B. The unit will be designed based on field requirements of flow, pressure, discharge pressure, length, and orientation of discharge piping (see table below). Motive water shall move the material from the wetting chamber to the final injection point. The pressure and quantity of motive water required to wet and convey the carbon slurry will be ultimately dependent on the configuration (which relates to back pressure) of the Purchaser's slurry transport piping system and the injection point pressure.

Soda Ash Feed Line Parameters				
Flow	Inlet Pressure	Line Pressure	Feed Diameter	Feed Length
1-10 gph	10-20 psi	5-10 PSI	1” Flex	80 ft

2.07 Controls

A. Control Panel

1. Frame mounted local control panel.

2. NEMA 4X

3. 230 VAC, 3phase

4. Panel shall house all starters, overloads, VFD’s and all other required devices

5. Panel mounted touch screen for PLC control

6. All switches and alarms will be available on the touchscreen.

7. HOA selector switches for the solenoid valve and vibrator

8. On/Off/Remote selector switch for the feeder

9. 10 kilo-ohm potentiometer for local feeder speed adjustment

10. Feeder speed display

B. Communications

1. Start and stop by dry contact from the plant control room

2. Feeder pace by 4-20mA signal from the plant control room

3. Alarm and running lights per the manufacturer's standard design.

4. Dry contact relay for System Alarm, Running

5. 4-20mA signal to SCADA for feeder speed.

C. Controls to be mounted inside the Class II Div I rated area the panel shall be pressurized and purged to isolate any arching or sparking occurrences in the panel.

PART 3 EXECUTION

3.01 INSTALLATION

A. The equipment shall be installed per the contract documents and manufacturer's recommendations.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL BULK BAG HANDLER AND SODA ASH FEED SYSTEM related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 41 14 23

PART 1 GENERAL

1.01 SUMMARY

A. Work includes furnishing, fabricating, delivering, erecting, coating, and placing into service one (1) welded steel Recarbonation Tank (HeliCarb contact vessel) complete with appurtenances as shown on the Drawings and specified herein.

B. The Recarbonation Tank shall provide controlled contact between carbon dioxide (CO_2) gas and lime-softened water for pH adjustment. The vessel shall:

1. Utilize a downward helical flow path to create high downward water velocity.

2. Promote efficient dissolution of rising CO_2 gas bubbles.

3. Operate without mixers, pumps, or other moving mechanical equipment.

4. Rely solely on hydraulic energy provided by influent flow through the inlet nozzle.

C. The tank shall be a shop-fabricated and field-erected welded steel structure designed in accordance with AWWA and applicable structural codes.

1.02 RELATED SECTIONS

A. Section 09 96 00 - High-Performance Coatings

B. Section 03 30 00 – Cast-in-Place Concrete (Foundations)

C. Section 40 05 15 – Piping Support Systems

D. Section 40 05 64 - Valves for Actuator Control

E. Section 46 31 43 – Carbon Dioxide Storage and Feed System

1.03 REFERENCES

A. AWWA D100 – Welded Steel Tanks for Water Storage

B. AISC – Steel Construction Manual, Allowable Stress Design

C. ASME Section IX – Welding and Brazing Qualifications

D. AWS D1.1 – Structural Welding Code – Steel

E. ASTM – Applicable Material Specifications

F. SSPC-PA1 – Paint Application Specification

G. OSHA – Occupational Safety and Health Standards

1.04 SUBMITTALS

A. Submit shop drawings and calculations including:

1. Plan, elevation, and sectional views.

2. Shell thickness calculations.

3. Nozzle schedule.

4. Anchor bolt layout and loads.

5. Design wind and seismic calculations.

6. Welding procedures and welder certifications.

B. Coating system data sheets.

C. Installation and operation instructions.

D. Certification of compliance with specified standards.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. The Recarbonation Tank shall be designed, fabricated, and erected by a single supplier regularly engaged in the manufacture of similar recarbonation contact vessels.

2. The supplier shall have successfully designed, fabricated, and erected a minimum of ten (10) recarbonation contact vessels of similar configuration and size using its own organization.

3. At least ten (10) installations shall have been in continuous satisfactory operation for a minimum of two (2) years on similar water treatment applications.

4. Fabrication and erection shall not be subcontracted without prior written approval of the Engineer.

B. Personnel Qualifications

1. Field supervision shall have a minimum of fifteen (15) years' experience in fabrication and erection of welded conical or double-curvature steel plate structures.

2. Field erection personnel shall have documented experience in welded steel tank construction.

3. All shop and field welders shall be certified in accordance with ASME Section IX or AWS D1.1.

4. The supplier shall maintain an Experience Modification Rate (EMR) of less than 0.80.

C. Design and Construction Standards

1. Tank design shall conform to AWWA D100 allowable stresses.

2. Structural members shall conform to AISC.

3. Welding procedures shall conform to ASME Section IX and AWS D1.1.

4. Field inspection of butt welds shall be performed by spot radiography in accordance with AWWA D100.

5. Radiographs shall become the property of the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect all materials from damage and corrosion.

B. Store materials off the ground and protect flange faces and machined surfaces.

C. Handle components in a manner that prevents distortion or coating damage.

1.07 GUARANTEE

A. Provide a one (1) year warranty from date of Substantial Completion covering defects in materials and workmanship.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

A. The Basis of Design is the HeliCarb Recarbonation Contact Vessel as manufactured by CB&I.

B. Approved equal manufacturers shall demonstrate strict compliance with this Section, including hydraulic performance, fabrication tolerances, structural design, and operating history.

2.02 GENERAL

A. Furnish one (1) welded steel Recarbonation Tank complete with nozzles, anchor bolts, internals, and accessories.

B. External piping, CO_2 storage, feed systems, diffusers, and controls are specified under Section 46 31 43 and shall be provided by others unless noted otherwise.

2.03 DESIGN CRITERIA

A. Hydraulic Design

1. Minimum Flow: 600 gpm
2. Average Design Flow: 1,200 gpm
3. Maximum Flow: 1,500 gpm
4. Hydraulic Retention Time: Greater than 5 minutes

B. Major Dimensions

1. Major Diameter: 12'-0"
2. Minor Diameter: 2'-3"
3. Overall Height: ~~22'-7.5"~~ **21'-11"**

C. Loading Conditions

1. Liquid Level: Full to top angle
2. Specific Gravity: 1.0
3. Burial: Above grade (no external soil load)
4. Wind Design:
   a. 115 mph (3-second gust)

b. Exposure C

c. Importance Factor 1.25

5. Seismic Design:

a. Seismic Use Group III

b. Soil Classification D

c. Importance Factor 1.25

d. Ss = 0.639

e. S1 = 0.21

2.04 MATERIALS

A. Shell Plates: ASTM A36 steel

B. Structural Members: ASTM A36

C. Minimum Shell Thickness:

1. Shell: 1/4 inch

2. Bottom Plate: 3/8 inch

D. Minimum Internal Component Thickness: 3/16 inch

E. Permanent Fasteners: Type 304 Stainless Steel

F. Anchor Bolts: Hot-dip galvanized ASTM A36

2.05 COMPONENTS

A. Upper Cylinder

1. Small-diameter cylinder with inlet and outlet nozzles.

2. Annular space sized to provide minimum 1.0 ft/sec downward velocity at design flow.

3. Vent fitting for discharge of unreacted CO_2.

B. Internal Riser / Outlet

1. Centrally located vertical riser extending from near tank bottom to top.

2. Designed to prevent short-circuiting.

3. Outlet nozzle connected to riser.

C. Transition Section

1. Conical transition connecting upper and lower cylinders.

2. Provides gradual velocity reduction.

D. Lower Cylinder

1. Sized to meet contact time requirement.

2. Provided with drain nozzle, manway, and CO_2 couplings.

E. Nozzles

Description	Qty	Size	Type
Inlet	1	12-inch	Flanged
Outlet	1	12-inch	Flanged
Drain	1	~~4~~ **6**-inch	Flanged
CO_2 Feed	2	2-inch	Coupling
Manway	1	24-inch	Flanged
Vent	1	2-inch	Coupling

1. Flanged nozzles shall extend minimum 12 inches beyond shell. Flanges for field piping shall be furnished loose for final alignment.

2.06 FABRICATION

A. All vessel boundary butt welds shall be full penetration.

B. Misalignment of butt joints shall not exceed 1/16 inch.

C. Back-up bars are not permitted.

D. Banding and peaking shall not exceed 1/2 inch in 36-inch arc.

E. Conical shell plates shall be shop formed into radial cone segments.

F. Sweep board tolerances shall not exceed 1/8 inch in 36 inches.

2.07 COATINGS

A. Surface Preparation

1. Exterior and non-submerged: SSPC-SP6

2. Interior/submerged: SSPC-SP10

B. Shop Primer

1. Tnemec Series N140 Pota-Pox Plus Primer (Beige), 3.0–5.0 mils DFT, or approved equal.

C. Interior Finish (Shop-Applied)

1. Tnemec Series N140 Pota-Pox Plus (Tank White), 4.0–6.0 mils DFT.

D. Field Coating

E. General Contractor shall provide touch-up and final coatings per Section 09 96 00 - High-Performance Coatings

F. No coating required for stainless steel or galvanized materials.

PART 3 EXECUTION

3.01 FOUNDATION

A. Foundation provided under Section 03 30 00.

B. Minimum foundation thickness: 16 inches.

C. Level tolerance: ±1/4 inch around circumference.

3.02 SAND CUSHION OR GROUT

A. Provide minimum 1-inch sand cushion beneath bottom plate per AWWA D100, or

B. Fully grout bottom plate with non-shrink grout.

1. Outer perimeter shall be sealed with non-shrink grout.

3.03 ERECTION

A. Erect in accordance with approved shop drawings.

B. External piping shall be independently supported.

C. Supplier shall provide field supervision.

3.04 START-UP SERVICE

A. Provide one (1) trip and one (1) day of process engineering services for start-up and operational verification.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL (1) RECARBONATION TANK related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 43 10 00

PART 1 GENERAL

1.01 SUMMARY

A. Scope of Work:

1. Work includes furnishing, fabricating, delivering, erecting, coating, and placing into service two (2) welded steel ClariCone Solids Contact Clarifiers complete with internals, nozzles, bridge, appurtenances, and controls as shown on the Drawings and specified herein.

2. The ClariCone clarifier shall accomplish:

   a. Mixing of treatment chemicals with raw water in a mixing and reaction zone.

   b. Solids contact and agglomeration within a flocculation zone.

   c. Solids separation within a clarification zone.

   d. Slurry concentration and compaction within a centrally located slurry concentrator.

3. All treatment processes shall occur within a single vessel.

4. The clarifier shall:

   a. Operate without mixers, scrapers, or continuously moving mechanical equipment.

   b. Rely solely on hydraulic energy supplied by influent flow through tangential inlet nozzles.

   c. Maintain a helical upflow pattern to sustain solids suspension and contact.

5. The tank shall be shop-fabricated and field-erected welded steel designed in accordance with AWWA and applicable structural codes.

1.02 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 09 96 00 - High-Performance Coatings

C. Section 40 05 57 - Actuators for Process Valves and Gates

D. Section 40 05 64 - Valves for Actuator Control

E. Section 43 10 00 – Recarbonation Tank

F. Section 43 41 13 - Pillar-Type Steel Water Storage Tank (Head Tank)

1.03 REFERENCES

A. AISC American Institute of Steel Construction, Allowable Stress Design

B. ASME IX American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Welding and Brazing Qualifications

C. ASTM American Society for Testing and Materials

D. AWS D1.1 American Welding Society, Structural Welding Code, Steel

E. AWWA D100 American Water Works Association, Standard for Welded Steel Tanks for Water Storage

F. NEMA National Electrical Manufacturers Association

G. OSHA Occupational Safety and Health Standards

H. SSPC-PA1 Steel Structures Painting Council, Paint Application Specification

1.04 SUBMITTALS

A. Submit the following:

1. Plan, elevation, and sectional drawings.

2. Shell thickness and structural calculations.

3. Wind and seismic design calculations.

4. Nozzle schedule.

5. Anchor bolt layout and loads.

6. Welding procedures and welder certifications.

7. Radiographic inspection procedures.

8. Coating system data sheets.

9. Installation and operation instructions.

10. Documentation of experience qualifications.

B. Fourteen (14) days prior to bid, supplier shall furnish written evidence demonstrating compliance with experience requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Clarifier shall be designed, fabricated, and erected by a single supplier regularly engaged in manufacturing similar solids contact clarifiers.

2. Supplier shall have successfully designed, fabricated, and erected a minimum of ten (10) similar vessels.

3. At least ten (10) installations shall have been in continuous satisfactory operation for a minimum of two (2) years.

4. Experience Modification Rate (EMR) shall be less than 0.80.

5. Fabrication and erection shall not be subcontracted without written approval of the Engineer.

B. Personnel Qualifications

1. Field supervision: Minimum fifteen (15) years' experience in welded conical steel structures.

2. Field erection personnel: Documented experience in welded steel tank construction.

3. Welders: Certified in accordance with ASME Section IX or AWS D1.1.

C. Design and Construction Standards

1. Tank design shall conform to AWWA D100 allowable stresses.

2. Structural members shall conform to AISC.

3. Welding procedures shall conform to ASME Section IX and AWS D1.1.

4. Field inspection of butt welds shall be performed by spot radiography in accordance with AWWA D100.

5. Radiographs shall become the property of the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect all materials from damage and corrosion.

B. Store materials off the ground and protect flange faces and machined surfaces.

C. Handle components in a manner that prevents distortion or coating damage.

1.07 GUARANTEE

A. Provide a one (1) year warranty from date of Substantial Completion covering defects in materials and workmanship.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN

A. Basis of Design: ClariCone Solids Contact Clarifier as manufactured by CB&I.

B. Approved equal manufacturers shall demonstrate strict compliance with:

1. Hydraulic performance.

2. Structural design.

3. Fabrication tolerances.

4. Operating history.

2.02 GENERAL

A. Furnish and erect two (2) ClariCone solids contact clarifiers as shown on the Plans and as specified herein.

2.03 DESIGN CRITERIA

A. Each clarifier shall be designed for the following operating conditions:

1.	Raw Water Source:	Ground
2.	Treatment Application:	Lime Softening
3.	Minimum Flow:	325 gpm
4.	Average Design Flow:	750 gpm
5.	Maximum Flow:	1,000 gpm

6. Loading Rate – At Weir Elevation (gpm/ft^2): <1.0 min

7. Hydraulic Retention Time: Greater than 5 minutes

B. Each clarifier shall be constructed to the following major dimensions:

1. Diameter – At Weir Elevation (feet) 26’ – 0”

2. Overall Height (feet) 21’ – 11”

C. The clarifier steel shell and bridge shall be designed for the following loading conditions:

1. Liquid Level Full to top angle

2. Specific Gravity 1.0

3. Burial (external soil pressure) 0 (constructed above grade)

4. Wind Load AWWA D100

   a. Design Category III

   b. Wind Speed 115 MPH (3 sec burst)

   c. Exposure Cat C

   d. Importance Factor 1.15

5. Seismic Design

   a. Seismic Use Group III
   b. Soil Classification Class D

   c. Importance Factor 1.25

   d. S_s 0.639g

   e. S_1 0.21g

   f. Bridge Live Load (lbs/ft^2) 100

   g. Bridge Dead Load (lbs/lf) – Piping Determined by manufacturer

   h. Point Loads (lbs) Determined by manufacturer

D. Design Standards:

1. Shell: Design in accordance with the allowable stresses specified in the latest edition of AWWA D100, Welded Carbon Steel Tanks for Water Storage.

2. Other Structural Components: Design in accordance with the latest edition of AISC, Steel Construction Manual.

E. External Piping Support: All external piping shall be supported independently of the vessel to prevent transfer of dead loads, live loads, or thermal loads to the vessel shell or nozzles.

2.04 MATERIALS

A. Shell Plates: ASTM A36 steel plate.

B. Structural Members: ASTM A36 structural steel.

C. Internals, Weir Troughs, and Bridge Structural Components: ASTM A36 steel, unless otherwise specified.

D. Corrosion Allowance: No corrosion allowance is required.

E. Minimum Shell Thickness:

1. Shell Plates (Pressure Boundary): 1/4 inch.

2. Lower Cylinder Bottom Plate: 3/8 inch.

F. Minimum Internal Component Thickness:

G. Internals, Weir Troughs, Bridge Structural, and Other Components: 3/16 inch minimum thickness.

2.05 COMPONENTS

A. Inlet Distribution

1. The ClariCone shall be provided with two (2) tangential influent nozzles, located in the lower cylindrical section of the ClariCone, to direct the raw water into an expanding helical flow pattern.

2. The General Contractor shall furnish and install an electrically operated knife gate valve, designed to operate at an inlet side pressure of 50 psig, in the large influent line. The automatic valve assembly shall include a

slow acting electrical motor for valve actuation and a manual operator mounted on the valve with a local mechanical position indicator.

3. The General Contractor shall furnish and install a manually operated butterfly valve in the small influent line.

B. Water Jets

1. A minimum of two tangential water jet nozzles shall be provided. The water jets shall provide additional hydraulic energy for resuspending the slurry blanket following a shutdown.

2. The General Contractor shall furnish and install piping to each water jet nozzle complete with a manual ball valve to allow throttling of the water jet flowrate and with a slow acting, electrically operated ball or solenoid valve in the common manifold to the water jets to turn the water jets on and off.

C. Grit Blowdown

1. The lower cylinder shall include a grit discharge and tank drain nozzle.

2. The General Contractor shall supply and install grout in the lower cylinder that is sloped to the grit nozzle invert to the Clarifier Suppliers' specifications. The General Contractor shall also furnish and install a manually-operated plug valve in the grit blowdown line.

D. Flocculation and Clarification Zone

1. The ClariCone clarifier shall have a flocculation zone having the configuration of a truncated right circular cone. A rotating slurry blanket of flocculated particles shall be maintained by proper control of the hydraulic energy within the ClariCone. The blanket shall provide intimate contact between previously flocculated particles and the raw water, providing maximum chemical efficiency. The flocculation zone shall provide decreasing energy and rise rate, with the upward helical flow thereby promoting the growth of flocculated particles. The side walls of the flocculation zone shall form an angle of approximately 45 degrees with the horizontal to provide a properly decreasing rise rate and to prevent accumulation of slurry on the side walls or clarifier shell.

2. The clarification zone shall provide a decreasing rise rate as the water flows upwards through the conical area of the ClariCone, allowing flocculated particle subsidence as the particle settling velocity exceeds the rise rate. The relative depth allocated to both the flocculation and clarification zones shall be adjustable by the positioning of a centrally located, adjustable slurry concentrator.

E. Slurry Concentration and Blowdown

1. The ClariCone clarifier shall include a slurry concentrator centrally located on the vertical axis of the ClariCone. The concentrator shall have the configuration of a truncated right circular cone for slurry compaction. The slurry concentrator shall have the following characteristics.

   a. Volume (gallons): 365

   b. Overflow Weir Length (feet): 16.5

   c. Vertical Travel Range (feet): 4

2. Solids shall be removed from the surface of the rotating slurry blanket by overflow into the concentrator. By varying the elevation of the concentrator, the level of the rotating slurry blanket shall be adjustable so that the solids inventory or blanket level can be varied to compensate for fluctuations in flow rate, turbidity or other conditions, necessitating additional solids contact time or increased clarification depth. The Clarifier Supplier shall select the minimum elevation for the concentrator based on the specific treatment application.

3. The concentrator operator shall be located on the access bridge. It shall consist of a manual handwheel jacking screw that is connected to the concentrator.

4. The concentrator shall be equipped with a bubble trap. The bubble trap shall have a diameter larger than the diameter of the lower cylinder to trap air bubbles rising from the inlet and reaction zone. The bubble trap shall be vented to the atmosphere. The bubble trap shall prevent disruption of the sludge blanket by entrained air and prevent the carryover of flocculated particles, with attached air bubbles, into the clarification zone.

5. The concentrator shall be equipped with a pressure relief device that allows water to enter or exit the concentrator cone to prevent excessive loading on the concentrator stem or support bridge.

6. A slurry discharge nozzle shall be provided in the lower cylinder and connected to the concentrator by a telescoping pipe arrangement.

7. The General Contractor shall furnish and install a manually operated plug valve in the slurry blowdown line. The General Contractor shall also furnish and install an electrically operated eccentric plug valve, designed to operate at an inlet side pressure of 50 psig, in the slurry blowdown line. The automatic valve assembly shall include a slow acting electric valve actuator with a manual operator mounted on the valve.

F. ELECTRICAL CONTROLS

1. All electrical controls shall be directed to the SCADA control system provided under Section 40 60 00 - Supervisory Control and Data Acquisition. The SCADA system shall control and indicate the position of the valve in the large inlet line and activate the slurry blowdown and water jet functions. No local controls shall be provided unless noted otherwise.

2. Large Inlet Valve Position Control

   a. An Open/Stop/Close selector switch shall be provided to allow plant personnel to manually modulate the valve in the large inlet line to the ClariCone. A modulating valve actuator shall be provided by the General Contractor to allow the valve to be stopped at the fully opened and fully closed positions as well as at any intermediate position. An indicator shall be provided to show the position of the valve. The indicator shall accept a 4-20 mA position signal from the valve actuator.

3. Slurry Blowdown Valve Control

   a. Automatic operation of the slurry blowdown valve shall be controlled by a repeat cycle timer or PLC, with separate settings for ON duration and OFF duration, that are adjustable from 1 second to 50 hours.

4. Water Jet Valve Control

   a. Actuation of the water jet valves can be accomplished locally or remotely and manually or automatically. These options are described below.

   b. An local H-O-A switch shall be provided to actuate the water jet valves. When the H-O-A switch is in the “Hand” position, operation of the water jet valves shall be controlled by a manual ON/OFF selector switch. The ON/OFF selector switch shall be provided to allow plant personnel to manually actuate the water jet valves.

   c. When the H-O-A switch is in the “Automatic” position, operation of the water jet valves shall be controlled by SCADA. Automatic operation of the water jet valves will allow the water jet valves to be opened for a user selected time period, between 0 and 15 minutes, prior to startup of the ClariCone, and will allow the water jet valves to stay open for a user selected time period, between 0 and 15 minutes, after startup of the ClariCone.

d. The General Contractor shall install the control panel, furnish and install all wiring, conduit and any remote-control systems or equipment.

G. Clarified Water Collection

1. The ClariCone shall include an adjustable radial weir trough, designed to handle the maximum flow rate, for clarified water collection. Adjustable, 3/16” thick, weir plates shall be provided on the radial trough.

2. The radial trough shall be sized by the Clarifier Supplier for the specified flowrates and shall consist of a single trough extending from the drop box across approximately ½ of the clarifier diameter.

3. The trough shall be designed so that they can be adjusted, through a range of level and out-of-level positions, so that the weir rate can be varied along the radius of the ClariCone. The trough position shall be quickly and easily adjustable with a manual, handwheel operated actuator, from one point on the bridge while the ClariCone is in operation, so that the operator can alter the distribution flow on an in-service basis. A position indicator shall be provided on the actuator.

4. The trough shall be supported by the ClariCone shell at its outer end. That support shall be hinged to allow the trough to pivot up and down. The trough shall be supported at its inner end, by the actuator, which shall be supported from the bridge of the ClariCone.

5. The trough shall discharge into a drop box welded to the ClariCone shell that is provided with a flanged nozzle. The drop box shall be designed to provide for free discharge so that the trough is not flooded.

6. Peripheral or inboard circular troughs shall only be allowed if walkways are provided, immediately above or adjacent to the troughs, along their entire length to provide safe access for weir plate adjustment and maintenance.

7. The General Contractor shall install and level the weir plates after final painting.

H. Adjustable Elevation Disinfection Header

1. The ClariCone shall be provided with an adjustable elevation disinfectant header that allows the slurry concentrator to be moved as required to maximize the solids contact treatment process within the ClariCone while minimizing trihalomethane formation and maximizing disinfectant contact time within the ClariCone.

2. The header shall be horizontal and oriented radially within the ClariCone. Orifices shall be spaced along the header to distribute the disinfectant across the radius of the ClariCone. The orifices shall be located on the downstream side of the header with respect to the rotating motion of the water within the ClariCone.

3. The disinfectant header shall be supported by brackets on the slurry concentrator. The header shall be mounted at a fixed distance above the slurry concentrator to ensure that the header is as low as possible within the clarification zone while still being above the sludge blanket. The disinfectant shall be fed into the header through a flexible conduit that allows the header to move up and down with the concentrator.

4. The General Contractor shall furnish and install all piping beyond the flexible conduit supplied by the Clarifier Supplier and all chemical feed equipment and controls.

I. Manway

1. The Clarifier Supplier shall furnish a 24” diameter access manway in the lower cylindrical section of the ClariCone. A davit supported, bolted manway cover shall be provided. A removable baffle plate shall be provided on the inside of the ClariCone to cover the entire manway opening and prevent any disturbance of the hydraulic flow pattern within the ClariCone. The baffle plate shall be curved to match the inside diameter of the ClariCone.

J. Access And Support Bridge

1. The Clarifier Supplier shall furnish an access and support bridge constructed of rigidly braced wide flange structural beam sections. The Clarifier Supplier shall provide a walkway and handrail across the full bridge length as specified herein and in accordance with the Metals Section:

a.	Walkway Surface	Alum. Grating, 1.5” deep, banded, mill finish
b.	Handrail	Alum., 2 rail, 1.5”Ø., Sch 40, anodized finish
c.	Toe Plates	Alum., 4” deep x ¼” thick, anodized finish

2. The bridge shall be designed to support a live load as specified. Deflection of the bridge shall be limited to l/360 of the span, considering the live load. The bridge shall be designed to support the live and all dead loads, including the weight of the radial trough full of water with the

ClariCone empty, if that condition can occur, without exceeding AISC allowables. The dead load deflection shall be cambered out of the bridge.

K. Nozzles

1. The Clarifier Supplier shall furnish the following nozzles in the clarifier with flanged nozzles extending 12 inches beyond the shell or plate surface. Flanges for nozzles that will be connected to external piping shall be left loose for final alignment and welding in place by the General Contractor.

	Description	Quantity	Dia. (inches)	Type
a.	Small Inlet	1	~~6~~ 4	Flanged
b.	Large Inlet	1	~~12~~10	Flanged
c.	Slurry Blowdown	1	6	Flanged
d.	Grit Blowdown	1	6	Flanged
e.	Outlet	1	12	Flanged
f.	Water Jets	2	1.5	Coupling
g.	Manway	1	~~30~~24	Flanged
h.	Samples	5	2	Coupling
i.	Chemical Feed	2	2	Coupling
j.	Overflow	1	12	Flanged

L. Anchorage

1. The Clarifier Supplier shall furnish hot dip galvanized A36 anchor bolts, nuts and washers.

2. The General Contractor shall install the anchor bolts in the concrete foundation in accordance with the Clarifier Suppliers' instructions.

M. Fasteners

1. The Clarifier Supplier shall furnish all permanent fasteners of 304 stainless steel.

N. Sample Lines

1. The Clarifier Supplier shall furnish and weld 1-inch diameter couplings and pipe support brackets to the ClariCone shell to allow for sample collection from the lower cylinder, sludge blanket and clarified water zones.

2. The General Contractor shall provide and install the pipe lines, valves, sample sink, insulation and heat tracing as required. All lines shall be located on the outside of the ClariCone and terminate four (4) feet above the finished floor with a valve. The sample lines shall be schedule 80 PVC piping, minimum.

PART 3 EXECUTION

3.01 INSPECTION

A. Field inspection of butt welds shall be performed by the Clarifier Supplier by spot radiography in accordance with the latest edition of AWWA D100. All radiographs shall become the property of the Owner. Inspection of shell butt welds, by sectioning (cutting plugs), oil testing or vacuum testing, will not be permitted.

3.02 FOUNDATION

A. The General Contractor shall construct the foundation in accordance with the applicable requirements of the Specifications and Plans specifying concrete, excavation and backfill. The foundation shall be designed in accordance with the soil bearing value established in the Geotechnical Report.

B. Anchors shall be installed by the General Contractor to the Clarifier Suppliers' specifications. A minimum foundation thickness of 16 inches is required to provide sufficient depth for anchor bolt embedment.

C. The poured concrete foundation shall be level to within □1/4 inch within the total circumference of the foundation.

3.03 SAND CUSHION

A. A sand cushion shall be furnished and installed under the ClariCone lower cylinder to provide for uniformity of bearing between the plate bottom and the foundation and as an insulator against galvanic corrosion. Cushion thickness shall be a minimum of 1 inch over flat concrete slabs. The outer circumference of the bottom plate shall be grouted full with either a non-shrink grout or a 1:1.5 cement-sand grout to contain the sand. See AWWA D100, Section 12.6, notes 1, 2 and 3.

B. Alternatively, the bottom plate may be fully grouted under its entire surface with a non-shrink grout, a pumpable grout or a 1:1.5 cement-sand grout.

C. The General Contractor shall furnish and install the sand cushion shall be in compliance with this General Specification and with the Plans which may specify sand and grout thicknesses in excess of the minimum.

3.04 FABRICATION AND ERECTION

A. The Clarifier Supplier's welding procedures, welders and welding operators shall be qualified and certified in accordance with the requirements of the ASME Code Section IX or AWS Section D1.1, for all shop and field welding. All shop and field welders shall have their qualifications available for the Engineer's inspection.

B. The edges or surfaces of the pieces to be joined by welding shall be prepared by flame cutting, plasma arc cutting, arc gouging, machining, shearing, grinding or chipping and shall be cleaned of detrimental oil, grease, scale and rust. The edges of the pieces may have a protective coating applied to them, which need not be removed before they are welded unless specifically prohibited by the WPS.

C. All field welding shall be done by the shielded metal arc welding process, the gas metal arc welding process, the flux core arc welding process and the submerged arc welding process. Shop welding may be done by the shielded metal arc process, submerged arc welding process, gas metal arc welding process and flux core metal arc welding process.

D. Plates and component members of the tank shall be assembled and welded following a procedure which will result in a minimum of distortion from weld shrinkage. The weld metal shall meet or exceed the minimum requirements for visual inspection as set out in AWWA D100 Section 11.4 and as set forth in the radiographic acceptance standards of AWWA D100 Section 11.6.10.

E. All shell plate material for the conical portion of the ClariCone shall be shop formed into radial cone segments. Fabrication techniques which do not provide a uniform plate curvature, or which create butt joint misalignment shall not be allowed.

F. During fabrication, after each segment is cut or burned, but before forming, both plate diagonals shall be measured. The difference shall not exceed 1/8 inch. After each conical segment is formed, 36-inch-long sweep boards shall be used to measure the horizontal contour at the upper and lower edges, and the approximate center of each conical segment. Gaps shall not appear between the sweep board and the fabricated conical segment in excess of 1/8 inch, in any 36 inches of arc.

G. Misalignment of butt joints shall not exceed 1/16 inch. Back-up bars are not permitted in butt joints.

H. Banding and peaking, that occurs during shop fabrication or field erection, shall not exceed 1/2 inch in any 36-inch-long arc when measured with a 36 inch long sweep board.

I. Weld spatter, burrs and slag shall be removed by chipping, grinding or brushing.

J. All vessel boundary butt welds shall be full penetration welds.

3.05 EXTERNAL PIPING

A. All external piping must be supported independently of the vessel to prevent the transfer of piping dead and live loads to the vessel nozzles or shell. All external piping, valves, and supports beyond the first vessel flange are by the General Contractor.

3.06 COATINGS & FINISHES

A. All painting shall be in accordance with Section 09 96 00 - High-Performance Coatings

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL CLARICONES related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 46 43 53

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provide all labor, materials, and equipment necessary to furnish and install one (1) complete induced draft aluminum aeration system for oxidation of iron and manganese and removal of carbon dioxide and other dissolved gases from raw water.

B. The aeration system shall be factory assembled, piped, and wired as a complete package prior to shipment.

C. The unit shall be designed for continuous 24-hour operation.

1.02 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures

B. Section 43 41 13 - Pillar-Type Steel Water Storage Tank (Head Tank)

1.03 REFERENCES

A. Illinois Administrative Code, Title 35, Section 604.400, Subtitle F, Subpart D – Aeration

B. ANSI B16.5 – Pipe Flanges and Flanged Fittings

C. NEC – National Electrical Code

D. NEMA Standards

E. AMCA Standard 210 – Fan Performance Testing

1.04 SUBMITTALS

A. Submit in accordance with Section 01 33 00 - Submittal Procedures

B. Product Data:

1. Manufacturer’s literature describing system components and performance.

C. Shop Drawings:

1. Structural, mechanical, and electrical details.

2. Dimensions, materials of construction, and installation requirements.

3. Wiring diagrams.

D. Design Calculations:

1. Demonstrate compliance with specified performance criteria.

E. Certifications:

1. Manufacturer certification of compliance with specifications.

1.05 QUALITY ASSURANCE

A. Manufacturer shall maintain an auditable quality control program.

B. Aeration system shall be supplied by a single-source manufacturer responsible for fabrication of major components.

C. Manufacturer Qualifications:

1. Minimum five (5) years experience producing induced draft aerators.

D. D. Warranty:

1. Provide 12-month warranty from substantial completion.

2. Cover defects in materials and workmanship.

E. Field Services:

1. Provide manufacturer’s representative for installation assistance, startup, and training.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment as complete as practical.

B. Protect aluminum components from damage.

C. Store materials off ground and protected from weather.

1.07 GUARANTEE

A. Guarantee all equipment for a period of twelve (12) months after substantial completion.

PART 2 PRODUCTS

2.01 GENERAL

A. Provide complete induced draft aeration system including tower, media, blower, and accessories.

B. Design Conditions:

1. Average Flow: 1200 GPM
2. Maximum Flow: 1500 GPM
3. Influent Water Quality:
4. Iron: 1.7 mg/L
5. Manganese: 0.04 mg/L
6. pH: 7.2
7. Temperature: 70°F

C. Design Criteria:

1. Maximum Hydraulic Loading: 25 GPM/sq ft
2. Minimum Air-to-Water Ratio: 4:1
3. Media Loading Rate: 1–5 GPM/sq ft

2.02 BASIS OF DESIGN

A. Basis of Design Manufacturer:

1. DeLoach Division of WES, Inc., Sarasota, Florida.

B. The specified system establishes the standard of quality, function, and performance.

C. Approved equal products may be submitted in accordance with Division 01 requirements. Substitutions will be considered after award unless otherwise noted.

2.03 AERATION TOWER

A. Construct from 3003 or 5052 aluminum.

B. Dimensions: 8 feet square by 12 feet high.

C. Structural Requirements:

1. Self-supporting design.

2. Designed for 120 mph wind load.

3. Minimum wall thickness: 1/4 inch.

D. Provide aluminum reinforcement.

E. Provide four (4) welded legs with anchor flanges, minimum 12 inches high.

F. Provide lifting lugs.

G. All fasteners shall be Type 316 stainless steel.

2.04 MEDIA

A. Provide structured media consisting of:

1. Ten (10) tiers of 4-inch diameter Schedule 80 PVC pipe.

2. Fiberglass support structure.

B. Minimum media depth: 6 feet.

C. Media shall be removable and accessible through hinged doors.

D. Counter-current operation:

1. Air introduced below media.

2. Water distributed above media.

E. Loose or alternate media types are not acceptable.

2.05 INLET DISTRIBUTOR

A. Header/lateral spray nozzle system.

B. Requirements:

1. Uniform distribution at all flow rates.

2. Maximum pressure drop: 5 psi.

C. Components:

1. 12-inch inlet.

2. Approximately 21 nozzles rated at 71 GPM each.

D. Materials: SCH 40 and SCH 80 PVC.

2.06 AIR SYSTEM

A. Provide four (4) air inlets with stainless steel screens.

B. Provide polypropylene mist eliminator.

2.07 BLOWER

A. Induced draft exhaust blower.

B. Performance:

1. Minimum 6,000 CFM at 0.75 inches static pressure.

C. Construction:

1. Aluminum fan and housing.

D. Noise level: Maximum 80 dB.

E. Bearings: Sealed pillow block.

F. Factory tested per AMCA standards.

2.08 ELECTRIC MOTOR

A. 2 HP, 208V, 3-phase, 60 Hz.

B. TEFC enclosure.

C. Service factor: 1.15.

2.09 POWER SUPPLY

A. Provide NEMA 3R fused disconnect.

B. Installation per NEC and NEMA standards.

2.10 PIPING CONNECTIONS

A. ANSI B16.5 Class 150 flanged connections.

B. Inlet: 12-inch flanged.

C. Outlet: 14-inch plain end.

2.11 ACCESSORIES

A. Water outlet with seal and vortex breaker.

B. 3-inch threaded drain connection.

C. Fiberglass media support plate (minimum 1.5 inches thick).

D. Hinged, gasketed access doors.

E. Type 316 stainless steel anchor bolts.

F. Spare Parts:

1. One complete set of gaskets.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify foundation and anchor bolt placement.

3.02 INSTALLATION

A. Install per manufacturer’s instructions.

B. Ensure proper alignment and anchorage.

3.03 APPLICATION

A. Operate under continuous duty conditions.

B. Maintain unrestricted gravity discharge.

3.04 SYSTEM START-UP

A. Provide manufacturer's representative for startup (minimum two days).

B. Services include:

1. Installation inspection

2. Startup supervision

3. Operator training

C. Provide written certification of proper installation.

D. Correct deficiencies until satisfactory operation is achieved.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL AERATOR related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 46 51 11

PART 1 GENERAL

1.01 SUMMARY

A. Furnish, factory test, deliver, install, and place into satisfactory operation one (1) integrally-geared centrifugal air scour blower package complete with motor, lubrication system, enclosure, controls, bypass valve, accessories, and appurtenances as specified herein.

B. Furnish and install air header piping for uniform distribution of air to each filter lateral.

C. The blower system and header piping shall be designed for air scour service associated with filter backwash operations and shall be suitable for continuous and intermittent duty as required by the process.

D. The blower package shall be factory assembled and tested and delivered as a complete system ready for installation.

E. All equipment shall be manufactured in the United States and provided by a single manufacturer responsible for the complete blower package.

1.02 RELATED SECTIONS

A. Section 40 05 57 - Actuators for Process Valves and Gates

B. Section 40 05 64 - Valves for Actuator Control

C. Section 40 60 00 – Supervisory Control and Data Acquisition

D. Section 40 05 15 – Piping Support Systems

E. Section 46 61 26 - High-Rate Sand Filters

1.03 REFERENCES

A. American National Standards Institute (ANSI)

B. American Society of Mechanical Engineers (ASME)

C. American Gear Manufacturers Association (AGMA)

D. American Society of Testing and Materials (ASTM)

E. Anti-Friction Bearing Manufacturers' Association (AFBMA)

F. American Society for Metals (ASM)

G. National Electrical Code (NEC)

H. National Electrical Manufacturers Association (NEMA)

I. National Fire Protection Association (NFPA)

J. Occupational Safety and Health Administration (OSHA)

K. Underwriters Laboratories (UL)

1.04 SUBMITTALS

A. Submit the following:

1. Blower layout drawings including:

a. Dimensions and service clearances

b. Weights and anchor points

c. Piping connection points

d. Electrical interfaces

e. Lifting points

2. Air header piping shop drawings including:

a. Routing and dimensions

b. Pipe sizes and schedule

c. Support locations

d. Anchor details

e. Connection details to blower discharge and laterals

3. Certified blower performance curves and sizing calculations.

4. Product data for stainless steel pipe, fittings, anchors, and hardware.

5. Control panel wiring diagrams and UL 508 documentation.

6. Operation and Maintenance Manuals.

1.05 QUALITY ASSURANCE

A. The blower manufacturer shall have a minimum of ten (10) years of experience in the design and manufacture of integrally-geared centrifugal blowers.

B. The blower package shall be manufactured, assembled, and tested at a single U.S. facility.

C. All gearing shall be designed in accordance with AGMA high-speed gearing standards and manufactured to AGMA 11 quality or better.

D. Bearings shall be designed for a minimum L10 life of 90,000 hours.

E. Each blower shall undergo factory functional testing for a minimum duration of two (2) hours prior to shipment.

F. Factory testing shall include:

1. Verification of vibration and shaft excursion levels.

2. Testing of all start/stop sequences.

3. Verification of safety alarms and shutdown systems.

4. Recording of performance data at design conditions.

5. Testing with filters installed and enclosure panels closed.

G. Stainless steel piping materials shall conform to ASTM standards applicable to Type 304 stainless steel.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment fully assembled to the extent practical.

B. Protect all openings from dirt, moisture, and damage.

C. Store equipment in a dry, weather-protected location.

D. Follow manufacturer’s written storage recommendations for long-term storage.

E. Store stainless steel piping off the ground and isolated from carbon steel to prevent contamination.

1.07 GUARANTEE

A. Provide a minimum one (1) year warranty from date of startup or eighteen (18) months from shipment, whichever ~~occurs first~~ **provides the longest warranty period**.

B. Warranty shall cover defects in materials and workmanship, including gearbox, impeller, bearings, motor (manufacturer's standard warranty), and control components.

PART 2 PRODUCTS

2.01 GENERAL

A. Basis of Design

1. The equipment specified is based on integrally-geared centrifugal blowers manufactured by Inovair, Lenexa, Kansas.

2. Alternate manufacturers will be considered only if:

a. Submitted in accordance with Section 01 25 00 - Substitution Procedures

b. Complete technical documentation is provided.

c. All performance, material, and design requirements are met or exceeded.

d. Contractor assumes all costs associated with redesign, including electrical, structural, and civil modifications.

B. Performance Requirements

1. The air scour blower shall meet the following design conditions:

Parameter	Value
Air Service	Filter Backwash
Quantity	1
Design Ambient Pressure	14.4 PSIA
Design Ambient Temperature	100°F
Site Elevation	518 ft ASL
Relative Humidity	70%
Design Discharge Pressure	8.0 PSI

Parameter	Value
Design Flow Capacity	1,000 SCFM
Head Rise to Surge	1.93 PSI
Motor Shaft Power	47.8 HP
Motor Size	50 HP
Power Consumption	39.5 kW
Sound Level @ 1 m	< 85 dBA

C. Blower Construction

1. Type: Single-stage integrally-geared centrifugal blower.
2. Construction shall exceed maximum design pressure.
3. All major components manufactured in the USA.

D. Gear Case

1. Three-piece casing:
   a. Cast iron center section.
   b. CNC-machined steel end plates.
2. Line-bored for precise shaft alignment.
3. Internal oil galleys for pressurized lubrication.

E. Impeller

1. Machined from 7075-T6 billet aluminum.
2. Backswept 3-dimensional blade design.
3. Designed using Computational Fluid Dynamics (CFD).
4. sized to achieve the flow and pressure required for application.
5. Balanced to ISO G2.5 or better.
6. Structurally suitable for full operating range.

F. Gears and Shafts

1. Solid 8620 steel shafts and gearing.

2. Case hardened to 52–56 Rc “C”.

3. Fully ground shafts for fitment to the gears and bearings and to minimize run-out and imbalance.

4. Two-stage helical gear configuration.

5. Manufactured to AGMA 11 or better.

6. Balanced to ISO G6.3.

7. Minimum 10-year gear life.

8. Shaft operation at or above 120% of first lateral critical speed.

G. Bearings and Seals

1. Input/intermediate shafts: Rolling element bearings (90,000 hr L10 life).

2. Impeller shaft: Floating-ring oil film journal bearings.

3. Axial support: Tapered land thrust bearing.

4. Impeller seal: Aerospace carbon face lift-off oil seal with vented labyrinth.

5. Input shaft seal: Viton lip seal.

6. Air or magnetic bearings not permitted.

H. Lubrication System

1. ISO 32 synthetic turbine oil.

2. Shaft-mounted mechanical oil pump.

3. Integral air-to-oil cooler (no external coolers permitted).

4. 10-micron oil filtration.

5. Oil pressure regulation between 40–70 psig.

6. Maximum oil temperature: 180°F.

I. Frame and Enclosure

1. Structural steel base frame.

2. Powder coat finish:
    a. Sand blast
    b. Epoxy primer
    c. White powder coat topcoat
3. Noise-reducing enclosure:
    a. Carbon steel construction
    b. Internal acoustic insulation
    c. No external silencers permitted
4. Integral:
    a. Process air filters
    b. Cabinet cooling air filters

J. Electric Motor

1. NEMA premium efficiency.
2. TEFC or ODP, inverter duty rated.
3. Class F insulation.
4. Rated for 105°F ambient.
5. 1.15 service factor across-the-line.
6. 1.0 service factor with VFD.

K. Bypass Valve

1. Integrated butterfly-style valve.
2. Stainless steel/aluminum construction.
3. Electric servo actuator.
4. Automatically actuated during startup, shutdown, and surge avoidance.

L. Local Control Panel (LCP)

1. Integral NEMA 4 enclosure.

2. UL 508 listed.

3. Includes:

a. Machine Level Controller

b. HMI

c. VFD integration package

d. Pressure and temperature sensors

e. Oil monitoring instrumentation

f. Electrically actuated bypass valve control

g. Remote/Local selector

h. Stop button

4. Control Features:

a. Speed control via VFD only (no inlet/discharge vanes permitted).

b. Maintains mass airflow setpoint.

c. Surge protection logic.

d. Rapid bypass open (~1 sec) and controlled close (~15 sec).

e. Automatic shutdown on:

1) Low oil pressure

2) High oil temperature

3) Multiple surge events

f. TCP/IP Modbus connectivity.

g. 4–20 mA or Modbus SCADA interface.

h. Remote monitoring of operating parameters and alarms.

5. VFD:

a. Wall, stand, or MCC mounted.

b. Not permitted within blower enclosure.

M. ACCESSORIES

1. Integral air filters.

2. Oil filtration system.

3. Acoustic enclosure.

4. Bypass valve and actuator.

5. All sensors required for complete operation.

6. Anchor bolts (by Contractor unless noted otherwise).

2.02 AIR HEADER PIPING

A. General

1. Provide complete air header piping system from blower discharge connection to distribution laterals as shown on the Drawings.

2. The air header system shall be designed to uniformly distribute air to each lateral during air scour operation.

B. Materials

1. Pipe:

a. 6-inch diameter.

b. Schedule 5.

c. Type 304 stainless steel.

d. Conforming to applicable ASTM standards for austenitic stainless steel pipe.

2. Fittings:

a. Type 304 stainless steel.

b. Same alloy and corrosion resistance as pipe.

3. Flanges:

a. Stainless steel, compatible with pipe material.

b. Drilled to ANSI standards.

4. Anchors and Hardware:

a. Type 18-8 stainless steel.

b. All bolts, nuts, washers, threaded rods, and anchors shall be stainless steel.

c. No carbon steel hardware permitted in contact with stainless components.

C. Fabrication

1. Cut, fabricate, and weld in accordance with recognized stainless steel welding standards.

2. Welds shall be continuous and ground smooth where required for proper fit-up.

3. Prevent contamination from carbon steel tools during fabrication.

4. Clean piping after fabrication to remove debris and contaminants.

D. Supports and Anchoring

1. Provide supports in accordance with Section 40 05 15.

2. Anchors and supports shall:

a. Prevent vibration.

b. Allow for thermal expansion.

c. Maintain alignment with blower discharge and laterals.

3. All anchors and fastening hardware shall be Type 18-8 stainless steel.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify foundation is level and properly cured.

B. Confirm anchor bolt placement and electrical service availability.

C. Inspect equipment upon delivery for damage.

3.02 INSTALLATION

A. Blower Installation

1. Install blower system in accordance with manufacturer’s written instructions and approved shop drawings.

2. Provide all electrical protection including motor overload protection and 110 VAC circuit protection.

3. Connect air piping without imposing strain on blower flanges.

4. Install VFD in approved remote location.

5. Do not operate equipment until installation has been inspected by manufacturer’s representative.

B. Air Header Piping Installation

1. Install 6-inch Schedule 5 Type 304 stainless steel header piping as shown.

2. Align piping to avoid imposing stress on blower discharge nozzle.

3. Install piping to provide uniform airflow distribution to each lateral.

4. Provide proper slope or drainage provisions where required.

5. Install stainless steel anchors and hardware.

6. Isolate stainless steel components from dissimilar metals to prevent galvanic corrosion.

7. Field welds shall be performed by qualified welders experienced in stainless steel fabrication.

3.03 FIELD QUALITY CONTROL

A. Prior to startup:

1. Inspect alignment.

2. Verify electrical connections.

3. Confirm proper motor rotation.

B. Manufacturer's Services:

1. Installation check and startup – 1/2 day.

2. Owner training – 1/2 day.

C. Post-startup:

1. Unit shall operate smoothly without abnormal vibration.

2. Operate continuously for minimum eight (8) hours.

3. Verify alarms, interlocks, and safety shutdowns.

4. Confirm operation at design performance conditions.

D. Provide complete documentation to Owner upon completion of startup.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL AIR SCOUR BLOWER AND ALL RELATED PIPING related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 46 61 17

PART 1 GENERAL

1.01 SUMMARY

A. Work Included

1. Furnish all labor, materials, equipment, and incidentals required to provide complete factory-fabricated, steel high-rate gravity filters with underdrain systems, air scour system, filter media, appurtenances, and accessories as specified herein and as shown on the Contract Drawings.

2. Filters shall be rectangular, 10 feet by 15 feet (150 square feet surface area).

B. Each filter shall include, but not be limited to:

1. Painted carbon steel tank.

2. Dual parallel lateral underdrain system with integral media retainers.

3. Air header distribution system.

4. Washwater troughs.

5. Anthracite cap media.

6. GreensandPlus™ manganese dioxide coated media.

7. All required nozzles, flanges, and connections.

C. The filter system shall be furnished by a single manufacturer regularly engaged in the design and fabrication of high-rate gravity filtration systems and underdrains for potable water treatment.

D. The General Contractor for Contract 1 shall provide and install the influent/effluent/drain piping, touch up paint, filter control panel, and air scour system to provide a complete and operational filter/backwash system.

E. All contractors shall coordinate deliveries, installation, and lay down areas. Contractors shall not take action preventing other contracts from completing their work in a timely and efficient manner.

1.02 RELATED SECTIONS

A. Section 09 96 00 - High-Performance Coatings

B. Section 33 05 19 - Ductile Iron Pipe

C. Section 40 05 57 - Actuators for Process Valves and Gates

D. Section 40 05 64 - Valves for Actuator Control

E. Section 46 61 17 - Air Scour Equipment

1.03 REFERENCES

A. AWWA B100 – Filtering Material.

B. NSF/ANSI 61 – Drinking Water System Components – Health Effects.

C. ASTM A36 – Structural Steel.

D. ASTM C150 – Portland Cement.

E. AWWA C504 – Rubber-Seated Butterfly Valves.

F. AWS – American Welding Society Code.

G. AISC – Specifications for Structural Steel Buildings.

1.04 SUBMITTALS

A. Product Data

1. Shop drawings showing tank dimensions, structural supports, connection sizes and locations, underdrain layout, air header details, and wash trough configuration.

2. Hydraulic calculations demonstrating compliance with specified flow and headloss criteria.

3. Coating system data sheets and application procedures.

4. Media data sheets and certified gradation analyses.

B. Media Submittals

1. Certified gradation, effective size, and uniformity coefficient for each media type.

2. Certified compliance with AWWA B100 and NSF/ANSI 61.

3. Guaranteed analysis for anthracite and GreensandPlus™ media.

4. Manufacturer's Quality Control documentation.

C. Certificates

1. NSF/ANSI 61 certification for all wetted components.

2. Manufacturer's Certificate of Compliance.

1.05 QUALITY ASSURANCE

A. Manufacturer shall have minimum fifteen (15) years experience in the design and manufacture of dual parallel lateral air/water underdrain systems.

B. Underdrain and associated components shall be supplied by a single manufacturer to ensure system compatibility and performance responsibility.

C. All materials in contact with potable water shall be certified to NSF/ANSI 61.

D. Media shall comply with AWWA B100 latest revision.

E. Manufacturer shall provide qualified field service representative for installation supervision and start-up assistance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Media shall be delivered in manufacturer's original packaging.

B. Anthracite shall be packaged in 1 cubic foot bags or 2,000-pound super-sack totes.

C. GreensandPlus™ shall be packaged in 1/2 cubic foot bags or bulk sacks as supplied by manufacturer.

D. Protect media from contamination and moisture.

E. Store underdrain components off the ground and protected from ultraviolet exposure.

1.07 GUARANTEE

A. Provide one-year warranty from date of Substantial Completion covering defects in materials and workmanship.

PART 2 PRODUCTS

2.01 GENERAL

A. Basis of Design: Steel pre-engineered gravity filters with dual parallel lateral underdrain system as manufactured by F.B. Leopold Company or Engineer approved equal.

1. Leopold Type XA underdrain with I.M.S® 200 media retainer

B. Tanks shall be factory fabricated and shop painted prior to shipment.

2.02 STEEL FILTER TANK

A. Construction

1. Minimum 1/4-inch ASTM A36 structural steel plate.

2. Fully seal welded watertight construction.

3. Structural reinforcement as required by design loads.

4. Integral dual wash water troughs and supports.

B. Dimensions

1. Filter Media area: 10 feet x 15 feet.

2. Surface area: 150 square feet.

C. Connections (Flanged)

1. Influent: 12-inch.

2. Effluent: 16-inch.

3. Overflow: 12-inch.

4. Backwash effluent: 16-inch.

5. Media removal: 6-inch.

6. Backwash supply: ~~14~~ **16**-inch.

7. Filter to Waste: 6-inch.

8. Air scour inlet: ~~4~~ **6**-inch.

D. Coatings

1. Interior and exterior coating system suitable for potable water service.

2. Surface preparation SSPC-SP10.

3. Minimum interior dry film thickness: 10 mils.

2.03 UNDERDRAIN SYSTEM

A. Dual parallel lateral HDPE block system with integral primary and secondary chambers.

B. Dispersion orifices integrally molded; no drilled orifices permitted.

C. Minimum 20 inches headloss across orifices at 20 gpm/sf backwash rate.

D. Designed for:

1. The filter underdrain system, when installed, shall be designed for a net internal loading during backwash of the greater of either 1400 psf or 200 percent of the maximum pressure at maximum backwash rates. No credit shall be taken for the weight of gravel or filter media.

2. 2.800 psf downward loading minimum.

3. The underdrain system shall have an integral grout pocket designed to provide uplift resistance as a result of internal pressurization of 30 PSI (2.068 Bar) without any external mechanical anchors.

4. Underdrain blocks that do not have a grout pocket shall have external anchor rods embedded into the filter floor and shall extend above the underdrain and hold the underdrain down from the top.

5. The external anchor system shall be designed for a minimum allowable load of 30 psi hold down across the filter.

6. All anchors shall be tested prior to the placement of the underdrain block to 130% of the allowable load.

7. All anchors shall be type 316 stainless steel.

E. Capable of uniform air distribution at 1–5 scfm/sf and combined air/water backwash.

2.04 AIR HEADER

A. Type 304 stainless steel Schedule 5 header.

B. Designed to uniformly distribute air to each lateral.

C. Anchors and hardware Type 18-8 stainless steel.

2.05 FILTER MEDIA

A. Anthracite Media (Cap Layer)

1. Product shall be clean of debris and foreign material.

2. Only anthracite water filter media mined and manufactured in the United States shall be accepted.

3. Media shall not contain compounds producing toxic effects in properly treated water.

4. Certification

a. Certified to meet or exceed AWWA B100-01 and NSF/ANSI 61.

b. Bidder shall include guaranteed analysis with bid.

5. Physical Properties

a. Bulk Density: 50 lb/cu ft.

b. Specific Gravity: 1.6 ± 0.05.

c. Effective Size: 0.95 – 1.05 mm.

d. Uniformity Coefficient: 1.5 maximum.

e. Hardness: Moh's scale of hardness greater than 2.7.

6. Depth

a. 12 inches finished depth after backwashing and leveling.

B. Greensandplus™ Media

1. Manganese dioxide coated silica media for removal of iron, manganese, hydrogen sulfide, arsenic, and radium.

2. Media shall be GreensandPlus™ as manufactured by Inversand Company or approved equal.

3. Certified NSF/ANSI 61 compliant.

4. Effective Size: 0.30 – 0.35 mm.

5. Uniformity Coefficient: Less than 1.60.

6. Specific Gravity: Approximately 2.4.

7. Minimum depth: 15 inches.

C. Silica Gravel

1. Silica gravel to be placed between IMS underdrain and GreensandPlus™ to prevent iron and manganese plugging of underdrain in the following ascending layers:

a. 2.5 inches – 1/8 inch × No. 12 silica gravel.

b. 2 inches – 1/4 inch × 1/8 inch silica gravel.

c. 2 inches – 3/4 inch × 1/2 inch silica gravel.

2. All gravel shall be hard, durable, rounded silica gravel conforming to AWWA B100.

3. Gravel shall be washed, free of clay, shale, mica, organic matter, and other deleterious materials.

4. Gravel shall be placed carefully to avoid disturbance of underlying layers and leveled to uniform thickness prior to placement of GreensandPlus™ media.

2.06 PERFORMANCE REQUIREMENTS

A. Service Flow Rate: Up to 10 gpm/sf (1,500 gpm per filter).

B. Backwash Water Rate: Up to 15 gpm/sf.

C. Air Scour Rate: 4–6 scfm/sf.

D. Combined Air/Water Backwash: 4 scfm/sf and 5 gpm/sf typical.

E. Headloss through 40-ft lateral at 20 gpm/sf shall not exceed 45 inches water column.

2.07 ACCESSORIES

A. Washwater troughs designed for 1,125 gpm carry-off with minimum 2-inch freeboard.

B. Trough spacing such that maximum particle travel during backwash does not exceed 3 feet.

C. All gaskets, bolts, anchors, and appurtenances required for complete installation.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify foundation elevations and anchor bolt locations prior to installation.

B. Protect underdrain from debris and contamination.

3.02 APPLICATION

A. Install tank, underdrain, and appurtenances per manufacturer's written instructions.

B. Grout underdrain blocks with Portland cement grout, minimum 2,500 psi compressive strength.

C. Allow minimum three (3) days curing prior to functional testing.

D. Media Installation

1. Install GreensandPlus™ first.

2. Backwash and condition per manufacturer's recommendations prior to placing anthracite.

3. Install anthracite cap and backwash to final grade.

E. Perform visual air and water distribution tests prior to media placement.

F. Disinfect filter prior to placing into service.

PART 4 PAYMENT

4.01 The above work shall include all equipment, material, and labor; and shall be incidental to the price for pay item PROVIDE AND INSTALL FILTERS WITH UNDERDRAINS, MEDIA, ETC. related to plans titled W2E WATER TREATMENT PLANT.

END OF SECTION 46 61 26

Midwest Engineering and Testing, Inc.
geotechnical · environmental · materials engineers
501 Mercury Drive
Champaign, IL 61822-9649
FAX 217-359-8446
www.metgeotech.com

July 5, 2023

Mr. Lee Beckman
Milano & Grunloh Engineers, LLC
114 West Washington Street
Effingham, IL 62401

Re: Subsurface Exploration and Geotechnical Evaluation
Proposed Water Treatment Plant
Browns/Grayville Road
Grayville, Illinois
MET Project No. C33076

Dear Mr. Beckman:

In accordance with your request, Midwest Engineering and Testing, Inc. (MET) has completed this subsurface exploration and evaluation of the foundation conditions for the above-referenced project. Our report, which includes our findings and recommendations regarding design and construction of the foundation systems is being submitted in PDF format via e-mail. Hard copies can be provided, if desired.

MET appreciates the opportunity to be of service during this phase of the project. If there are any questions or comments you may have regarding the content of this report or if we may be of any further service, please contact us at your convenience.

Sincerely,

Midwest Engineering and Testing, Inc.

Nicholas D. Wendling, P.E.
Geotechnical Department Manager

Daniel E. Tappendorf, P.E.
President

SUBSURFACE EXPLORATION AND GEOTECHNICAL EVALUATION

Proposed Water Treatment Plant
Browns/Grayville Road
Grayville, Illinois

PREPARED FOR

Milano & Grunloh Engineers, LLC
114 West Washington Street
Effingham, IL 62401

July 5, 2023

MET File No. C33076

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INTRODUCTION

General

This report presents the results of a geotechnical exploration for the proposed new Water Treatment Plant building to be constructed along the east side of Browns/Grayville Road on the northern edge of Grayville, Illinois. The purpose of this study was to determine and evaluate the subsurface conditions existing at the subject site and to establish related parameters for consideration by the design engineers. Included herein are the results of the subsurface exploration, field and laboratory soil test data, and recommendations regarding design and construction of the foundation systems.

Scope

The scope of services included a reconnaissance of the site, subsurface exploration, field and laboratory testing of the soil samples collected, and engineering analysis and evaluation of the data. Additionally, area specific geologic maps and literature related to the site were reviewed.

Authorization

Authorization to perform this subsurface exploration and analysis was provided in a May 22, 2023, e-mail from Mr. Rex Gower with Milano and Grunloh Engineers. The e-mail was sent in response to MET Proposal No. C23117, dated April 17, 2023 which outlined the scope of services and conditions for performance of the work.

PROJECT AND SITE DESCRIPTION

The proposed project site is located within an existing agricultural field on the east side of Browns/Grayville Road on the northern edge of Grayville, Illinois. A Vicinity Map, Figure 1, is included in the Appendix. The topography of the site is relatively flat to slightly rolling with drainage generally directed to the east to a natural drainageway.

It is understood the proposed project will include construction of a new water treatment building which will house associated equipment. Building construction is anticipated to consist of structural steel framing with a concrete slab-on-grade. We anticipate the structure will have relatively light structural loading with maximum column loads on the order of 150 kips. Additionally, a new 1-million gallon ground storage tank and two (2) new lime beds will also be constructed. The anticipated locations of the improvements are shown on the Boring Location Diagram, Figure 2, which is included in the Appendix. We anticipate the improvements will be constructed near existing grade with cut and fill of less than 3 feet.

GEOLOGY OF THE AREA

General

The geology of the project area has been greatly influenced by several major land forming factors. Bedrock and tectonic movements prior to the Pleistocene Period, continental glaciation during the Pleistocene Period, wind action, and man have all contributed to the geologic history of the area.

Bedrock Geology

In the site vicinity, Pennsylvanian Age bedrock deposits associated with the Mattoon Formation are generally found at depths between 50 and 100 feet below the ground surface. Shale, Limestone, Coal, and Sandstone are the predominant rock types comprising the formation in this area.

Surficial Geology

In general, the surficial geology of the area typically consists of 10 to 15 feet of wind deposited and water worked loessial material which overlies Illinoisan Age glacial drift deposits. The drift is mapped as the Vandalia Till Member of the Glasford formation which is generally comprised of a compact silty to sandy clay till. Tubes, lenses and seams of water sorted sandy and silty glacial outwash are also common within the geologic formation.

Seismic Considerations

Lacking soil strength and density data through a depth of 100 feet, it is our opinion that **Site Class D** as defined in Table 1613.5.2 of the International Building Code (IBC) – 2015 be utilized for design. The project site is located at approximate latitude 38.2816°N and longitude 87.9876°W. At this location, the 0.2 second period (S_S) and 1.0 second period (S_1) spectral acceleration values, as determined from the USGS U.S. Seismic Design Maps Web Application, are 0.639 g and 0.21 g, respectively.

FIELD EXPLORATION

Scope

In order to evaluate the significant engineering characteristics of the foundation soils, a field exploratory program was undertaken. Seven (7) soil borings were advanced for the project, to depths between 16.5 and 51.5 feet below the ground surface. The boring locations were determined in the field by MET personnel and the approximate locations are shown on the Boring Location Diagram, Figure 2, included in the Appendix. The following sections provide a description of field drilling and testing procedures utilized.

Drilling and Sampling Procedures

The soil borings were performed with a track-mounted drilling rig equipped with a rotary head. Conventional, continuous-flight, hollow-stem augers were used to advance the borings with representative samples obtained employing split-barrel sampling techniques in general accordance with ASTM Procedure D-1586.

Field Tests and Measurements

Standard Penetration Tests: During the sampling procedure, Standard Penetration Tests (SPTs) were performed at regular intervals through the depth of the boring. The SPT value ("N" or blow counts) is defined as the number of blows required to advance a 2-inch O.D., split-barrel sampler a distance of one foot by a 140-pound hammer falling 30-inches. These values provide a useful preliminary indication of the consistency or relative density of most soil deposits and are included on the Soil Boring Logs.

Water Level Measurements: Water level observations were made during and upon completion of the soil boring operations. All groundwater information is noted on the Soil Boring Logs included in the Appendix.

LABORATORY TESTING

General

Additional significant characteristics of the foundation materials were determined in the laboratory to provide data on which to classify and quantitatively assess the engineering properties of the soil samples obtained. The types of soils encountered were identified and logged on the boring record. The results of the field and laboratory tests are presented on the Soil Boring Logs found in the Appendix. Representative samples of the soils encountered in the field were placed in clean, glass sample jars and are now stored in the laboratory for further analysis, if desired.

Laboratory Tests and Measurements

Visual Classification: A soils engineer visually classified all samples in accordance with the Unified Soil Classification System (ASTM D-2488) terminology. An explanation of the symbols used in this system is included in the Appendix to this report.

Moisture Content Tests: The natural moisture content of all samples was determined by ASTM method D-2216 and is recorded on the Soil Boring Logs as a percentage of dry weight of soil.

Unconfined Compression Test: The undrained shear strength of the cohesive soils was determined from unconfined compression tests (Q_U) on specimens obtained from the split-barrel samplers. The strength values of soil samples obtained by the SPT method must also be considered, recognizing that this sampling technique provides a representative, but somewhat disturbed sample.

Hand Penetrometer Tests: Cohesive specimens extracted from the split-barrel sampler were tested in the laboratory with a calibrated soil penetrometer. This device provides an approximation of the unconfined compressive strength of the soils, and is useful, along with other soil parameters, in evaluating the soil strength characteristics. The results are listed on the Soil Boring Logs beneath the column labeled "Q_P".

Dry Density Determination: The dry density was determined on the cohesive soils where intact samples were available. The results are listed on the Soil Boring Logs beneath the column labeled "Dd".

The laboratory testing was performed in general accordance with the respective ASTM Methods, as applicable. The results are included on the Soil Boring Logs included in the Appendix to this report. Unless notified to the contrary, all samples will be disposed of after one (1) month.

DESCRIPTION OF SUBSURFACE CONDITIONS

General

The types of foundation materials encountered at the test boring locations are described on the Soil Boring Logs. The lines delineating the changes in strata on the logs represent an approximate boundary between the various soil classifications. These soil descriptions and delineations are representative for the specific test-hole location. Variations in the soil profile and the engineering properties of the soil deposits may occur across the site, even at relatively short distances. A summary of the major soil profile components is described in the following paragraphs. A more detailed description and supporting data for each boring location can be found on the individual Soil Boring Logs.

Soil Conditions

The surface at the boring locations was covered with a thin layer of vegetation and topsoil. The topsoil was underlain by loessial brown and brown mottled gray silty clays and clayey silts of loessial origin. The loess typically extended to depths of about 12 to 18 feet below surface grade and possessed a soft to very stiff consistency with moisture contents varying between 17 and 32 percent. The loess was underlain by to silty to sandy clay glacial till with stiff to hard consistency which extended to the boring termination depths.

Groundwater Observations

Groundwater was encountered in borings B-2, B-5, and B-7 at depths ranging from 5 to 10 feet below grade. It must be recognized that groundwater levels fluctuate with time due to variations in seasonal precipitation, lateral drainage conditions, and soil permeability characteristics. The site geology commonly manifests development of a perched groundwater condition, where infiltrated precipitation percolates through the more pervious loessial soils but is prevented from further downward migration by the relatively impermeable glacial till. Piezometers should be installed where it is desired to monitor the prevailing ground water levels at the site.

FOUNDATION DISCUSSION AND RECOMMENDATIONS

General

In light of the subsurface conditions encountered, it is our opinion that relatively lightly loaded shallow foundation systems could be considered for support of the proposed structures, tanks and equipment. Discussions of the foundation design parameters, as well as site preparation and construction considerations, are included in the following sections.

Shallow Foundation Systems

Water Treatment Plant

It is our opinion that conventional shallow footing foundations established on suitable natural soils or engineered structural fill represent a feasible foundation alternative for the Water Treatment Plant building and associated equipment. We anticipate foundations will be established within 3 feet of the existing ground surface, which would generally place the foundations within a stratum of stiff silty clay. However, soft or loose silts underlie the stiff silty clays and will control foundation design. It is recommended that spread and continuous footings founded within 3 feet of the existing ground surface be designed using net allowable bearing pressures of 2,000 PSF and 1,700 PSF, respectively. This allowable bearing capacity assumes a maximum column load of 150 kips and a maximum wall load of 6.5 kips/ft., with a minimum of one foundation width between each isolated footing.

It should be noted that if footings are required to extend below depths of about 3 to 4 feet below the existing ground surface, softer soils will likely be encountered. This would require either widening of the proposed foundation or excavation and replacement of the softer soils. Additional information regarding remedial measures for unsuitable bearing conditions can be found in the General Foundation Considerations section of this report.

Ground Storage Tank

The proposed water tank is anticipated to be a 75 ft. diameter by 32 ft. tall, welded steel structure. It is anticipated that the tank will be founded on a concrete ring-wall foundation infilled with granular fill, or upon a granular platform with a steel retainer ring placed at the surface and filled with sand or pea gravel. Based upon the height of the tank, we anticipate a contact pressure of about 2,500 PSF at the base of the proposed tank.

Considering the soils encountered in boring B-5 it is recommended that the proposed tank excavation extend through a depth of about 5 feet below existing grade, with proposed grade reestablished using crushed stone. Considering the silty nature of the soils at this depth, the use of geotextile or a base course of 3-inch size crushed stone may be required to provide a stable working platform for tank construction. After a relatively stable platform is achieved using the 3-inch size crushed stone, well-graded crushed stone such as IDOT CA-6 should be utilized to cap the large crushed stone and to reestablish proposed grade.

Assuming the upper 5 feet of the loessial soils are removed and replaced with engineered compacted granular fill, we anticipate a factor of safety of 2.5 or greater against bearing capacity failure would be achieved. Total settlements of 2.5-inches or less would be expected with differential settlements of less than 1.5 inches. While welded steel tanks can typically withstand such total and differential settlements, it is recommended that piping systems be designed to allow for the above outlined settlements.

General Foundation Consideration

Footings subjected to lateral loads should be dimensioned so that sliding resistance is adequate without including passive pressure. For sliding resistance, a friction coefficient of 0.35 is recommended for concrete on the native silty clay and clayey silt bearing soils. The friction coefficient value may be increased to 0.40 if the foundation elements are supported on a base course of crushed stone. Passive resistance in front of footings should not be used because of the possibility of disturbance from frost penetration and utility excavations. It should also be noted that relatively large displacements are necessary to mobilize full passive resistance.

All exterior foundation elements should be founded at least 30 inches below grade for frost protection purposes. Interior footings and mats may be founded immediately below floor slabs provided they are supported on suitable native soils or engineered structural fill. All footings must be protected from the effects of frost when construction is carried out during the winter months.

It is possible that areas of suspect or marginal bearing conditions might be encountered during excavation for shallow foundations. Such areas should be evaluated by the soils engineer when discovered to determine the appropriate remedial measures which may need to be taken. This may involve overexcavation down to underlying higher strength soils, where available, or removal and replacement of the unsuitable materials with engineered fill.

Where the removal and replacement of unsuitable bearing material is considered beneath a footing or mat foundation, the excavation must extend laterally 1 foot for each foot of backfill below the foundation base. It is recommended that fill or backfill materials used for this case consist of granular soils that can be categorized as GW, GP, SW or SP under the Unified Classification System. Granular backfill should be placed in lift thicknesses not exceeding 12 inches and compacted to 95 percent of the maximum ASTM D-698 (Standard Proctor) dry density.

It is recommended that individual column footings have a minimum dimension of 30 inches and continuous footings have a minimum width of 18-inches. In order to lessen the effects of any slight differential movement that may occur due to variations in the character of the supporting soils and seasonal moisture contents, it is recommended that all footings be suitably reinforced.

In general, the performance of the foundation systems on this site is dependent on the various factors, which have been discussed. The above outlined bearing pressures were evaluated using a factor-of-safety of 3 against bearing capacity failure, which theoretically results in contact pressures of sufficiently low magnitude to keep load-induced deformations within the elastic range of the bearing soils. Potential, load responsive settlements should remain within tolerable limits, estimated to be 1 inch or less for the Water Treatment Building, and less than 2.5 inches for the water tank foundation, if the suggested design and construction criteria are followed. It is recommended that the preparation and installation of the foundations be monitored and tested by a representative of the soils engineer.

Floor Slabs

Before any slab supporting fill is placed, all organic, loose, or obviously compressive materials should be removed. The subgrade should be carefully inspected, and areas of excessive yielding should be over-excavated and backfilled with clean, compacted soil, as discussed in the **Site Preparation** section of this report. It is recommended that slabs be supported on a base course of well-graded granular material such as IDOT gradation CA-6. Proper subgrade preparation and adherence to recommendations regarding placement of the engineered fill will allow the use of a subgrade modulus of 100 psi/in for floor slab design.

The floor slabs should be suitably reinforced and, in the case of floating slabs, proper joints should be provided at the junctions of the slab and foundation system so that a small amount of independent movement can occur without causing damage. Large floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes.

CONSTRUCTION CONSIDERATIONS

Site Preparation

It is recommended that all organic topsoil and vegetation be removed beneath the building and site work areas prior to construction. The resulting subgrade should then be proofrolled and thoroughly inspected to identify any unstable areas that may require remedial measures. Scarification, drying, and recompaction of wet soils or the removal and replacement of poor soils with acceptable materials are alternative methods which can be considered, but this determination should be made by the soils engineer at the time of construction. New engineered fill may then be added, as necessary, to establish finished grade.

It is recommended that fill materials used for structural support consist of granular material or lean, inorganic cohesive soils. The native on-site soils present below the organic vegetation and topsoil are considered suitable for use in mass grading operations, however the silty nature of the soils can make them difficult to place and compact if ideal moisture contents are not maintained. All structural backfill and fill materials should be placed in lifts not exceeding 8 inches in thickness in a loose state at a moisture content within 3 percentage points of laboratory optimum. Structural fill and backfill materials should be compacted to 95 percent of the maximum dry density as determined by ASTM D-698 (Standard Proctor) method of test.

Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities. This is especially true of cohesive soils, where scarification and aeration may be required to achieve near-optimum moisture levels prior to compaction. A sheepsfoot roller is generally required for compaction of clayey soils, whereas a vibratory smooth drum roller is preferred for granular and silty material. Granular backfill compacted with small, hand-operated equipment should be used in confined areas.

The evaluation of the subgrade and selection of fill materials for various applications should be done in consultation with the soils engineer. Similarly, the placement and compaction of fill for structural applications should be monitored and tested by a qualified representative of the soils engineer.

Groundwater Control

We do not anticipate significant groundwater seepage will be encountered in excavations extending less than 5 feet below surface grade. Should seepage be encountered we expect the use of sump pumps can be utilized to maintain relatively dry conditions.

Because the foundation materials are subject to deterioration when exposed to free moisture, every effort should be made to keep the soils dry, during and after construction. This is especially true of the silty soils that were often encountered below depths of 3 to 5 feet at this site. Site runoff and discharge water from roof drains should be diverted away from the foundation and directed towards on-site retention areas, natural drainage ways or municipal sewer systems. Such measures reduce the potential for the softening and possible erosion of the foundation subgrade soils.

Excavations

All excavations should be performed in accordance with the requirements detailed in the **OSHA Excavation Regulations and Procedures, Section 1926 Subpart P**. Based upon the soil boring data, Type A, Type B and Type C soils were all encountered throughout the depths explored. The maximum allowable slopes for these soil types are shown in the following table.

Soil Type	Maximum Allowable Slopes for Excavations Less than 20 ft. deep Horizontal : Vertical (H:V)
A	¾ : 1
B	1: 1
C	1½:1

All excavations should be monitored by a Competent Person, as defined by the OSHA standard, and appropriate shoring or sloping techniques used to prevent cave-ins.

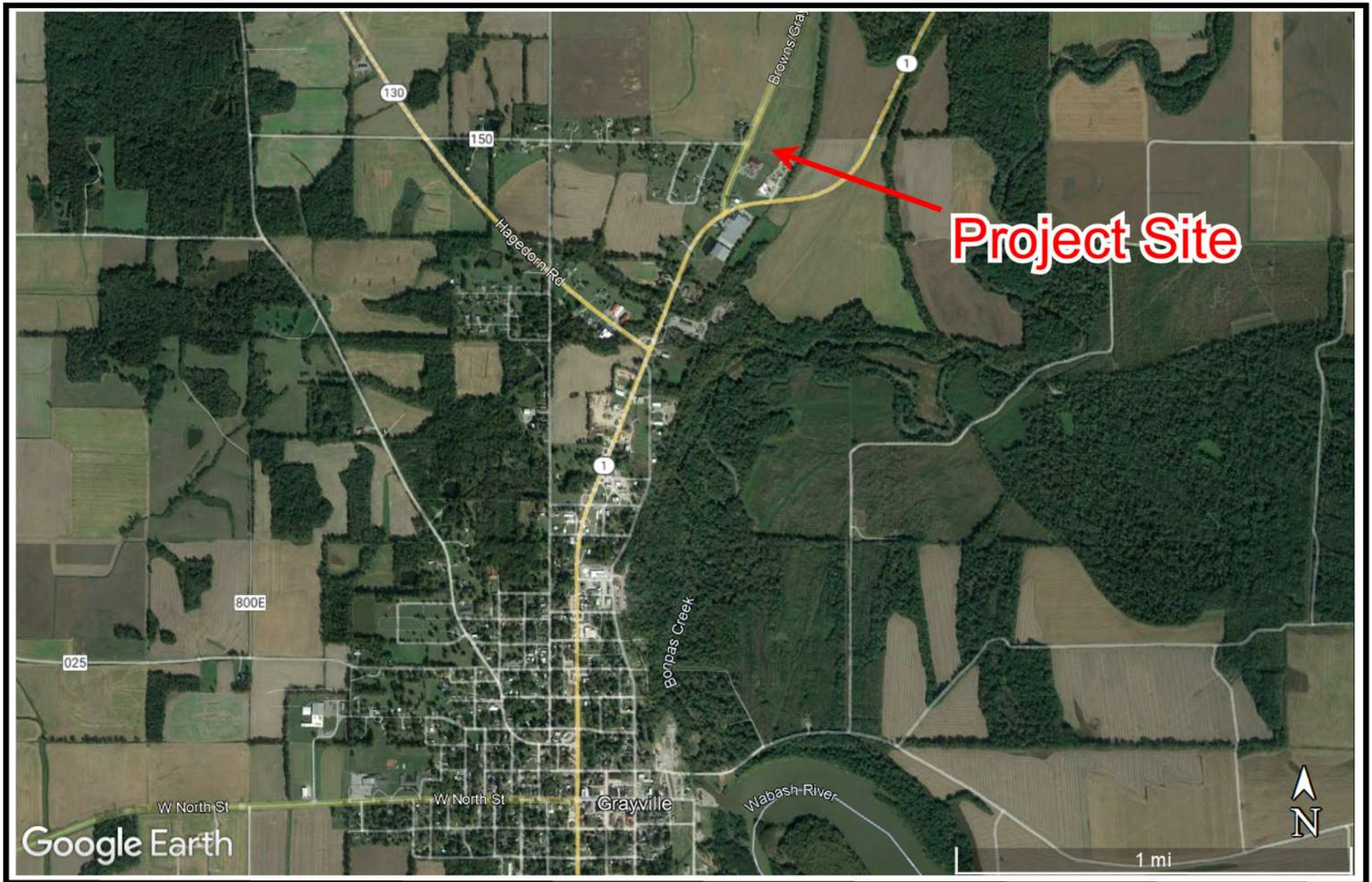
GENERAL COMMENTS

This geotechnical exploration and foundation analysis has been conducted to aid in the evaluation of the foundation conditions for the proposed new Water Treatment Plant to be constructed in northern Grayville, Illinois. The recommendations presented herein are based on the available soil information obtained and the design information provided. Any changes in the soil conditions encountered during construction, building design, or building location should be brought to the attention of the soils engineer to determine if modifications to the recommendations are required. The final design plans and specifications should also be reviewed by the soils engineer to determine that the recommendations presented herein have been interpreted and implemented as

intended. It is recommended that the earthwork and foundation operations be monitored by the soils engineer, to test and evaluate the bearing capacities, and the selection, placement and compaction of controlled fills.

This geotechnical study has been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings, recommendations, and opinions contained herein have been promulgated in accordance with generally accepted practice in the fields of foundation engineering, soils mechanics, and engineering geology.

APPENDIX



Midwest Engineering and Testing, Inc.

geotechnical*environmental*materials engineers

Figure 1 - Vicinity Map

Proposed Water Treatment Plant
Browns / Grayville Road
Grayville, Illinois

SCALE:	Shown Above
PROJECT NO.:	C33076
DATE:	July 5, 2023
DRAWN BY:	NDW



Midwest Engineering and Testing, Inc.

geotechnical*environmental*materials engineers

Figure 2 - Boring Location Diagram

Proposed Water Treatment Plant
Browns / Grayville Road
Grayville, Illinois

SCALE:	None
PROJECT NO.:	C33076
DATE:	July 5, 2023
DRAWN BY:	NDW

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-1
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION / Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil	1-SS	5	2.8	-	25	-	
Brown and gray silty CLAY (CL) with sand	2-SS	7	2.0	-	26	-	Dry during and upon completion of drilling
5	3-SS	3	0.3	0.3	30	86	
	4-SS	6	0.8	0.6	23	100	
Brown and gray clayey SILT (ML) with sand							
10	5-SS	7	1.8	1.9	20	108	
	6-SS	11	2.5	2.6	21	112	
15	7-SS	7	1.3	1.6	21	105	
Brown and gray sandy CLAY (CL)							
Brown and gray silty CLAY (CL) with sand and small gravel - Till 20	8-SS	21	4.5+	7.4	17	110	
Gray clayey SILT (ML) with sand and small gravel - Till 25	9-SS	12	2.5	2.2	18	109	
END OF BORING @ 26.5 FEET							

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-2
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION / Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil	1-SS	5	3.3	-	23	-	
Brown and gray silty CLAY (CL)	2-SS	7	1.3	1.0	25	99	
5	3-SS	3	0.3	-	32	-	▼ Drilling: 5 ft.
Brown clayey SILT (ML) with sand	4-SS	5	0.8	0.8	23	105	
10	5-SS	7	1.5	1.9	20	114	
	6-SS	13	1.8	-	22	-	
Brown and gray silty CLAY (CL) with sand 15	7-SS	13	4.3	-	17	-	
							▼ Completion: 18 ft.
20	8-SS	22	4.5+	6.4	18	110	
Brown and gray sandy CLAY (CL) with smalll gravel - Till							
25	9-SS	20	3.8	3.9	17	109	
END OF BORING @ 26.5 FEET							

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-3
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION	Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil		1-SS	5	2.5	-	27	-	
Brown and gray silty CLAY (CL)		2-SS	7	1.3	1.7	28	91	Dry during and upon completion of drilling
	5	3-SS	7	0.8	0.7	27	95	
Brown and gray clayey SILT (ML)		4-SS	10	1.3	0.7	27	100	
	10	5-SS	6	1.0	0.8	20	108	
		6-SS	10	2.5	2.5	22	113	
Brown and gray silty CLAY (CL) with sand	15	7-SS	9	1.3	1.4	21	107	
	20							
Brown and gray sandy CLAY (CL) with smalll gravel - Till		8-SS	19	4.5+	7.8	16	111	
Gray clayey SILT (ML) with sand and small gravel - Till	25	9-SS	13	2.5	3.3	19	108	
END OF BORING @ 26.5 FEET								

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-4
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION / Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil	1-SS	6	3.0	3.5	25	92	
Brown and gray silty CLAY (CL) with sand	2-SS	7	1.5	1.6	24	99	Dry during and upon completion of drilling
5	3-SS	4	0.5	0.3	30	88	
Brown and gray clayey SILT (ML) with sand	4-SS	6	1.3	0.6	24	101	
10	5-SS	6	1.8	1.2	20	110	
	6-SS	13	2.8	2.9	22	102	
Brown and gray silty CLAY (CL) with sand 15	7-SS	14	4.0	-	17	-	
20	8-SS	16	4.5+	7.0	17	110	
Brown and gray sandy CLAY (CL) with smalll gravel - Till							
25	9-SS	20	4.5	5.2	18	107	
END OF BORING @ 26.5 FEET							

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET Midwest Engineering and Testing, Inc.

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-5
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION	Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil		1-AU	5	2.5	2.8	25	94	
Brown and gray silty CLAY (CL)								
		2-SS	2	0.3	-	32	-	
	5							
Brown and gray clayey SILT (ML)		3-SS	4	1.0	0.8	24	100	
		4-SS	3	1.0	1.4	19	107	Drilling: 7.5 ft.
	10							
Brown and gray clayey SILT (ML) with sand		5-SS	3	1.0	1.3	21	103	
Brown and gray silty CLAY (CL) with sand		6-SS	4	2.0	2.0	25	101	
	15							
		7-SS	17	4.5+	5.9	16	112	
	20							
Brown and gray silty CLAY (CL) with sand and small gravel - Till		8-SS	15	3.8	3.6	17	111	
	25							
		9-SS	28	4.5+	4.2	19	116	
	30							
Brown and gray clayey SILT (ML)		10-SS	17	2.0	2.2	17	102	
Brown and gray silty CLAY (CL) with sand and small gravel - Till	35	11-SS	50 / 4"	3.5	3.7	20	109	Completion: 37 ft.
	40							
		12-SS	50 / 4"	4.5+	2.8	16	118	
Gray silty CLAY (CL) with sand and small gravel - Till	45	13-SS	50 / 3"	4.5+	-	11	-	
	50							
		14-SS	50 / 5"	4.5+	2.5	11	125	
END OF BORING @ 51.5 FEET								

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-6
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION / Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil	1-SS	5	2.8	2.7	22	97	
Brown and gray silty CLAY (CL) with sand							
	2-SS	3	0.5	-	29	-	Dry during and upon completion of drilling
5							
	3-SS	5	1.5	-	26	-	
Brown and gray clayey SILT (ML) with sand							
	4-SS	7	1.8	1.9	19	114	
10							
	5-SS	6	1.5	1.7	25	109	
	6-SS	10	1.3	1.4	19	122	
Brown and gray silty CLAY (CL) with sand and small gravel - Till							
15							
	7-SS	12	4.5	4.2	17	115	
END OF BORING @ 16.5 FEET							
20							
25							

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

SOIL BORING LOG

MET **Midwest Engineering and Testing, Inc.**

Project Name: Proposed Water Treatment Plant
Location: Browns / Grayville Road
Grayville, Illinois

Boring: B-7
Project No. : C33076
Date of Boring: May 31, 2023
Field Representative: Zach Wilcoxen

VISUAL SOIL CLASSIFICATION / Feet	Sample No.	N	Q_p (tsf)	Q_u (tsf)	MC (%)	Dd (pcf)	Remarks
6" Topsoil	1-SS	5	3.3	3.7	26	93	
Brown and gray silty CLAY (CL) with sand							
	2-SS	3	1.8	-	27	-	
5							
Brown and gray clayey SILT (ML) with sand	3-SS	1	0.5	-	27	-	
	4-SS	5	1.3	0.6	21	108	
10							▼ Drilling: 10 ft.
Brown and gray silty CLAY (CL) with sand	5-SS	5	1.5	1.8	20	114	
	6-SS	13	3.0	3.6	21	122	
Brown and gray sandy CLAY (CL) with smalll gravel - Till							
15	7-SS	12	2.8	2.8	18	109	
END OF BORING @ 16.5 FEET							
20							
25							

Lines of Demarcation represent an approximate boundary between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.

GENERAL NOTES

SAMPLE IDENTIFICATION

Visual soil classifications are made in general accordance with the Unified Soil Classification System on the basis of textural and particle size categorization, and various soil behavior characteristics. Visual classifications should be substantiated by appropriate laboratory testing when a more exact soil identification is required to satisfy specific project applications criteria.

PARTICLE SIZE ±

Boulders: 8 inches Cobbles: 3 to 8 inches Gravel: 5 mm to 3 inches	Coarse Sand: 2 mm to 4 mm Medium Sand: 0.42 mm to 2 mm Fine Sand: 0.074 to 0.42 mm	Silt: 0.005 mm to 0.074 mm Clay: - 0.005 mm

DRILLING & SAMPLING SYMBOLS

SS: Split-spoon, 2" O.D. by 1 3/8" I.D.
ST: Shelby Tube, 2" O.D. or 3" O.D., as noted in test
AU: Auger Sample
DB: Diamond Bit
CB: Carbide Bit
RB: Roller Bit
WS: Wash Sample
BS: Bag Sample
HA: Hand Auger

SOIL PROPERTY SYMBOLS

N: Standard penetration count, indicating number of blows of a 140 lb. Hammer with a 30-inch drop, required to advance a split-spoon sampler one (1) foot.
Qu: Unconfined compressive strength, tons per square foot (tsf).
Qp: Calibrated hand penetrometer resistance, tsf.
MC: Moisture Content, %
LL: Liquid Limit PL: Plastic Limit PI: Plasticity Index
Dd: Dry density, pounds per cubic foot (pcf).
PID Photoionization Detector (Hnu meter) volatile vapor level, ppm

SOIL RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

NON-COHESIVE SOILS		COHESIVE SOILS		
Classifier	N-Value Range	Classifier	Qu Range (tsf)	N-Value Range
very loose	0 – 3	very soft	0 – 0.25	0 – 2
loose	3 – 7	soft	0.25 – 0.5	2 – 5
medium dense	7 – 15	medium stiff	0.5 – 1.0	5 – 10
dense	15 – 38	stiff	1.0 – 2.0	10 – 14
very dense	38 +	very stiff	2.0 – 4.0	14 – 32
		hard	4.0 +	32 +

GROUNDWATER



Approximate Groundwater level at time noted on soil boring log, measured in open bore hole unless otherwise noted. Groundwater levels often vary with time, and are affected by soil permeability characteristics, weather conditions, and lateral drainage conditions.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	Gravel and Gravelly Soils	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures
			GP	Poorly-graded gravels and gravel-sand mixtures
		Gravels with Fines	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	Sand and Sandy Soils	Clean Sands	SW	Well-graded sands and gravelly sands
			SP	Poorly-graded sands and gravelly sands
		Sands with Fines	SM	Silty sands and sand-silt mixtures
			SC	Clayey sands and sand-clay mixtures
FINE GRAINED SOILS	Silts and Clays of Low Plasticity		ML	Inorganic silts or clayey silts of slight plasticity
			CL	Inorganic clays of low to medium plasticity
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays of High Plasticity		MH	Inorganic silts of high plasticity
			CH	Inorganic clays of medium to high plasticity
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, humus and swamp soils with high organic contents

Note: Dual symbols are used to indicate borderline classifications.

Browns/Grayville

/Fisk Ave.

Brasier Rd.

N

0 15 30

PROPOSED DITCH CHECK

PROPOSED DITCH CHECK

PROPOSED WASHOUT AREA

PROPOSED DITCH CHECK

PROPOSED TRACKOUT PAD

PROPOSED DITCH CHECK

GENERATOR

PROPOSED INLET PROTECTION

PROPOSED INLET PROTECTION

PROPOSED DITCH CHECK

PROPOSED DITCH CHECK

PROPOSED DITCH CHECK

PROPOSED SILT FENCE (50 LF)

PROPOSED SILT FENCE (770 LF)

LEGEND

- 6" PCC CONCRETE PAVEMENT & 6" AGGREGATE BASE COURSE, TYPE A
- 6" AGGREGATE BASE COURSE, TYPE B 2" AGGREGATE SURFACE COURSE, TYPE A
- PROPOSED FENCING
- PROPOSED SILT FENCING

FIELD BOOK: XXX
DRAWN BY: KCF \ BAF \ CRG
CHECKED BY:
FILE LOCATION: S:\2022\22228\DWG\CIVIL\SWPPP.DWG
SAVE DATE: 5/5/2026 14:28

MILANO & GRUNLOH ENGINEERS, LLC
114 W. WASHINGTON AVE. | PO BOX 897
EFFINGHAM, IL 62401
Phone: (217) 347-7262 | (800) 677-2714
Email: mgengineers@mgengineers.com
Web: www.mgengineers.com
Design Firm #184-003108

EROSION CONTROL

PROPOSED W2E WTP
EDWARDS/WHITE COUNTIES
CITIES OF ALBION & GRAYVILLE, IL

SHEET # EC OF 77

JOB # 22228

Clarification needed: On Sheet 6 (Site Plan) denotes concrete pavement as 6" PCC Concrete Pavement on 6" Aggregate Base Course, Type A, on the Landscape plan, it calls for 6" on 4" and in the bid schedule Item 32, indicates 8" PCC Pavement with welded wire fabric.

All concrete pavement on Sheet 6 will be 8" PCC with 6" Agg Base. We caught this and are currently preparing the addendum.

Clarification needed: Specification Section 011100-1.02.D.2 states all excavation, earthwork, dewatering and rough grading required for the construction of the lime drying beds shall be the responsibility of Contract 4, which is to be bid at a later date. Items 30 & 31 in the bid schedule are for the access road around the lime drying beds. What are the limits of the excavation for Contract 1?

I will move the aggregate access road to Contract 4. I think that makes more sense. Contract 1 excavation will be limited to that required for the concrete pavement and the GST area. I am hoping this ends up being the same contractor to negate this issue.

On the Utilities Sheet, are the tapping sleeves and valves included in Contract 1? If not, where are these pipes terminated at coming out of the new plant?

Contract 1 will be responsible for all piping shown on sheet 7 to include TS&Vs and connection to existing with the exception of the lime drying bed header pipe.

Where does Contract 1 terminate the sludge line to the drying beds?

Contract 4 begins at Tee for the Lime bed header. See Sheet 11.

Clarification needed: What is considered yard piping for Items 22 through 25. Specification 330519.4.01 and 330519.4.02 indicate process piping is to 10' outside building foundations. Quantities shown on bid schedule do not match those scaled from drawings.

We are aware the quantities do not match. We have worked through the schedule and corrected all the pipe ID markers and schedules and will be releasing the new sheets in addendum shortly. Everything to a point 10' outside the foundation is considered Process Piping (Bid Item #5). Everything beyond that is considered Yard Piping (Bid Items 22-25. Same for valves.

Clarification needed: On Sheet 18 of 77, Recarbonation Vessel, several notes indicate work to be performed by Contract 3. Please confirm if this should be Contract 1?

Yes, that should be Contract 1. I missed that.

Regarding chemical feed pipe color coding, please confirm that the PVC chemical feed lines are to receive field applied labels identifying the contents and flow direction in lieu of painting the PVC entire length of pipe a specified color. Please advise the spacing of the labels.

Yes, all chemical feed lines should be identified with contents and direction of flow. Color identification can be found on chemical feed plan sheets 62-68 and also in guidance provided in 10 States Standards for Water Works. Spacing of labels likewise can be found on chemical feed sheet notes and is specified as every 30", also included in 10 States Standards.

Regarding the room finish schedule, please advise whether the walls and ceilings of the treatment plant, chem feed room, pac feed room, and lime room are to have painted exposed structure or metal liner panel.

Architectural Sheet A101 has callouts referencing G001 details indicating the wall finish for all rooms.

Please confirm the project is tax exempt.

Yes, they are a tax-exempt organization.

Please confirm the number of bid forms required and whether separate bid forms are required for contract #1 and contract #2.

The same bid form may be used for both contracts. If you only wish to bid one, you may leave the other blank.

On Sheet P2 there is a sanitary line that appears to traverse the WTP under the Recarb Tank but when it reaches the Sludge/Filter overflow pipe the sanitary line discontinues. Please advise where this line continues to and where this line terminates. (Please refer to marked up Sheet P2 for clarification of line in question)

That is not sanitary, it is a floor drain. All floor drains in the operations area tie into the plant effluent waste line to the lime drying beds. Floor drains in the lab, break room, bathrooms must connect to sanitary.

The Civil sheets, in particular Sheet #6, calls out the site pavement to be 6" PCC concrete pavement over 6" aggregate base course type A. In contrast, bid form line item #32 calls for PCC pavement 8" with WWF mesh. Please confirm whether the site concrete pavement is to be 6" or 8" and whether it is to have WWF mesh reinforcing.

It is all 8" PCC with WWF. We are fixing that in addendum that will be released soon.

The Landscaping Plan Sheet #10 states that evergreen screening tree species, spacing, and quantity are to be determined by the owner. For the purposes of bidding and for bid form line item #34, please advise if we are to assume a certain quantity and species or is there an allowance we are to include for this line item.

Spacing will be the minimum suggested by the arborist, which will determine the quantity. The area shown on the landscaping plan will be required to planted to provide the screening required by the owner's contract. I am going to address this in addendum, although I am not exactly sure how I am going to do it without knowing what species. I am not sure there is a big difference in price between white pine and arborvitae.

The Civil sheets, in particular Sheet #6, shows parking pavement paint striping and marking in front of the WTP, but there are no call-outs or specifications for this. Please confirm whether we are to include pavement striping and marking in our bid.

Yes, parking area should be striped. I did not feel a need to write a specification for it. I would refer to IDOT standards.

Please confirm whether the new photovoltaic system is to be included in bid form line item #16 (Electrical, Complete) or will be bid at a later date under separate contract.

Where that portion of the work is included in the bid form will be up to the GC, but it will be included in Contract 1. Electrical makes sense, but I could also see it included in PEMB or additional work.