ADDENDUM NO. 1
September 20, 2023

PROJECT: CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT

BID DATE: October 13, 2023

The following changes and/or additions shall be made to the Plans, Specifications, and Contract Documents for the above referenced project. Bidder shall acknowledge receipt of this Addendum by signing below and returning this Addendum with the Bid.

1) GENERAL

BID DATE – The bid opening date has been extended to October 13th, 2023, at 10:00 am.

BID SCHEDULE – The base bid schedule of Contract 1 – Water Treatment Plant has been revised to add additional line items. Please utilize the updated and attached bid schedule labeled "Contract 1 – Water Treatment Plant - Addendum 1", shown in (Attachment 1) for your bid.

The TCEQ plan approval letter has been included in this addendum (See Attachment 2) to inform the contractor of the information required during the RO performance test. Specifically, this information is called out on the Membrane Use Checklist (Step 2). The contractor shall provide the engineer items 1-3 and 7.

The most recent water quality analysis of the three city wells has been included in this addendum (Attachment 3).

2) PLAN SHEETS

D-3 – WTB Building Layout - This sheet has been revised to clarify the 1" treated waterline material shall be SDR 9 Poly.

D-4 – Existing Building Layout – This sheet has been modified to provide additional details on the check valve to be replaced.

D-10 – Concentrate Tank Details – This sheet has been modified to clarify the concentrate tank material type. This tank shall be HDPE.

D-17 – Control Diagram - This sheet has been revised to clarify the existing and proposed control notes.

S-2 – WTP Building Elevations – This sheet has been revised to clarify the overhead and side door schedules.

E1-E4 - All electrical sheets have been modified and reissued. Please see all attached electrical sheets.

3) SPECIFICATIONS

01 03 01 – Measurement and Payment - The following changes have been made to this section:

i) Added section for Fencing and Gates
ii) Added section for Air Compressor
iii) Added section for Minisplit AC & Heating Unit
iv) Added section for Wash sink and Shower.
v) Added section for Valve Vaults
vi) Added section for Check Valves
vii) Modified Gas Chlorine System section

11 03 02 – Galvanized Bolted Tank – Section 11 03 02 has been added and is attached to this addendum.

46 01 01 – Packaged Reverse Osmosis Treatment System – The following changes have been made:

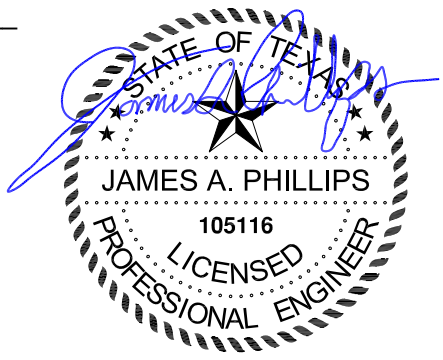
i) Section 2.01 Products/Manufacturer(A) – Added Rotec, USA as engineer Pre-approved equal.
ii) Section 2.05 Membrane Filtration(C)(2)(h) –Membranes shall be Hydranautics model CPA6-LD.

Prepared by:

JACOB | MARTIN
TBPE Firm No. 2448

_____
Bidder's Acknowledgment

_____
Date



09/20/2023

Attachment 1

Bid Schedule

Contract 1 - Water Treatment Plant – Addendum 1

CITY OF ROPESVILLE
TWDB DWSRF WATER TREATMENT PLANT
Contract 1 - Water Treatment Plant - Addendum 1

Show prices in numerals. Round off unit prices to two decimal places only.
These Bid Prices must include all labor, materials, equipment, insurance, overhead, superintendence, transportation, profits & incidentals to cover the finished Work called for in the Contract Documents.

For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:

Bid Item	Description	Est. Qty.	Unit	Unit Price	Extended Amount
1	Mobilization, Bonds and Insurance	1	LS	**$**	**$**
2	RFRO WTP Equipment	1	LS	**$**	**$**
3	RFRO WTP Electrical	1	LS	**$**	**$**
4	System Control	1	LS	**$**	**$**
5	6" C900 DR 18 PVC WL	50	LF	**$**	**$**
6	8" Gate Valve and Box	2	EA	**$**	**$**
7	6" Gate Valve and Box	2	EA	**$**	**$**
8	8" WL Connections	2	EA	**$**	**$**
9	Valve Vault	2	EA	**$**	**$**
10	Air Compressor	1	EA	**$**	**$**
11	Wash Sink & Shower	1	EA	**$**	**$**
12	Minisplit AC & Heating Unit	1	EA	**$**	**$**
13	4" SDR 35 PVC Concentrate Line	150	LF	**$**	**$**
14	1" SDR9 Poly Distribution Line to Building	100	LF	**$**	**$**
15	1" Water Service Tap	1	EA	**$**	**$**
16	Sewer System Connection	1	LS	**$**	**$**
17	5,000 Gallon HDPE Concentrate Tank	1	LS	**$**	**$**
18	Gas Chlorine Building	1	LS	**$**	**$**
19	Gas Chlorine System	1	LS	**$**	**$**
20	Trench Safety	150	LF	**$**	**$**
21	Fencing and Gates	95	LF	**$**	**$**
	TOTAL BASE BID (Items 1-21)				**$**

ADDITIVE ALTERNATE BID SCHEDULE

For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:

Bid Item	Description	Est. Qty.	Unit	Unit Price	Extended Amount
A1	4" Check Valve in Pump Building	1	EA	$	$

A2	Tower Demolition	1	LS	$	$
	TOTAL ADDITIVE ALTERNATE BID (Items A1-A1)				$

DEDUCTIBLE ALTERNATE BID SCHEDULE					
For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:					
Bid		**Est.**		**Unit**	**Extended**
Item	**Description**	**Qty.**	**Unit**	**Price**	**Amount**
D1	5,000 Gallon HDPE Concentrate Tank	1	LS	$	$
D2	4" SDR 35 PVC Concentrate Line	150	LF	$	$
D3	1" SDR9 Poly Distribution Line to Building	100	LF	$	$
D4	1" Water Service Tap	1	EA	$	$
D5	Sewer System Connection	1	LS	$	$
D6	Trench Safety	150	LF	$	$
D7	Fencing and Gates	95	LF	$	$
	TOTAL DEDUCTIBLE ALTERNATE BID (Items D1-D7)				$

TOTAL PROPOSED NUMBER OF DAYS FOR COMPLETION:	

***Bidder shall enter proposed number of days for completion on the Bid Proposal and the Bid Schedule.**

Attachment 2

Revised TCEQ Approval Letter

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 13, 2023

Revised Letter

Allen Phillips, P.E.
Jacob & Martin, LLC
4920 South Loop 289, Suite 104
Lubbock, TX 79404

Re: City of Ropesville - Public Water System ID No. 1100004
Proposed Flow Reversal Reverse Osmosis (FRRO) Water Treatment Plant (WTP)
Engineer Contact Telephone: (325) 695-1070
Plan Review Log No. P-01312023-220
Texas Water Development Board DWSRF Project No. 62863
Hockley County, Texas

CN600624035 RN101175990

Dear Mr. Phillips:

This letter completely supersedes our plan review letter dated April 4, 2023 (P-01312023-220) based on the revised information received on August 29, 2023. As a result, the previously approved Hydranautics ESPA2-LD membrane modules are replaced with Hydranautics CPA6-LD membrane modules as approved below.

On January 31, 2023, the Texas Commission on Environmental Quality (TCEQ) received revised planning material with your letter dated January 30, 2023 for the proposed FRRO WTP, in response to our plan review letter dated December 15, 2022 (P-10142022-095). Revised and additional information was received on March 15, 2023 via email. Based on our review of the information submitted, the project generally meets the minimum requirements of Title 30 Texas Administrative Code (TAC) Chapter 290 – Rules and Regulations for Public Water Systems and is **conditionally approved for construction** if the project plans and specifications meet the following requirements:

1. Please note that before a new reverse osmosis membrane system can be used to produce drinking water, but after the proposed reverse osmosis membrane system has been constructed at the water system, a licensed professional engineer must submit an addendum to the engineering report to the Plan Review Team for review and approval. The addendum shall include the following verification data of the full-scale treatment process:

   (A) Provide the initial baseline performance of the plant. The baseline net driving pressure, normalized permeate flow, salt rejection (or salt passage) must be documented when the reverse osmosis membrane systems are placed online;

   (B) Provide the frequency of cleaning or membrane replacement. The frequency must be based on a set time interval or at a set point relative to baseline performance of the unit(s);

(C) If modeling is used as the basis for the design, provide verification of the model's accuracy. If the baseline performance evaluation shows that the modeling projection in the engineering report was inaccurate, the licensed professional engineer shall determine if the deviation from the modeled projections resulted from incorrect water quality assumptions or from other incorrect data in the model. The model shall be considered inaccurate if the overall salt passage or the required feed pressure is 1o% greater than the model projection. For any inaccurate model, provide a corrected model with the addendum to the engineering report;

(D) Provide verification of plant capacity. The capacity of the reverse osmosis and nanofiltration membrane facility shall be based on the as-built configuration of the system and the design parameters in the engineering report with adjustments as indicated by the baseline performance;

(E) Provide a complete physical and chemical analysis of the water. The analyses shall be in accordance with §290.41(c)(3)(G) for the raw water (before any treatment), the water produced from the membrane systems, and the water after any post-treatment. Samples must be submitted to an accredited laboratory for chemical analyses;

(F) The calculations for sizing feed pump(s) and chemical storage tank(s) must be submitted to demonstrate that a project meets chemical feed and storage capacity requirements; and

(G) Submit final blending report showing compliance to all maximum contaminant levels (MCL) and secondary contaminant levels (SCL).

A membrane use checklist is enclosed for your use.

2. 30 TAC §290.42(f)(1)(B) requires day tanks to be provided to minimize the possibility of severely overfeeding liquid chemicals from bulk storage facilities. Day tanks will not be required if adequate process control instrumentation and procedures are employed to prevent chemical overfeed incidents. Please provide day tanks for chemical feeds or have written procedures for adequate process control instrumentation.

3. The referenced system shall comply with 30 TAC 290.42(i) – Any discharge of wastewater and other plant wastes shall be in accordance with all applicable state and federal statutes and regulations. Permits for discharging wastes from water treatment processes shall be obtained from the commission, if necessary.

4. Corrosive indices will be used to calculate corrosivity of the FRRO system treated water. Corrosive or aggressive water could result in aesthetic problems, increased levels of toxic metals, and deterioration of household plumbing and fixtures. **If the water appears to be corrosive**, the system will be required to conduct a study and submit an engineering report that addresses corrosivity issues or may choose to install corrosion control treatment **before use may be granted**. All changes in treatment require submittal of plans and specifications for approval by TCEQ.

The submittal consisted of 36 sheets of engineering drawings, technical specifications, an engineering report and **revised information received on August 29, 2023 (revised computer modeling, revised technical specifications and manufacturer's specifications and NSF 61 certificate for Hydranautics CPA6-LD RO membrane modules**).

The approved project consists of:

- Pre-chlorination to prevent biofouling of the RO membranes with existing chlorination equipment (off site with existing chlorination equipment);
- Conversion of one (1) exiting 150,000-gallon ground storage tank from potable use to store the pre-chlorinated well water for FRRO treatment feed;
- One (1) 166 gallons per minute RO feed pump at a pressure 50 pounds per square inch (psi) taking raw water from 150,000-gallon tank;
- FRRO skid consisting of:
    - NSF 61 certified pre-treatment cartridge filter;
    - Blending bypass pipe;
    - Pre-treatment chemical injections including:
        - Anti-scalant, AWC-110, consisting of metering pump and one (1) 75-gallon tank with one (1) 100-gallon spill containment tank:
        - sodium metabisulfate for dechlorination of feed water consisting of metering pump and one (1) 75-gallon tank with one (1) 100-gallon spill containment tank; and
        - hydrochloric acid consisting of metering pump with two (2) 75-gallon tanks with two (2) 100-gallon spill containment tanks for each 75-gallon tank;
    - FRRO unit configurated in one (1) pass, two (2) stages, three (3) fiber-reinforced plastic vessels in Stage 1 and one (1) FRP vessel in Stage 2, eight (8) **400 square-feet hydranautics CPA6-LD membrane elements** per vessel, with the following computer modeled operating parameters:
        - Recovery of 89.0%;
        - RO feed flow of 146.07 gpm;
        - Permeate flow of 130.00 gpm;
        - Blending flow of 20.00 gpm; and
        - Average permeate flux of 14.62 gfd.
    - CIP system.
- One (1) 5,000-gallons HDPE concentrate tank.
- Caustic soda for post-treatment consisting of metering pump with two (2) 75-gallon tanks with two (2) 100-gallon spill containment tanks for each 75-gallon tank.
- Gas chlorine equipment and chlorine room.
- One (1) 60,000-gallon AWWA Standard D100 welded steel ground storage tank.
- Two (2) existing service pumps taking potable water from the 60,000-gallon ground storage tank for distribution to the existing 206,000-gallon standpipe.
- One (1) disinfectant vault.
- All yard pipes, fittings, valves, measuring/monitoring/recording devices associated with the FRRO unit, double block and bleed valving arrangement and appurtenances.

This approval is for the construction of the above listed items only. Any wastewater components contained in this design were not considered. The authorization provided in this letter does not relieve a Public Water System from the need to comply with other applicable state and federal regulations.

The City of Ropesville public water supply system provides water treatment.

The project is located at 207 Hockley, Main Street, Ropesville, in Hockley County, Texas.

An appointed engineer must notify the TCEQ's Region 2 Office in Lubbock by email at R2PWS@TCEQ.Texas.gov when construction will start. Please keep in mind that upon completion of the water works project, the engineer or owner will notify the TCEQ's Water Supply Division, in writing, as to its completion and attest to the fact that the completed work is substantially in accordance with the plans and change orders on file with the TCEQ as required in 30 TAC §290.39(h)(3). This notification may be sent to PTRS@tceq.texas.gov.

Please refer to the Plan Review Team's Log No. **P-01312023-220** in all correspondence for this project.

Please complete a copy of the most current Public Water System Plan Review Submittal form for any future submittals to TCEQ. Every blank on the form must be completed to minimize any delays in the review of your project. The document is available on TCEQ's website at the address shown below. You can also download the most current plan submittal checklists and forms from the same address.

https://www.tceq.texas.gov/drinkingwater/udpubs.html

For future reference, you can review part of the Plan Review Team's database to see if we have received your project. This is available on TCEQ's website at the following address:

https://www.tceq.texas.gov/drinkingwater/planrev.html/#status

You can download the latest revision of 30 TAC Chapter 290 – Rules and Regulations for Public Water Systems from this site.

If you have any questions concerning this letter or need further assistance, please contact Mr. Jonathan Pi, P.E. at (512) 239-6968 or by email at Jonathan.Pi@Tceq.Texas.Gov or by correspondence at the following address:

Plan Review Team, MC-159
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Sincerely,

Jonathan Pi, P.E.
Plan Review Team
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

Craig A. Stowell, P.E., Team Leader
Plan Review Team
Plan and Technical Review Section
Water Supply Division
Texas Commission on Environmental Quality

CAS/JP/av

Enclosure: Membrane Use Checklist (Step 2)

cc: City of Ropesville, Attn: Honorable Brenda Rabel, Mayor, 107 Hockley Main Street, Ropesville, TX 79358

bcc: TCEQ Central Records PWS File 1100004 (P-01312023-220/City of Ropesville)
TCEQ Region No. 2 Office - Lubbock
TCEQ PWSINVEN, MC-155
TWDB – DWSRF Project No. 62863

Membrane Use Checklist (Step 2)

Texas Commission on Environmental Quality
Water Supply Division
Plan Review Team MC-159
P.O. Box 13 087, Austin, Texas 78711-3087

Public Water System I.D. No._____
TCEQ Log No. P-_____

Any membrane treatment systems proposed for a public water supply must have plans approved by TCEQ prior to construction– see the "Membrane Construction Checklist (Step 1)". Plans are reviewed for compliance with "Rules and Regulations for Public Water Systems" Title 30 TAC Chapter 290. After the membrane treatment system is constructed, the completion data listed below must be submitted to TCEQ for evaluation. Based on this submitted data, approval may be given for use of the membrane treatment system. Please include the TCEQ construction approval Log Number and public water system name and identification number when submitting membrane treatment system completion information. This list is not a substitute for the rules and this checklist cannot be accepted in lieu of the required engineering submittals. Failure to submit the following items may delay project approval. Copies of the rules may be obtained from Texas Register, 1019 Brazos St, Austin, TX, 78701-2413, Phone: (512) 463-5561 or downloaded from the website: http://www.tceq.texas.gov/rules/indxpdf.html

Before reverse osmosis or nanofiltration membrane systems can be used to produce drinking water, but after the reverse osmosis or nanofiltration membrane system has been constructed at the water system, the licensed professional engineer must submit an addendum to the engineering report required by paragraph (6) of this subsection to the executive director for review and approval. The addendum shall include the following verification data of the full-scale treatment process: [§290.39(e)(7)]

1. ☐ Provide the initial baseline performance of the plant. The baseline net driving pressure, normalized permeate flow, salt rejection (or salt passage) must be documented when the reverse osmosis or nanofiltration membrane systems are placed online; [§290.39(e)(7)(A)]
2. ☐ Provide the frequency of cleaning or membrane replacement. The frequency must be based on a set time interval or at a set point relative to baseline performance of the unit(s); [§290.39(e)(7)(B)]
3. ☐ If modeling is used as the basis for the design, provide verification of the model's accuracy. If the baseline performance evaluation shows that the modeling projection in the engineering report were inaccurate, the licensed professional engineer shall determine if the deviation from the modeled projections resulted from incorrect water quality assumptions or from other incorrect data in the model. The model shall be considered inaccurate if the overall salt passage or the required feed pressure is 10% greater than the model projection. For any inaccurate model, provide a corrected model with the addendum to the engineering report; [§290.39(e)(7)(C)]
4. ☐ Provide verification of plant capacity. The capacity of the reverse osmosis and nanofiltration membrane facility shall be based on the as-built configuration of the system and the design parameters in the engineering report with adjustments as indicated by the baseline performance; [§290.39(e)(7)(D)]
5. ☐ The calculations for sizing feed pump(s) and chemical storage tank(s) must be submitted to demonstrate that a project meets chemical feed and storage capacity requirements; [§290.39(e)(8)]
6. ☐ Submit final blending report showing compliance to all maximum contaminant levels (MCL) and secondary contaminant levels (SCL);

Membrane Use Checklist (Step 2)

7. ☐ Provide a physical and chemical analysis of the water. The analyses for the raw water (before any treatment), the water produced from the membrane systems, and the water after any post-treatment (including blending) must be submitted to an accredited laboratory for chemical analyses. (See below)[§290.39(e)(7)(E)]
8. ☐ Public water systems shall ensure that their operators are trained regarding the use of all chemicals used in the water treatment plant. Submit the applicable training records of operators pertinent to this requirement. [§290.46(e)(2)(B)]
9. ☐ Effective September 1, 2016, reverse osmosis or nanofiltration membrane systems must have operators that have successfully completed at least one executive director-approved training course or event specific to the operations and maintenance of reverse osmosis or nanofiltration membrane treatment. Submit the applicable training records of operators pertinent to this requirement. [§290.46(e)(2)(D)]

For Item #7- All systems shall submit a physical and chemical analysis of the water for the raw water (before any treatment), the water produced from the membrane systems, and the water after any post-treatment (including blending) for the contaminants listed below. Reports must come from a TCEQ accredited laboratory and include all QA/QC data. MCL and SCL units are in mg/l (except arsenic which is in micrograms per liter).

Table 1: Primary Constituents with Maximum Contaminant Level (MCL)

PRIMARY	MCL
Nitrate	10 (as N)
Nitrite	1 (as N)
Arsenic	10
Fluoride	4.0

Table 2: Secondary Constituents with Secondary Contaminant Level (SCL)

SECONDARY	MCL
Aluminum	0.2
Copper	1.0
Iron	0.3
Manganese	0.05
Zinc	5.0
Total Dissolved Solids	1,000
Fluoride	2.0
Lead	N/A
Sulfate	300
Chloride	300
pH	> 7.0

Membrane Use Checklist (Step 2)

Table 3: Water Quality Parameters

PARAMETER	UNITS
Alkalinity as $CaCO_3$	mg/L
Calcium as $CaCO_3$	mg/L
Sodium	mg/L

All systems located in a high-risk county (see page 3) shall submit radiological analysis reports for water samples showing the water to be of acceptable quality for the most contaminants listed below. Reports must come from a TCEQ accredited laboratory for temporary use of the membrane unit.

Table 4: Radionuclides with Maximum Contaminant Level (MCL)

CONTAMINANT	MCL
Gross alpha	15 pCi/L
Radium-226/228	5 pCi/L
Beta particle	50 pCi/L
Uranium	30 µg/L

WHERE: pCi/L = pico curies per liter, µg/L = micrograms per liter

Please be aware when you review your radiological data that if the report has gross alpha over 15 pCi/L and individual uranium isotopes are not reported, you will have to resample or reanalyze and resubmit radionuclide results. If you see gross alpha plus radium-228 over 5 pCi/L, and don't have radium-226, you will have to resample or reanalyze and resubmit complete results. For more information please see the website at the following URL:

https://www.tceq.texas.gov/drinkingwater/chemicals/radionuclides/pdw_rad.html

List of Counties where Radionuclide Testing is Required

Please be aware that we have added the requirement for analysis for radionuclides for high-risk counties. For elevated levels of any contaminants found in a test well, treatment or blending may be required.

Table 5: List of Counties where Radionuclide Testing is Required

COUNTY				
Atascosa	Bandera	Bexar	Bosque	Brazoria
Brewster	Burnet	Concho	Culberson	Dallam
Dawson	Erath	Fort Bend	Frio	Garza
Gillespie	Gray	Grayson	Harris	Hudspeth
Irion	Jeff Davis	Jim Wells	Kendall	Kent
Kerr	Kleberg	Liberty	Llano	Lubbock
McCulloch	Mason	Matagorda	Medina	Midland
Montgomery	Moore	Parker	Pecos	Polk
Presidio	Refugio	San Jacinto	San Saba	Tarrant
Travis	Tyler	Upton	Val Verde	Victoria
Walker	Washington	Wichita	Williamson	Zavala

Attachment 3

Water Quality Analysis

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Lubbock
6701 Aberdeen Ave.
Suite 8
Lubbock, TX 79424
Tel: (806)794-1296

Laboratory Job ID: 820-3443-1
Client Project/Site: City of Ropesvile-WTP

For:
Jacob & Martin LCC
1014 Broadway
Lubbock, Texas 79401

Attn: Allen Phillips

Holly Taylor

Authorized for release by:
3/8/2022 5:14:50 PM

Holly Taylor, Project Manager
(806)794-1296
holly.taylor@eurofinset.com

Table of Contents

Definitions/Glossary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
U	Indicates the analyte was analyzed for but not detected.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 820-3443-1

Laboratory: Eurofins Lubbock

Narrative

Job Narrative
820-3443-1

Comments
No additional comments.

Receipt
The samples were received on 2/17/2022 1:22 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 10.3º C.

Receipt Exceptions

As III samples were filtered upon receipt in South Bend
Well #1 (820-3443-1), Well #2 (820-3443-2) and Well #3 (820-3443-3)

Metals
Method 200.7 Rev 4.4: Due to the high concentration of calcium, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 860-42330 and analytical batch 860-42543 could not be evaluated for accuracy and precision. The associated laboratory control sample (LCS) met acceptance criteria.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method 150.1: This analysis is normally performed in the field and has a method-defined holding time of 15 minutes. The following samples has been qualified with the "HF" flag to indicate analysis was performed in the laboratory outside the 15 minute timeframe: Well #1 (820-3443-1), Well #2 (820-3443-2) and Well #3 (820-3443-3).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Subcontract non-Sister
See attached subcontract report.

Client Sample Results

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Client Sample ID: Well #1

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-1

Matrix: Drinking Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Chloride	64.3		0.500		mg/L			02/18/22 15:46	1
Nitrate as N	4.68		0.100		mg/L			02/18/22 15:46	1
Fluoride	5.18		0.500		mg/L			02/18/22 15:46	1
Nitrite as N	0.319		0.100		mg/L			02/18/22 15:46	1
Sulfate	104		0.500		mg/L			02/18/22 15:46	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Calcium	42.7		0.200		mg/L		02/22/22 09:00	02/23/22 02:48	1
Iron	<0.200	U	0.200		mg/L		02/22/22 09:00	02/23/22 02:48	1
Magnesium	46.0		0.200		mg/L		02/22/22 09:00	02/23/22 02:48	1
Potassium	11.2		0.500		mg/L		02/22/22 09:00	02/23/22 02:48	1
Sodium	100		0.500		mg/L		02/22/22 09:00	02/23/22 02:48	1
SiO2	49.0		1.07		mg/L		02/22/22 09:00	02/23/22 02:48	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	51.4		1.07		mg/L		02/23/22 09:30	02/24/22 14:00	1

Method: 200.8 As Spec - Arsenic Speciation (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
As (III)	<1.00	U	1.00		ug/L		02/24/22 12:15	02/24/22 17:44	1

Method: 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	<0.0200	U	0.0200		mg/L		02/23/22 10:30	02/23/22 20:51	1
Arsenic	0.00894		0.00400		mg/L		02/23/22 10:30	02/23/22 20:51	1
Manganese	0.0151		0.00200		mg/L		02/23/22 10:30	02/23/22 20:51	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
pH	8.3	HF	0.1		SU			03/04/22 17:18	1
Alkalinity, Total	285		1.00		mg/L			02/24/22 10:54	1
Total Dissolved Solids	596		10.0		mg/L			02/21/22 12:29	1
Carbon Dioxide, Free	3.00		0.100		mg/L			03/07/22 16:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Orthophosphate as P	<0.0200	U	0.0200		mg/L			02/18/22 15:26	1

Client Sample ID: Well #2

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-2

Matrix: Drinking Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Chloride	119		0.500		mg/L			02/18/22 16:33	1
Nitrate as N	8.37		0.100		mg/L			02/18/22 16:33	1
Fluoride	4.34		0.500		mg/L			02/18/22 16:33	1
Nitrite as N	0.285		0.100		mg/L			02/18/22 16:33	1
Sulfate	131		0.500		mg/L			02/18/22 16:33	1

Client Sample ID: Well #2

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-2

Matrix: Drinking Water

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Calcium	56.7		0.200		mg/L		02/22/22 09:00	02/23/22 02:51	1
Iron	<0.200	U	0.200		mg/L		02/22/22 09:00	02/23/22 02:51	1
Magnesium	74.8		0.200		mg/L		02/22/22 09:00	02/23/22 02:51	1
Potassium	14.2		0.500		mg/L		02/22/22 09:00	02/23/22 02:51	1
Sodium	74.8		0.500		mg/L		02/22/22 09:00	02/23/22 02:51	1
SiO2	47.3		1.07		mg/L		02/22/22 09:00	02/23/22 02:51	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	46.7		1.07		mg/L		02/23/22 09:30	02/24/22 14:03	1

Method: 200.8 As Spec - Arsenic Speciation (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
As (III)	<1.00	U	1.00		ug/L		02/24/22 12:15	02/24/22 17:47	1

Method: 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	<0.0200	U	0.0200		mg/L		02/23/22 10:30	02/23/22 21:11	1
Arsenic	0.00690		0.00400		mg/L		02/23/22 10:30	02/23/22 21:11	1
Manganese	<0.00200	U	0.00200		mg/L		02/23/22 10:30	02/23/22 21:11	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
pH	8.2	HF	0.1		SU			03/04/22 17:21	1
Alkalinity, Total	266		1.00		mg/L			02/24/22 10:46	1
Total Dissolved Solids	731		10.0		mg/L			02/21/22 12:33	1
Carbon Dioxide, Free	3.00		0.100		mg/L			03/07/22 16:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Orthophosphate as P	<0.0200	U	0.0200		mg/L			02/18/22 15:31	1

Client Sample ID: Well #3

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-3

Matrix: Drinking Water

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Chloride	145		0.500		mg/L			02/18/22 16:56	1
Nitrate as N	10.9		0.100		mg/L			02/18/22 16:56	1
Fluoride	3.82		0.500		mg/L			02/18/22 16:56	1
Nitrite as N	0.264		0.100		mg/L			02/18/22 16:56	1
Sulfate	179		0.500		mg/L			02/18/22 16:56	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Calcium	69.0		0.200		mg/L		02/22/22 09:00	02/23/22 02:55	1
Iron	0.302		0.200		mg/L		02/22/22 09:00	02/23/22 02:55	1
Magnesium	79.6		0.200		mg/L		02/22/22 09:00	02/23/22 02:55	1
Potassium	13.9		0.500		mg/L		02/22/22 09:00	02/23/22 02:55	1
Sodium	87.3		0.500		mg/L		02/22/22 09:00	02/23/22 02:55	1

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Client Sample ID: Well #3

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-3

Matrix: Drinking Water

Method: 200.7 Rev 4.4 - Metals (ICP) - Total Recoverable (Continued)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	**50.0**		1.07		mg/L		02/22/22 09:00	02/23/22 02:55	1

Method: 200.7 Rev 4.4 - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	**51.5**		1.07		mg/L		02/23/22 09:30	02/24/22 14:07	1

Method: 200.8 As Spec - Arsenic Speciation (ICP/MS)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
As (III)	<1.00	U	1.00		ug/L		02/24/22 12:15	02/24/22 17:50	1

Method: 200.8 - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	<0.0200	U	0.0200		mg/L		02/23/22 10:30	02/23/22 21:14	1
Arsenic	**0.00664**		0.00400		mg/L		02/23/22 10:30	02/23/22 21:14	1
Manganese	<0.00200	U	0.00200		mg/L		02/23/22 10:30	02/23/22 21:14	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
pH	**8.2**	**HF**	0.1		SU			03/04/22 17:24	1
Alkalinity, Total	**227**		1.00		mg/L			02/24/22 11:04	1
Total Dissolved Solids	**862**		10.0		mg/L			02/21/22 12:37	1
Carbon Dioxide, Free	**NA**		0.100		mg/L			03/07/22 16:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Orthophosphate as P	<0.0200	U	0.0200		mg/L			02/18/22 15:32	1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: LCS 860-42025/48
Matrix: Drinking Water
Analysis Batch: 42025

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride			10.0	9.499		mg/L		95	90 - 110		
Fluoride			10.0	10.11		mg/L		101	90 - 110		
Sulfate			10.0	9.598		mg/L		96	90 - 110		

Lab Sample ID: LCSD 860-42025/49
Matrix: Drinking Water
Analysis Batch: 42025

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride			10.0	9.961		mg/L		100	90 - 110	5	20
Fluoride			10.0	10.43		mg/L		104	90 - 110	3	20
Sulfate			10.0	9.944		mg/L		99	90 - 110	4	20

Lab Sample ID: 880-11424-C-2 MS
Matrix: Drinking Water
Analysis Batch: 42025

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Fluoride	0.695		10.0	10.89		mg/L		102	90 - 110		
Sulfate	128		10.0	136.1	4	mg/L		86	90 - 110		

Lab Sample ID: 880-11424-C-2 MSD
Matrix: Drinking Water
Analysis Batch: 42025

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	0.695		10.0	11.22		mg/L		105	90 - 110	3	20
Sulfate	128		10.0	136.6	4	mg/L		91	90 - 110	0	20

Lab Sample ID: MB 860-42026/47
Matrix: Drinking Water
Analysis Batch: 42026

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	<0.100	U	0.100		mg/L			02/18/22 17:43	1
Nitrite as N	<0.100	U	0.100		mg/L			02/18/22 17:43	1

Lab Sample ID: LCS 860-42026/48
Matrix: Drinking Water
Analysis Batch: 42026

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Nitrate as N			10.0	9.620		mg/L		96	80 - 120		
Nitrite as N			5.00	4.784		mg/L		96	80 - 120		

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCSD 860-42026/49
Matrix: Drinking Water
Analysis Batch: 42026

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N			10.0	9.976		mg/L		100	80 - 120	4	20
Nitrite as N			5.00	4.871		mg/L		97	80 - 120	2	20

Lab Sample ID: 880-11424-C-2 MS
Matrix: Drinking Water
Analysis Batch: 42026

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	11.7		10.0	21.61		mg/L		100	80 - 120
Nitrite as N	<0.100	U	5.00	4.705		mg/L		92	80 - 120

Lab Sample ID: 880-11424-C-2 MSD
Matrix: Drinking Water
Analysis Batch: 42026

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate as N	11.7		10.0	21.69		mg/L		100	80 - 120	0	15
Nitrite as N	<0.100	U	5.00	4.686		mg/L		92	80 - 120	0	15

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 860-42330/1-A
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Calcium	<0.200	U	0.200		mg/L		02/22/22 09:00	02/23/22 01:49	1
Iron	<0.200	U	0.200		mg/L		02/22/22 09:00	02/23/22 01:49	1
Magnesium	<0.200	U	0.200		mg/L		02/22/22 09:00	02/23/22 01:49	1
Potassium	<0.500	U	0.500		mg/L		02/22/22 09:00	02/23/22 01:49	1
Sodium	<0.500	U	0.500		mg/L		02/22/22 09:00	02/23/22 01:49	1
SiO2	<1.07	U	1.07		mg/L		02/22/22 09:00	02/23/22 01:49	1

Lab Sample ID: LCS 860-42330/2-A
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium			25.0	24.83		mg/L		99	85 - 115
Iron			5.00	4.951		mg/L		99	85 - 115
Magnesium			25.0	24.85		mg/L		99	85 - 115
Potassium			10.0	10.01		mg/L		100	85 - 115
Sodium			25.0	24.93		mg/L		100	85 - 115
SiO2			21.4	21.39		mg/L		100	85 - 115

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LCSD 860-42330/3-A
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium			25.0	24.89		mg/L		100	85 - 115	0	20
Iron			5.00	4.960		mg/L		99	85 - 115	0	20
Magnesium			25.0	25.01		mg/L		100	85 - 115	1	20
Potassium			10.0	10.06		mg/L		101	85 - 115	0	20
Sodium			25.0	25.05		mg/L		100	85 - 115	0	20
SiO2			21.4	21.69		mg/L		101	85 - 115	1	20

Lab Sample ID: 860-21178-D-1-B MS
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Matrix Spike
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Calcium	81.9	E	25.0	104.1	E	mg/L		89	70 - 130		
Iron	0.236		5.00	5.281		mg/L		101	70 - 130		
Magnesium	18.5		25.0	42.81		mg/L		97	70 - 130		
Potassium	6.54		10.0	16.50		mg/L		100	70 - 130		
Sodium	173		25.0	193.5	4	mg/L		82	70 - 130		
SiO2	21.2		21.4	44.41		mg/L		109	70 - 130		

Lab Sample ID: 860-21318-A-1-B MS
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Matrix Spike
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Calcium	41.9		25.0	67.06		mg/L		101	70 - 130		
Iron	0.209		5.00	5.197		mg/L		100	70 - 130		
Magnesium	8.00		25.0	32.55		mg/L		98	70 - 130		
Potassium	2.13		10.0	12.08		mg/L		99	70 - 130		
Sodium	57.6		25.0	82.73		mg/L		100	70 - 130		
SiO2	6.10		21.4	28.84		mg/L		106	70 - 130		

Lab Sample ID: 860-21318-A-1-C MSD
Matrix: Drinking Water
Analysis Batch: 42543

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total Recoverable
Prep Batch: 42330

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	41.9		25.0	67.36		mg/L		102	70 - 130	0	20
Iron	0.209		5.00	5.232		mg/L		100	70 - 130	1	20
Magnesium	8.00		25.0	32.67		mg/L		99	70 - 130	0	20
Potassium	2.13		10.0	12.18		mg/L		100	70 - 130	1	20
Sodium	57.6		25.0	82.97		mg/L		101	70 - 130	0	20
SiO2	6.10		21.4	29.16		mg/L		108	70 - 130	1	20

Lab Sample ID: MB 860-42520/1-A
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 42520

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	<1.07	U	1.07		mg/L		02/23/22 09:30	02/24/22 12:33	1

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: LCS 860-42520/2-A
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 42520

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
SiO2			21.4	20.01		mg/L		94	85 - 115		

Lab Sample ID: LCSD 860-42520/3-A
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 42520

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
SiO2			21.4	20.45		mg/L		96	85 - 115	2	20

Lab Sample ID: 860-21270-C-1-B MS
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Matrix Spike
Prep Type: Total Recoverable
Prep Batch: 42520

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
SiO2	46.9		21.4	67.47		mg/L		96	70 - 130		

Lab Sample ID: 860-21270-C-1-C MSD
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total Recoverable
Prep Batch: 42520

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
SiO2	46.9		21.4	65.31		mg/L		86	70 - 130	3	20

Lab Sample ID: MB 860-42168/1-C
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 42520

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
SiO2	<1.07	U	1.07		mg/L		02/23/22 09:30	02/24/22 13:45	1

Lab Sample ID: LCS 860-42168/2-C
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 42520

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
SiO2			21.4	21.75		mg/L		102	85 - 115		

Lab Sample ID: LCSD 860-42168/3-C
Matrix: Drinking Water
Analysis Batch: 42807

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 42520

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
SiO2			21.4	22.19		mg/L		104	85 - 115	2	20

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 860-42548/1-A
Matrix: Drinking Water
Analysis Batch: 42732

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 42548

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	<0.0200	U	0.0200		mg/L		02/23/22 10:30	02/23/22 20:43	1
Arsenic	<0.00400	U	0.00400		mg/L		02/23/22 10:30	02/23/22 20:43	1
Manganese	<0.00200	U	0.00200		mg/L		02/23/22 10:30	02/23/22 20:43	1

Lab Sample ID: LCS 860-42548/2-A
Matrix: Drinking Water
Analysis Batch: 42732

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 42548

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Aluminum			0.500	0.4887		mg/L		98	85 - 115		
Arsenic			0.100	0.09705		mg/L		97	85 - 115		
Manganese			0.100	0.09916		mg/L		99	85 - 115		

Lab Sample ID: LCSD 860-42548/3-A
Matrix: Drinking Water
Analysis Batch: 42732

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 42548

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum			0.500	0.4893		mg/L		98	85 - 115	0	20
Arsenic			0.100	0.09695		mg/L		97	85 - 115	0	20
Manganese			0.100	0.09920		mg/L		99	85 - 115	0	20

Lab Sample ID: 820-3443-1 MS
Matrix: Drinking Water
Analysis Batch: 42732

Client Sample ID: Well #1
Prep Type: Total Recoverable
Prep Batch: 42548

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Aluminum	<0.0200	U	0.500	0.5039		mg/L		97	70 - 130		
Arsenic	0.00894		0.100	0.1107		mg/L		102	70 - 130		
Manganese	0.0151		0.100	0.1164		mg/L		101	70 - 130		

Lab Sample ID: 820-3443-1 MSD
Matrix: Drinking Water
Analysis Batch: 42732

Client Sample ID: Well #1
Prep Type: Total Recoverable
Prep Batch: 42548

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	<0.0200	U	0.500	0.4975		mg/L		96	70 - 130	1	20
Arsenic	0.00894		0.100	0.1092		mg/L		100	70 - 130	1	20
Manganese	0.0151		0.100	0.1144		mg/L		99	70 - 130	2	20

Method: 200.8 As Spec - Arsenic Speciation (ICP/MS)

Lab Sample ID: MB 810-13681/16
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
As (III)	<1.00	U	1.00		ug/L			02/24/22 15:13	1

Method: 200.8 As Spec - Arsenic Speciation (ICP/MS) (Continued)

Lab Sample ID: MB 810-13681/53
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
As (III)	<1.00	U	1.00		ug/L			02/24/22 16:52	1

Lab Sample ID: LCS 810-13681/47
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
As (III)			50.0	49.79		ug/L		100	85 - 115		

Lab Sample ID: LLCS 810-13681/11
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
As (III)			0.300	<1.00	U	ug/L		106	50 - 150		

Lab Sample ID: LLCS 810-13681/18
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
As (III)			2.00	2.024		ug/L		101	50 - 150		

Lab Sample ID: 810-15631-B-1 MS
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
As (III)	4.75		50.0	53.75		ug/L		98	70 - 130		

Lab Sample ID: 810-15631-B-1 MSD
Matrix: Drinking Water
Analysis Batch: 13681

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
As (III)	4.75		50.0	54.58		ug/L		100	70 - 130	2	20

Method: 150.1 - pH (Electrometric)

Lab Sample ID: LCSSRM 810-14204/4
Matrix: Drinking Water
Analysis Batch: 14204

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			9.00	9.1		SU		100.9	98.9 - 101.1		

Method: 150.1 - pH (Electrometric) (Continued)

Lab Sample ID: LCSSRM 810-14204/8
Matrix: Drinking Water
Analysis Batch: 14204

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
pH	9.00	9.1		SU		100.6	98.9 - 101.1

Method: 365.1 - Phosphorus, Ortho

Lab Sample ID: MB 860-42114/9
Matrix: Drinking Water
Analysis Batch: 42114

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Orthophosphate as P	<0.0200	U	0.0200		mg/L			02/18/22 15:23	1

Lab Sample ID: LCS 860-42114/10
Matrix: Drinking Water
Analysis Batch: 42114

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Orthophosphate as P	0.250	0.2514		mg/L		101	90 - 110

Lab Sample ID: LCSD 860-42114/11
Matrix: Drinking Water
Analysis Batch: 42114

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Orthophosphate as P	0.250	0.2511		mg/L		100	90 - 110	0	20

Lab Sample ID: 820-3443-1 MS
Matrix: Drinking Water
Analysis Batch: 42114

Client Sample ID: Well #1
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Orthophosphate as P	<0.0200	U	0.250	0.2542		mg/L		102	90 - 110

Lab Sample ID: 820-3443-1 MSD
Matrix: Drinking Water
Analysis Batch: 42114

Client Sample ID: Well #1
Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Orthophosphate as P	<0.0200	U	0.250	0.2542		mg/L		102	90 - 110	0	20

Method: SM 2320B - Alkalinity

Lab Sample ID: MB 810-13633/6
Matrix: Drinking Water
Analysis Batch: 13633

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	<1.00	U	1.00		mg/L			02/24/22 07:37	1

Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCS 810-13633/4
Matrix: Drinking Water
Analysis Batch: 13633

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Alkalinity, Total			100	91.16		mg/L		91	78 - 114		

Lab Sample ID: LLCS 810-13633/5
Matrix: Drinking Water
Analysis Batch: 13633

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Alkalinity, Total			1.00	<1.00	U	mg/L		97	50 - 150		

Lab Sample ID: 810-15366-A-4 DU
Matrix: Drinking Water
Analysis Batch: 13633

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Alkalinity, Total	361			361.8		mg/L				0.3	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 810-13319/1
Matrix: Drinking Water
Analysis Batch: 13319

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10.0	U	10.0		mg/L			02/21/22 11:27	1

Lab Sample ID: LCS 810-13319/2
Matrix: Drinking Water
Analysis Batch: 13319

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			1000	1001		mg/L		100	85 - 115		

Lab Sample ID: 810-15235-A-2 DU
Matrix: Drinking Water
Analysis Batch: 13319

Client Sample ID: Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	972			969.0		mg/L				0.3	10

QC Association Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

HPLC/IC

Analysis Batch: 42025

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	300.0	
820-3443-2	Well #2	Total/NA	Drinking Water	300.0	
820-3443-3	Well #3	Total/NA	Drinking Water	300.0	
LCS 860-42025/48	Lab Control Sample	Total/NA	Drinking Water	300.0	
LCSD 860-42025/49	Lab Control Sample Dup	Total/NA	Drinking Water	300.0	
880-11424-C-2 MS	Matrix Spike	Total/NA	Drinking Water	300.0	
880-11424-C-2 MSD	Matrix Spike Duplicate	Total/NA	Drinking Water	300.0	

Analysis Batch: 42026

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	300.0	
820-3443-2	Well #2	Total/NA	Drinking Water	300.0	
820-3443-3	Well #3	Total/NA	Drinking Water	300.0	
MB 860-42026/47	Method Blank	Total/NA	Drinking Water	300.0	
LCS 860-42026/48	Lab Control Sample	Total/NA	Drinking Water	300.0	
LCSD 860-42026/49	Lab Control Sample Dup	Total/NA	Drinking Water	300.0	
880-11424-C-2 MS	Matrix Spike	Total/NA	Drinking Water	300.0	
880-11424-C-2 MSD	Matrix Spike Duplicate	Total/NA	Drinking Water	300.0	

Metals

Prep Batch: 13597

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	None	
820-3443-2	Well #2	Total/NA	Drinking Water	None	
820-3443-3	Well #3	Total/NA	Drinking Water	None	

Analysis Batch: 13681

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	200.8 As Spec	13597
820-3443-2	Well #2	Total/NA	Drinking Water	200.8 As Spec	13597
820-3443-3	Well #3	Total/NA	Drinking Water	200.8 As Spec	13597
MB 810-13681/16	Method Blank	Total/NA	Drinking Water	200.8 As Spec	
MB 810-13681/53	Method Blank	Total/NA	Drinking Water	200.8 As Spec	
LCS 810-13681/47	Lab Control Sample	Total/NA	Drinking Water	200.8 As Spec	
LLCS 810-13681/11	Lab Control Sample	Total/NA	Drinking Water	200.8 As Spec	
LLCS 810-13681/18	Lab Control Sample	Total/NA	Drinking Water	200.8 As Spec	
810-15631-B-1 MS	Matrix Spike	Total/NA	Drinking Water	200.8 As Spec	
810-15631-B-1 MSD	Matrix Spike Duplicate	Total/NA	Drinking Water	200.8 As Spec	

Filtration Batch: 42168

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Dissolved	Drinking Water	Filtration	
820-3443-2	Well #2	Dissolved	Drinking Water	Filtration	
820-3443-3	Well #3	Dissolved	Drinking Water	Filtration	
MB 860-42168/1-C	Method Blank	Dissolved	Drinking Water	Filtration	
LCS 860-42168/2-C	Lab Control Sample	Dissolved	Drinking Water	Filtration	
LCSD 860-42168/3-C	Lab Control Sample Dup	Dissolved	Drinking Water	Filtration	

QC Association Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Metals

Prep Batch: 42330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total Recoverable	Drinking Water	200.7	
820-3443-2	Well #2	Total Recoverable	Drinking Water	200.7	
820-3443-3	Well #3	Total Recoverable	Drinking Water	200.7	
MB 860-42330/1-A	Method Blank	Total Recoverable	Drinking Water	200.7	
LCS 860-42330/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7	
LCSD 860-42330/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.7	
860-21178-D-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7	
860-21318-A-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7	
860-21318-A-1-C MSD	Matrix Spike Duplicate	Total Recoverable	Drinking Water	200.7	

Prep Batch: 42520

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Dissolved	Drinking Water	200.7	42168
820-3443-2	Well #2	Dissolved	Drinking Water	200.7	42168
820-3443-3	Well #3	Dissolved	Drinking Water	200.7	42168
MB 860-42168/1-C	Method Blank	Dissolved	Drinking Water	200.7	42168
MB 860-42520/1-A	Method Blank	Total Recoverable	Drinking Water	200.7	
LCS 860-42168/2-C	Lab Control Sample	Dissolved	Drinking Water	200.7	42168
LCS 860-42520/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7	
LCSD 860-42168/3-C	Lab Control Sample Dup	Dissolved	Drinking Water	200.7	42168
LCSD 860-42520/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.7	
860-21270-C-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7	
860-21270-C-1-C MSD	Matrix Spike Duplicate	Total Recoverable	Drinking Water	200.7	

Analysis Batch: 42543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
820-3443-2	Well #2	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
820-3443-3	Well #3	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
MB 860-42330/1-A	Method Blank	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
LCS 860-42330/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
LCSD 860-42330/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
860-21178-D-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
860-21318-A-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330
860-21318-A-1-C MSD	Matrix Spike Duplicate	Total Recoverable	Drinking Water	200.7 Rev 4.4	42330

Prep Batch: 42548

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total Recoverable	Drinking Water	200.8	
820-3443-2	Well #2	Total Recoverable	Drinking Water	200.8	
820-3443-3	Well #3	Total Recoverable	Drinking Water	200.8	
MB 860-42548/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	
LCS 860-42548/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	
LCSD 860-42548/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.8	
820-3443-1 MS	Well #1	Total Recoverable	Drinking Water	200.8	
820-3443-1 MSD	Well #1	Total Recoverable	Drinking Water	200.8	

Analysis Batch: 42732

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total Recoverable	Drinking Water	200.8	42548
820-3443-2	Well #2	Total Recoverable	Drinking Water	200.8	42548

Metals (Continued)

Analysis Batch: 42732 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-3	Well #3	Total Recoverable	Drinking Water	200.8	42548
MB 860-42548/1-A	Method Blank	Total Recoverable	Drinking Water	200.8	42548
LCS 860-42548/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.8	42548
LCSD 860-42548/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.8	42548
820-3443-1 MS	Well #1	Total Recoverable	Drinking Water	200.8	42548
820-3443-1 MSD	Well #1	Total Recoverable	Drinking Water	200.8	42548

Analysis Batch: 42807

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Dissolved	Drinking Water	200.7 Rev 4.4	42520
820-3443-2	Well #2	Dissolved	Drinking Water	200.7 Rev 4.4	42520
820-3443-3	Well #3	Dissolved	Drinking Water	200.7 Rev 4.4	42520
MB 860-42168/1-C	Method Blank	Dissolved	Drinking Water	200.7 Rev 4.4	42520
MB 860-42520/1-A	Method Blank	Total Recoverable	Drinking Water	200.7 Rev 4.4	42520
LCS 860-42168/2-C	Lab Control Sample	Dissolved	Drinking Water	200.7 Rev 4.4	42520
LCS 860-42520/2-A	Lab Control Sample	Total Recoverable	Drinking Water	200.7 Rev 4.4	42520
LCSD 860-42168/3-C	Lab Control Sample Dup	Dissolved	Drinking Water	200.7 Rev 4.4	42520
LCSD 860-42520/3-A	Lab Control Sample Dup	Total Recoverable	Drinking Water	200.7 Rev 4.4	42520
860-21270-C-1-B MS	Matrix Spike	Total Recoverable	Drinking Water	200.7 Rev 4.4	42520
860-21270-C-1-C MSD	Matrix Spike Duplicate	Total Recoverable	Drinking Water	200.7 Rev 4.4	42520

General Chemistry

Analysis Batch: 13319

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	SM 2540C	
820-3443-2	Well #2	Total/NA	Drinking Water	SM 2540C	
820-3443-3	Well #3	Total/NA	Drinking Water	SM 2540C	
MB 810-13319/1	Method Blank	Total/NA	Drinking Water	SM 2540C	
LCS 810-13319/2	Lab Control Sample	Total/NA	Drinking Water	SM 2540C	
810-15235-A-2 DU	Duplicate	Total/NA	Drinking Water	SM 2540C	

Analysis Batch: 13633

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	SM 2320B	
820-3443-2	Well #2	Total/NA	Drinking Water	SM 2320B	
820-3443-3	Well #3	Total/NA	Drinking Water	SM 2320B	
MB 810-13633/6	Method Blank	Total/NA	Drinking Water	SM 2320B	
LCS 810-13633/4	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	
LLCS 810-13633/5	Lab Control Sample	Total/NA	Drinking Water	SM 2320B	
810-15366-A-4 DU	Duplicate	Total/NA	Drinking Water	SM 2320B	

Analysis Batch: 14204

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	150.1	
820-3443-2	Well #2	Total/NA	Drinking Water	150.1	
820-3443-3	Well #3	Total/NA	Drinking Water	150.1	
LCSSRM 810-14204/4	Lab Control Sample	Total/NA	Drinking Water	150.1	
LCSSRM 810-14204/8	Lab Control Sample	Total/NA	Drinking Water	150.1	

QC Association Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

General Chemistry

Analysis Batch: 14298

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Total/NA	Drinking Water	SM 4500 CO2 B	
820-3443-2	Well #2	Total/NA	Drinking Water	SM 4500 CO2 B	
820-3443-3	Well #3	Total/NA	Drinking Water	SM 4500 CO2 B	

Analysis Batch: 42114

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-3443-1	Well #1	Dissolved	Drinking Water	365.1	
820-3443-2	Well #2	Dissolved	Drinking Water	365.1	
820-3443-3	Well #3	Dissolved	Drinking Water	365.1	
MB 860-42114/9	Method Blank	Total/NA	Drinking Water	365.1	
LCS 860-42114/10	Lab Control Sample	Total/NA	Drinking Water	365.1	
LCSD 860-42114/11	Lab Control Sample Dup	Total/NA	Drinking Water	365.1	
820-3443-1 MS	Well #1	Dissolved	Drinking Water	365.1	
820-3443-1 MSD	Well #1	Dissolved	Drinking Water	365.1	

Lab Chronicle

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Client Sample ID: Well #1

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-1

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			42025	02/18/22 15:46	WP	XEN STF
Total/NA	Analysis	300.0		1			42026	02/18/22 15:46	WP	XEN STF
Dissolved	Filtration	Filtration			250 mL	250 mL	42168	02/19/22 11:17	PB	XEN STF
Dissolved	Prep	200.7			50 mL	50 mL	42520	02/23/22 09:30	MD	XEN STF
Dissolved	Analysis	200.7 Rev 4.4		1			42807	02/24/22 14:00	AV	XEN STF
Total Recoverable	Prep	200.7			50 mL	50 mL	42330	02/22/22 09:00	MD	XEN STF
Total Recoverable	Analysis	200.7 Rev 4.4		1			42543	02/23/22 02:48	AV	XEN STF
Total Recoverable	Prep	200.8			50 mL	50 mL	42548	02/23/22 10:30	MD	XEN STF
Total Recoverable	Analysis	200.8		1			42732	02/23/22 20:51	SHZ	XEN STF
Total/NA	Prep	None			20 mL	20 mL	13597	02/24/22 12:15	JK	EA SB
Total/NA	Analysis	200.8 As Spec		1			13681	02/24/22 17:44	JK	EA SB
Total/NA	Analysis	150.1		1			14204	03/04/22 17:18	JA	EA SB
Dissolved	Analysis	365.1		1	10 mL	10 mL	42114	02/18/22 15:26	YVD	XEN STF
Total/NA	Analysis	SM 2320B		1			13633	02/24/22 10:54	KH	EA SB
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	13319	02/21/22 12:29	TN	EA SB
Total/NA	Analysis	SM 4500 CO2 B		1			14298	03/07/22 16:16	KH	EA SB

Client Sample ID: Well #2

Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-2

Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			42025	02/18/22 16:33	WP	XEN STF
Total/NA	Analysis	300.0		1			42026	02/18/22 16:33	WP	XEN STF
Dissolved	Filtration	Filtration			250 mL	250 mL	42168	02/19/22 11:17	PB	XEN STF
Dissolved	Prep	200.7			50 mL	50 mL	42520	02/23/22 09:30	MD	XEN STF
Dissolved	Analysis	200.7 Rev 4.4		1			42807	02/24/22 14:03	AV	XEN STF
Total Recoverable	Prep	200.7			50 mL	50 mL	42330	02/22/22 09:00	MD	XEN STF
Total Recoverable	Analysis	200.7 Rev 4.4		1			42543	02/23/22 02:51	AV	XEN STF
Total Recoverable	Prep	200.8			50 mL	50 mL	42548	02/23/22 10:30	MD	XEN STF
Total Recoverable	Analysis	200.8		1			42732	02/23/22 21:11	SHZ	XEN STF
Total/NA	Prep	None			20 mL	20 mL	13597	02/24/22 12:15	JK	EA SB
Total/NA	Analysis	200.8 As Spec		1			13681	02/24/22 17:47	JK	EA SB
Total/NA	Analysis	150.1		1			14204	03/04/22 17:21	JA	EA SB
Dissolved	Analysis	365.1		1	10 mL	10 mL	42114	02/18/22 15:31	YVD	XEN STF
Total/NA	Analysis	SM 2320B		1			13633	02/24/22 10:46	KH	EA SB
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	13319	02/21/22 12:33	TN	EA SB
Total/NA	Analysis	SM 4500 CO2 B		1			14298	03/07/22 16:16	KH	EA SB

Lab Chronicle

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Client Sample ID: Well #3
Date Collected: 02/17/22 11:20
Date Received: 02/17/22 13:22

Lab Sample ID: 820-3443-3
Matrix: Drinking Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1			42025	02/18/22 16:56	WP	XEN STF
Total/NA	Analysis	300.0		1			42026	02/18/22 16:56	WP	XEN STF
Dissolved	Filtration	Filtration			250 mL	250 mL	42168	02/19/22 11:17	PB	XEN STF
Dissolved	Prep	200.7			50 mL	50 mL	42520	02/23/22 09:30	MD	XEN STF
Dissolved	Analysis	200.7 Rev 4.4		1			42807	02/24/22 14:07	AV	XEN STF
Total Recoverable	Prep	200.7			50 mL	50 mL	42330	02/22/22 09:00	MD	XEN STF
Total Recoverable	Analysis	200.7 Rev 4.4		1			42543	02/23/22 02:55	AV	XEN STF
Total Recoverable	Prep	200.8			50 mL	50 mL	42548	02/23/22 10:30	MD	XEN STF
Total Recoverable	Analysis	200.8		1			42732	02/23/22 21:14	SHZ	XEN STF
Total/NA	Prep	None			20 mL	20 mL	13597	02/24/22 12:15	JK	EA SB
Total/NA	Analysis	200.8 As Spec		1			13681	02/24/22 17:50	JK	EA SB
Total/NA	Analysis	150.1		1			14204	03/04/22 17:24	JA	EA SB
Dissolved	Analysis	365.1		1	10 mL	10 mL	42114	02/18/22 15:32	YVD	XEN STF
Total/NA	Analysis	SM 2320B		1			13633	02/24/22 11:04	KH	EA SB
Total/NA	Analysis	SM 2540C		1	100 mL	100 mL	13319	02/21/22 12:37	TN	EA SB
Total/NA	Analysis	SM 4500 CO2 B		1			14298	03/07/22 16:16	KH	EA SB

Laboratory References:

EA SB = Eurofins Eaton South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777
IGL = Integrated Geosciences Laboratories, 6016 Centralcrest St, Houston, TX 77092
XEN STF = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Accreditation/Certification Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Laboratory: Eurofins Eaton South Bend

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704187-20-4	12-31-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
150.1		Drinking Water	pH
200.8 As Spec	None	Drinking Water	As (III)
SM 2320B		Drinking Water	Alkalinity, Total
SM 4500 CO2 B		Drinking Water	Carbon Dioxide, Free

Laboratory: Eurofins Houston

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704215-21-44	06-30-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
200.7 Rev 4.4	200.7	Drinking Water	Calcium
200.7 Rev 4.4	200.7	Drinking Water	SiO2
365.1		Drinking Water	Orthophosphate as P

Method Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Method	Method Description	Protocol	Laboratory
300.0	Anions, Ion Chromatography	MCAWW	XEN STF
200.7 Rev 4.4	Metals (ICP)	EPA	XEN STF
200.8	Metals (ICP/MS)	EPA	XEN STF
200.8 As Spec	Arsenic Speciation (ICP/MS)	Lab SOP	EA SB
150.1	pH (Electrometric)	MCAWW	EA SB
365.1	Phosphorus, Ortho	EPA	XEN STF
SM 2320B	Alkalinity	SM	EA SB
SM 2540C	Solids, Total Dissolved (TDS)	SM	EA SB
SM 4500 CO2 B	Free Carbon Dioxide	SM	EA SB
Subcontract	Particle Sized Distribution	None	IGL
200.7	Preparation, Total Recoverable Metals	EPA	XEN STF
200.8	Preparation, Total Recoverable Metals	EPA	XEN STF
Filtration	Sample Filtration	None	XEN STF
None	Preparation, Arsenic (III)	Lab SOP	EA SB

Protocol References:

EPA = US Environmental Protection Agency
Lab SOP = Laboratory Standard Operating Procedure
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
None = None
SM = "Standard Methods For The Examination Of Water And Wastewater"

Laboratory References:

EA SB = Eurofins Eaton South Bend, 110 S Hill Street, South Bend, IN 46617, TEL (574)233-4777
IGL = Integrated Geosciences Laboratories, 6016 Centralcrest St, Houston, TX 77092
XEN STF = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: Jacob & Martin LCC
Project/Site: City of Ropesvile-WTP

Job ID: 820-3443-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
820-3443-1	Well #1	Drinking Water	02/17/22 11:20	02/17/22 13:22
820-3443-2	Well #2	Drinking Water	02/17/22 11:20	02/17/22 13:22
820-3443-3	Well #3	Drinking Water	02/17/22 11:20	02/17/22 13:22

INTEGRATED GEOSCIENCES LABORATORIES, LLC
*Environmental * Geotechnical * Core Analysis*

6016 Centralcrest Street • Houston, Texas 77092
Telephone (713) 316-1800 • Fax (877) 255-9953

February 23, 2022

Holly Taylor,
Project Manager,
Eurofins Lubbock
6701 Aberdeen Ave. Suite 8
Lubbock, TX 79424.

Re: IGS Labs File No: **2202-30**
Project Name: **City of Ropesville-WTP**
Project Number: **82000474**
Site Location:

Subject: Final Report: Laser Particle Size Analysis – (ASTM D4464)

Dear Holly Taylor,

Please find enclosed report for Physical Properties analyses conducted on fluid samples received from your **"City of Ropesville-WTP"** project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The sample is currently in storage and will be retained for fifteen days past the completion of testing at no charge. Please note that the sample will be disposed of at that time. You may contact me regarding storage, disposal, or return of the sample.

Integrated Geosciences Laboratories appreciate the opportunity to be of service. If you have any questions or require additional information, please contact me or Emeka Anazodo at (713) 316-1800.

Sincerely,
Integrated Geosciences Laboratories, LLC.

Wumi Andrew

Laboratory Technician.
Encl.

Integrated Geosciences Laboratories, LLC

Project Name: City of Ropesville-WTP
Project Number: 82000474
Site Location: N/A

IGS Labs File No: 2202-30
Client: Eurofins Lubbock
Date Received: 2/18/2022

TEST PROGRAM - 20220218

Serial Number	Sample ID	Date	Time	Fluid Type	Particle Size: Microsize ASTM D4464	Comments
Date Received: 20220218			Central			
1	Well #1 (820-3443-1)	2/17/2022	11:20	Drinking Water	X	1- [500mL plastic bottle]
2	Well #2 (820-3443-2)	2/17/2022	11:20	Drinking Water	X	1- [500mL plastic bottle]
3	Well #3 (820-3443-3)	2/17/2022	11:20	Drinking Water	X	1- [500mL plastic bottle]
	TOTAL				**3**	**3**

Laboratory Test Program Notes

1. Standard TAT for basic analysis is 10-15 business days.
2. Due Date Requested: 2/23/2022

Integrated Geosciences Laboratories, LLC.

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D4464M)

PROJECT NAME: City of Ropesville-WTP
PROJECT NO: 82000474

Eurofins Lubbock
IGS Labs File No: 2202-30

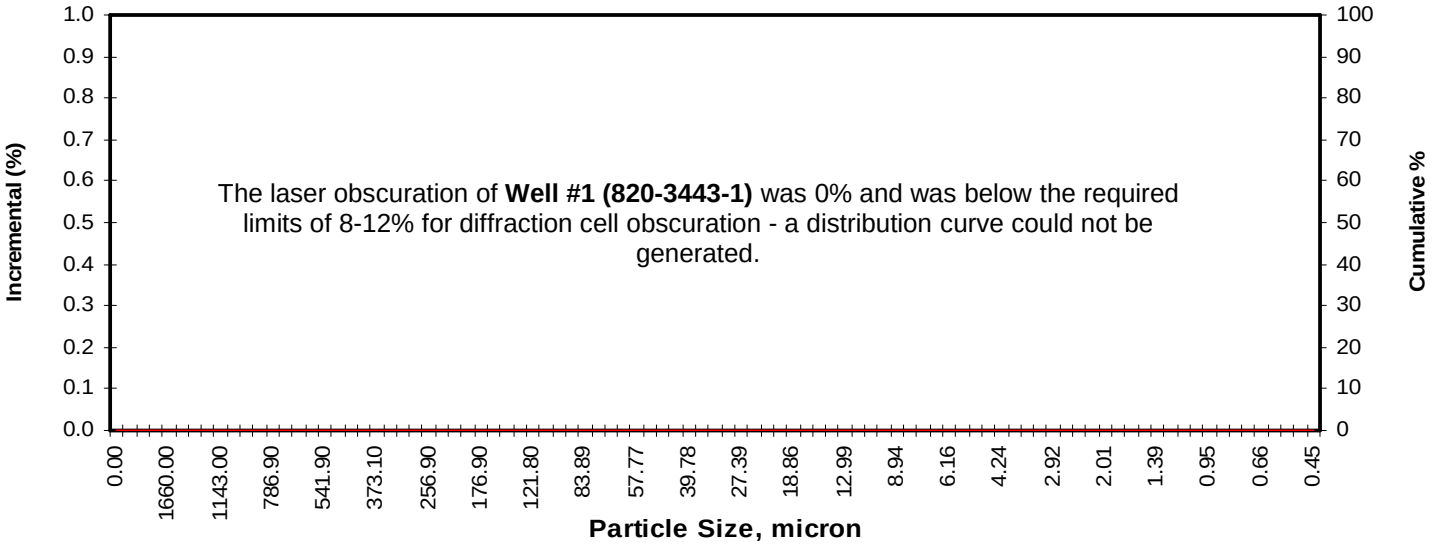
Sample ID	Matrix	Median Grain Size, micron (1)	CUMULATIVE PERCENT GREATER THAN Distribution percent, microns										
			5%	10%	16%	25%	40%	50%	60%	75%	84%	90%	95%
Well #1 (820-3443-1)	Aqueous	Obscuration = 0%	Sample below the required limits of 8-12% for diffraction cell obscuration - a distribution curve could not be generated.										
Well #2 (820-3443-2)	Aqueous	Obscuration = 0%	Sample below the required limits of 8-12% for diffraction cell obscuration - a distribution curve could not be generated.										
Well #3 (820-3443-3)	Aqueous	Obscuration = 0%	Sample below the required limits of 8-12% for diffraction cell obscuration - a distribution curve could not be generated.										

(1) Based on Trask Median

Integrated Geosciences Laboratories, LLC.

Particle Size Analysis - ASTM D4464M

Client:	Eurofins Lubbock	**IGS Labs File No:**	2202-30
Project:	City of Ropesville-WTP	**Sample ID:**	Well #1 (820-3443-1)
Project No:	82000474	**Matrix:**	Aqueous



Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
0.00	0.00	0.0
0.00	0.00	0.0
2000.00	0.00	0.0
1822.00	0.00	0.0
1660.00	0.00	0.0
1512.00	0.00	0.0
1377.00	0.00	0.0
1255.00	0.00	0.0
1143.00	0.00	0.0
1041.00	0.00	0.0
948.30	0.00	0.0
863.90	0.00	0.0
786.90	0.00	0.0
716.80	0.00	0.0
653.00	0.00	0.0
594.90	0.00	0.0
541.90	0.00	0.0
493.60	0.00	0.0
449.70	0.00	0.0
409.60	0.00	0.0
373.10	0.00	0.0
339.90	0.00	0.0
309.60	0.00	0.0
282.10	0.00	0.0
256.90	0.00	0.0
234.10	0.00	0.0
213.20	0.00	0.0
194.20	0.00	0.0
176.90	0.00	0.0
161.20	0.00	0.0
146.80	0.00	0.0
133.70	0.00	0.0
121.80	0.00	0.0
111.00	0.00	0.0
101.10	0.00	0.0
92.09	0.00	0.0
83.89	0.00	0.0
76.42	0.00	0.0
69.61	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
63.41	0.00	0.0
57.77	0.00	0.0
52.62	0.00	0.0
47.94	0.00	0.0
43.67	0.00	0.0
39.78	0.00	0.0
36.24	0.00	0.0
33.01	0.00	0.0
30.07	0.00	0.0
27.39	0.00	0.0
24.95	0.00	0.0
22.73	0.00	0.0
20.70	0.00	0.0
18.86	0.00	0.0
17.18	0.00	0.0
15.65	0.00	0.0
14.26	0.00	0.0
12.99	0.00	0.0
11.83	0.00	0.0
10.78	0.00	0.0
9.82	0.00	0.0
8.94	0.00	0.0
8.15	0.00	0.0
7.42	0.00	0.0
6.76	0.00	0.0
6.16	0.00	0.0
5.61	0.00	0.0
5.11	0.00	0.0
4.66	0.00	0.0
4.24	0.00	0.0
3.86	0.00	0.0
3.52	0.00	0.0
3.21	0.00	0.0
2.92	0.00	0.0
2.66	0.00	0.0
2.42	0.00	0.0
2.21	0.00	0.0
2.01	0.00	0.0
1.83	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
1.668	0.000	0.0
1.520	0.000	0.0
1.385	0.000	0.0
1.261	0.000	0.0
1.149	0.000	0.0
1.047	0.000	0.0
0.953	0.000	0.0
0.868	0.000	0.0
0.791	0.000	0.0
0.721	0.000	0.0
0.656	0.000	0.0
0.598	0.000	0.0
0.545	0.000	0.0
0.496	0.000	0.0
0.452	0.000	0.0
TOTALS:	**0.00**	**0.0**

Measure	Trask	Inman
Median, mm		
Median, micron	#VALUE!	#VALUE!
Mean, mm		
Mean, micron	#VALUE!	#VALUE!
Sorting		
Skewness		
Kurtosis		

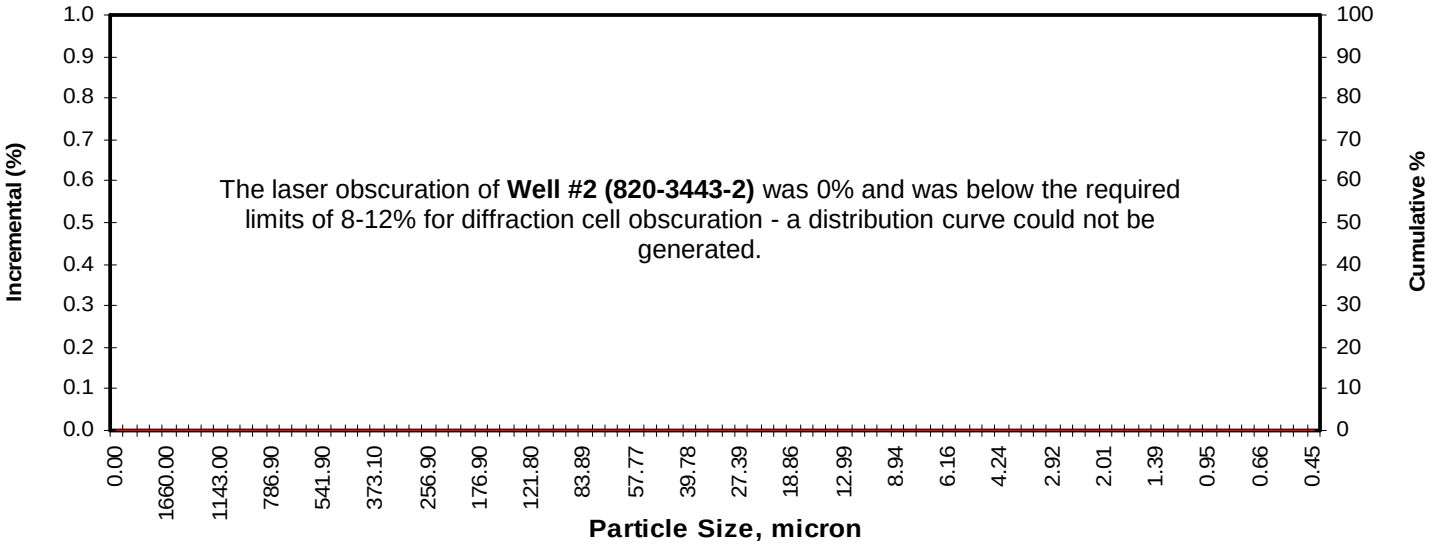
Cumulative Percent greater than		
Distribution percent	Particle Size	
	Micron	Millimeters
5		
10		
16		
25		
40		
50		
60		
75		
84		
90		
95		

Phone: (713) 316-1800 Fax: (877) 255-9953

Integrated Geosciences Laboratories, LLC.

Particle Size Analysis - ASTM D4464M

Client:	Eurofins Lubbock	**IGS Labs File No:**	2202-30
Project:	City of Ropesville-WTP	**Sample ID:**	Well #2 (820-3443-2)
Project No:	82000474	**Matrix:**	Aqueous



Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
0.00	0.00	0.0
0.00	0.00	0.0
2000.00	0.00	0.0
1822.00	0.00	0.0
1660.00	0.00	0.0
1512.00	0.00	0.0
1377.00	0.00	0.0
1255.00	0.00	0.0
1143.00	0.00	0.0
1041.00	0.00	0.0
948.30	0.00	0.0
863.90	0.00	0.0
786.90	0.00	0.0
716.80	0.00	0.0
653.00	0.00	0.0
594.90	0.00	0.0
541.90	0.00	0.0
493.60	0.00	0.0
449.70	0.00	0.0
409.60	0.00	0.0
373.10	0.00	0.0
339.90	0.00	0.0
309.60	0.00	0.0
282.10	0.00	0.0
256.90	0.00	0.0
234.10	0.00	0.0
213.20	0.00	0.0
194.20	0.00	0.0
176.90	0.00	0.0
161.20	0.00	0.0
146.80	0.00	0.0
133.70	0.00	0.0
121.80	0.00	0.0
111.00	0.00	0.0
101.10	0.00	0.0
92.09	0.00	0.0
83.89	0.00	0.0
76.42	0.00	0.0
69.61	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
63.41	0.00	0.0
57.77	0.00	0.0
52.62	0.00	0.0
47.94	0.00	0.0
43.67	0.00	0.0
39.78	0.00	0.0
36.24	0.00	0.0
33.01	0.00	0.0
30.07	0.00	0.0
27.39	0.00	0.0
24.95	0.00	0.0
22.73	0.00	0.0
20.70	0.00	0.0
18.86	0.00	0.0
17.18	0.00	0.0
15.65	0.00	0.0
14.26	0.00	0.0
12.99	0.00	0.0
11.83	0.00	0.0
10.78	0.00	0.0
9.82	0.00	0.0
8.94	0.00	0.0
8.15	0.00	0.0
7.42	0.00	0.0
6.76	0.00	0.0
6.16	0.00	0.0
5.61	0.00	0.0
5.11	0.00	0.0
4.66	0.00	0.0
4.24	0.00	0.0
3.86	0.00	0.0
3.52	0.00	0.0
3.21	0.00	0.0
2.92	0.00	0.0
2.66	0.00	0.0
2.42	0.00	0.0
2.21	0.00	0.0
2.01	0.00	0.0
1.83	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
1.668	0.000	0.0
1.520	0.000	0.0
1.385	0.000	0.0
1.261	0.000	0.0
1.149	0.000	0.0
1.047	0.000	0.0
0.953	0.000	0.0
0.868	0.000	0.0
0.791	0.000	0.0
0.721	0.000	0.0
0.656	0.000	0.0
0.598	0.000	0.0
0.545	0.000	0.0
0.496	0.000	0.0
0.452	0.000	0.0
TOTALS:	**0.00**	**0.0**

Measure	Trask	Inman
Median, mm		
Median, micron	#VALUE!	#VALUE!
Mean, mm		
Mean, micron	#VALUE!	#VALUE!
Sorting		
Skewness		
Kurtosis		

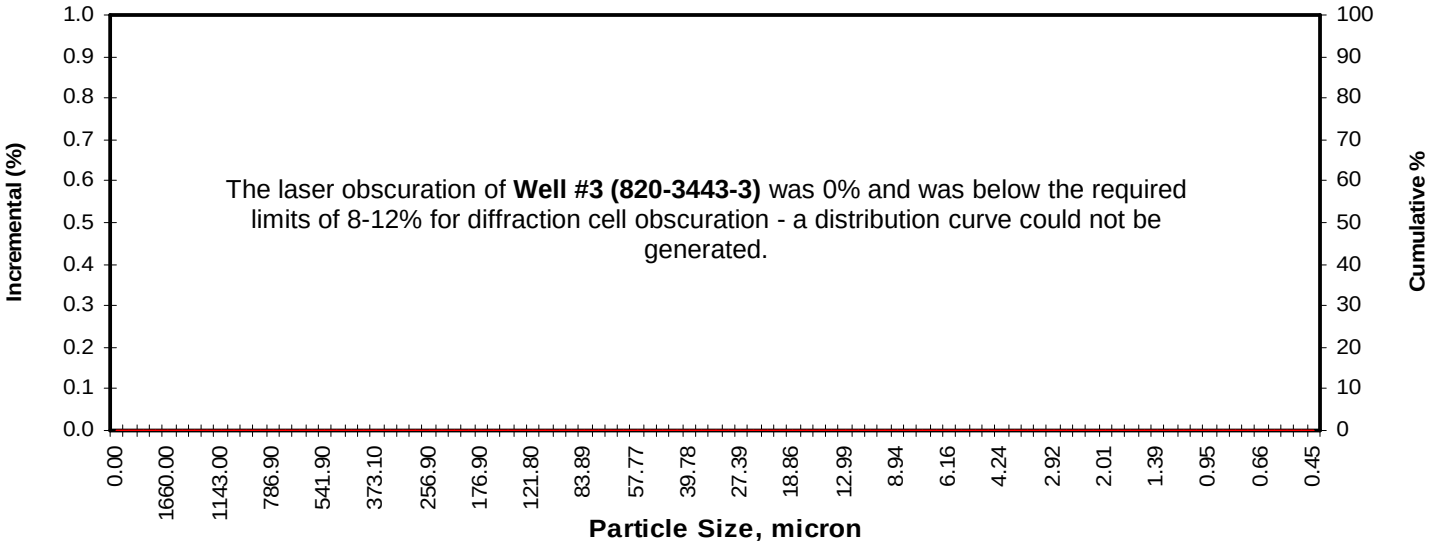
Cumulative Percent greater than		
Distribution percent	Particle Size	
	Micron	Millimeters
5		
10		
16		
25		
40		
50		
60		
75		
84		
90		
95		

Phone: (713) 316-1800 Fax: (877) 255-9953

Integrated Geosciences Laboratories, LC.

Particle Size Analysis - ASTM D4464M

Client:	Eurofins Lubbock	**IGS Labs File No:**	2202-30
Project:	City of Ropesville-WTP	**Sample ID:**	Well #3 (820-3443-3)
Project No:	82000474	**Matrix:**	Aqueous



Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
0.00	0.00	0.0
0.00	0.00	0.0
2000.00	0.00	0.0
1822.00	0.00	0.0
1660.00	0.00	0.0
1512.00	0.00	0.0
1377.00	0.00	0.0
1255.00	0.00	0.0
1143.00	0.00	0.0
1041.00	0.00	0.0
948.30	0.00	0.0
863.90	0.00	0.0
786.90	0.00	0.0
716.80	0.00	0.0
653.00	0.00	0.0
594.90	0.00	0.0
541.90	0.00	0.0
493.60	0.00	0.0
449.70	0.00	0.0
409.60	0.00	0.0
373.10	0.00	0.0
339.90	0.00	0.0
309.60	0.00	0.0
282.10	0.00	0.0
256.90	0.00	0.0
234.10	0.00	0.0
213.20	0.00	0.0
194.20	0.00	0.0
176.90	0.00	0.0
161.20	0.00	0.0
146.80	0.00	0.0
133.70	0.00	0.0
121.80	0.00	0.0
111.00	0.00	0.0
101.10	0.00	0.0
92.09	0.00	0.0
83.89	0.00	0.0
76.42	0.00	0.0
69.61	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
63.41	0.00	0.0
57.77	0.00	0.0
52.62	0.00	0.0
47.94	0.00	0.0
43.67	0.00	0.0
39.78	0.00	0.0
36.24	0.00	0.0
33.01	0.00	0.0
30.07	0.00	0.0
27.39	0.00	0.0
24.95	0.00	0.0
22.73	0.00	0.0
20.70	0.00	0.0
18.86	0.00	0.0
17.18	0.00	0.0
15.65	0.00	0.0
14.26	0.00	0.0
12.99	0.00	0.0
11.83	0.00	0.0
10.78	0.00	0.0
9.82	0.00	0.0
8.94	0.00	0.0
8.15	0.00	0.0
7.42	0.00	0.0
6.76	0.00	0.0
6.16	0.00	0.0
5.61	0.00	0.0
5.11	0.00	0.0
4.66	0.00	0.0
4.24	0.00	0.0
3.86	0.00	0.0
3.52	0.00	0.0
3.21	0.00	0.0
2.92	0.00	0.0
2.66	0.00	0.0
2.42	0.00	0.0
2.21	0.00	0.0
2.01	0.00	0.0
1.83	0.00	0.0

Particle Diameter, micron	Particle Distribution	
	Incremental percent	Cumulative percent
1.668	0.000	0.0
1.520	0.000	0.0
1.385	0.000	0.0
1.261	0.000	0.0
1.149	0.000	0.0
1.047	0.000	0.0
0.953	0.000	0.0
0.868	0.000	0.0
0.791	0.000	0.0
0.721	0.000	0.0
0.656	0.000	0.0
0.598	0.000	0.0
0.545	0.000	0.0
0.496	0.000	0.0
0.452	0.000	0.0
TOTALS:	**0.00**	**0.0**

Measure	Trask	Inman
Median, mm		
Median, micron	#VALUE!	#VALUE!
Mean, mm		
Mean, micron	#VALUE!	#VALUE!
Sorting		
Skewness		
Kurtosis		

Cumulative Percent greater than		
Distribution percent	Particle Size	
	Micron	Millimeters
5		
10		
16		
25		
40		
50		
60		
75		
84		
90		
95		

Phone: (713) 316-1800 Fax: (877) 255-9953

Eurofins Lubbock
6701 Aberdeen Ave. Suite 8
Lubbock, TX 79424
Phone: 806-794-1296

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Taylor, Holly	Carrier Tracking No(s):	COC No: 820-3206.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: holly.taylor@eurofinset.com	State of Origin: Texas	Page: Page 1 of 1
Company: Integrated Geosciences Laboratories LLC		Accreditations Required (See note): NELAP - Texas		Job #: 820-3443-1
Address: 6016 Centralcrest St,	Due Date Requested: 2/23/2022			
City: Houston	TAT Requested (days):			
State, Zip: TX, 77092				
Phone:	PO #:			
Email:	WO #:			
Project Name: City of Ropesvile-WTP	Project #: 82000474			
Site:	SSOW#:			

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUB (Particle Sized Distribution) Particle Sized Distribution	Total Number of containers	Special Instructions/Note:
			Preservation Code:						2202-30
Well #1 (820-3443-1)	2/17/22	11:20 Central		Drinking Wate			X	1	
Well #2 (820-3443-2)	2/17/22	11:20 Central		Drinking Wate			X	1	
Well #3 (820-3443-3)	2/17/22	11:20 Central		Drinking Wate			X	1	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Ashley T. Keppler	2/17/22 17:00			2/18/22 0930	IGSL
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Loc: 820
3443

urofins | Environment Testing Xenco

Chain of Custody

Houston, TX (281) 240-4200, Dallas, TX (214) 902-0300
Midland, TX (432) 704-5440, San Antonio, TX (210) 509-3334
EL Paso, TX (915) 585-3443, Lubbock, TX (806) 794-1296
Hobbs, NM (575) 392-7550, Carlsbad, NM (575) 988-3199

820-3443 Chain of Custody

www.xenco.com Page _____ of _____

Project Manager:	Josh Barker	Bill to: (if different)	
Company Name:	Jacobs / Martin	Company Name:	
Address:		Address:	
City, State ZIP:		City, State ZIP:	
Phone:	Email:	aphillips@jacobsmartin.com	

Work Order Comments

Program: UST/PST ☐ PRP ☐ Brownfields ☐ RRC ☐ Superfund ☐
State of Project:
Reporting: Level II ☐ Level III ☐ PST/UST ☐ TRRP ☐ Level IV ☐
Deliverables: EDD ☐ ADaPT ☐ Other:

Project Name:	City of Roseville - WTP	Turn Around	
Project Number:		☐ Routine ☐ Rush	
Project Location:		Due Date:	
Sampler's Name:		TAT starts the day received by the lab, if received by 4:30pm	
PO #:			

SAMPLE RECEIPT				
Temp Blank:	Yes (No)	Wet Ice:	(Yes) No	
Samples Received Intact:	(Yes) No	Thermometer ID:	IR-4	
Cooler Custody Seals:	Yes No (N/A)	Correction Factor:	-0.1	
Sample Custody Seals:	Yes No (N/A)	Temperature Reading:	10.4	
Total Containers:		Corrected Temperature:	10.3	

Preservative Codes

None: NO; DI Water: H_2O; Cool: Cool; MeOH: Me; HCL: HC; HNO_3: HN; H_2SO_4: H_2; NaOH: Na; H_3PO_4: HP; $NaHSO_4$: NABIS; $Na_2S_2O_3$: $NaSO_3$; Zn Acetate+NaOH: Zn; NaOH+Ascorbic Acid: SAPC

Sample Identification	Matrix	Date Sampled	Time Sampled	Depth	Grab/ Comp	# of Cont	Pres. Code	Parameters: Metals As III	Anions	pH	CO_2	Phosphorous	RSD	Sample Comments
Well #1		2/17/22	11:20											
Well #2		2/17/22	11:20											
Well #3		2/17/22	11:20											

Total 200.7 / 6010 200.8 / 6020: 8RCRA 13PPM Texas 11 Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Mo Ni K Se Ag SiO_2 Na Sr Tl Sn U V Zn
Circle Method(s) and Metal(s) to be analyzed TCLP / SPLP 6010 : 8RCRA Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl U Hg: 1631 / 245.1 / 7470 / 7471

Relinquished by: (Signature)	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Received by: (Signature)	Date/Time
1	Ashley P. Ruggler	2/17/22 13:22			
3			4		
5			6		

Revised Date: 08/25/2020 Rev. 2020.2

Eurofins Lubbock
6701 Aberdeen Ave. Suite 8
Lubbock, TX 79424
Phone: 806-794-1296

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Taylor, Holly	Carrier Tracking No(s):	COC No: 820-3205.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: holly.taylor@eurofinset.com	State of Origin: Texas	Page: Page 1 of 1
Company: Eurofins Eaton Analytical		Accreditations Required (See note): NELAP - Texas		Job #: 820-3443-1
Address: 110 S Hill Street, ,	Due Date Requested: 2/24/2022			
City: South Bend	TAT Requested (days):			
State, Zip: IN, 46617				
Phone: 574-233-4777(Tel) 574-233-8207(Fax)	PO #:			
Email:	WO #:			
Project Name: City of Ropesvile-WTP	Project #: 82000474			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	200.8_AsSpec/AsSpec_Prep Arsenic(III)	SM4500_CO2_B	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
Well #1 (820-3443-1)	2/17/22	11:20 Central		Drinking Wate			X	X	1	As III Unfiltered
Well #2 (820-3443-2)	2/17/22	11:20 Central		Drinking Wate			X	X	1	
Well #3 (820-3443-3)	2/17/22	11:20 Central		Drinking Wate			X	X	1	

As III filtered upon receipt in South Bend. SS 2/18/22

Client Provided Sample Container

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Ashley T. Keegler	2/17/22 17:00			2-18-22 0915	GEA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:
X		0°C

Eurofins Lubbock
6701 Aberdeen Ave. Suite 8
Lubbock, TX 79424
Phone: 806-794-1296

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler	Lab PM: Taylor Holly	Carrier Tracking No(s):	COC No: 820-3204.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: holly.taylor@eurofinset.com	State of Origin: Texas	Page: Page 1 of 1
Company: Eurofins Environment Testing South Centr		Accreditations Required (See note): NELAP Texas		Job #: 820-3443-1
Address: 4145 Greenbriar Dr	Due Date Requested: 2/23/2022			
City: Stafford	TAT Requested (days):			
State, Zip: TX, 77477				
Phone: 281-240-4200(Tel)	PO #:			
Email:	WO #:			
Project Name: City of Ropesvile-WTP	Project #: 82000474			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A HCL, B NaOH, C Zn Acetate, D Nitric Acid, E NaHSO4, F MeOH, G Amchlor, H Ascorbic Acid, I Ice, J DI Water, K EDTA, L EDA, M Hexane, N None, O AsNaO2, P Na2O4S, Q Na2SO3, R Na2S2O3, S H2SO4, T TSP Dodecahydrate, U Acetone, V MCAA, W pH 4-5, Z other (specify)
Other:

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	200.7/200.7_P_TR (MOD) Custom List	200.8/200.8_P_TR (MOD) Custom List	200.7/Filtration_ME (MOD) Custom List	300_ORGFM_28D/ (MOD) Custom List	300_ORGFMS/ (MOD) Custom List	365.1_Ortho/FIELD_FLTRD (MOD) Local Method	SM4500_H+/ pH and Temperature	Total Number of containers	Special Instructions/Note:
			Preservation Code:												
Well #1 (820-3443-1)	2/17/22	11:20 Central		Drinking Wate			X	X	X	X	X	X	X		
Well #2 (820-3443-2)	2/17/22	11:20 Central		Drinking Wate			X	X	X	X	X	X	X		
Well #3 (820-3443-3)	2/17/22	11:20 Central		Drinking Wate			X	X	X	X	X	X	X		

Temp: 2.2 IR ID:HOU-223
C/F:-0.1
Corrected Temp: 2.1

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing South Central, LLC places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins Environment Testing South Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing South Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing South Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I II III, IV Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by	Date	Time:	Method of Shipment

Relinquished by	Date/Time:	Company	Received by:	Date/Time:	Company
Ashley T. Ruggles	2/17/22 17 00		FedEx		
Relinquished by: FedEx	Date/Time:	Company	Received by:	Date/Time: 2/18/2022 10:51	Company EX
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks:

Ver 06/08/2021

Login Sample Receipt Checklist

Client: Jacob & Martin LCC

Job Number: 820-3443-1

Login Number: 3443
List Number: 1
Creator: Ruggles, Ashley

List Source: Eurofins Lubbock

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	

Login Sample Receipt Checklist

Client: Jacob & Martin LCC

Job Number: 820-3443-1

Login Number: 3443
List Number: 3
Creator: Spurgeon, Sheri

List Source: Eurofins Eaton South Bend
List Creation: 02/19/22 08:39 AM

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Samples do not require splitting or compositing.	True	
Container provided by EEA	False	Client provided containers

Login Sample Receipt Checklist

Client: Jacob & Martin LCC

Job Number: 820-3443-1

Login Number: 3443
List Number: 4
Creator: Pehling-Wright, Penny

List Source: Eurofins Eaton South Bend
List Creation: 03/07/22 03:28 PM

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Samples do not require splitting or compositing.	True	
Container provided by EEA	True	

Login Sample Receipt Checklist

Client: Jacob & Martin LCC

Job Number: 820-3443-1

Login Number: 3443
List Number: 2
Creator: Milone, Jeancarlo

List Source: Eurofins Houston
List Creation: 02/18/22 01:11 PM

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	

Attachment 4

Revised Construction Plans

NOTE:
PIPING SHALL HAVE COLOR CODED LABELS PER TAC.30.290.42(d)(13)(A) WITH FLOW ARROWS AND PIPE DESCRIPTION AS SHOWN BELOW:
RO PERMEATE – GREEN
FINISHED WATER (PRODUCT) – LIGHT BLUE
RAW WATER – TAN
BACKWASH WASTE – DARK GREY

2– 75 GALLON ACID DAY TANK W/ 100 GALLON CONTAINMENT

75 GALLON SODIUM METABISULFATE DAY TANK W/ 100 GALLON CONTAINMENT

75 GALLON ANTI–SCALANT AND DAY TANK W/ 100 GALLON CONTAINMENT

5000 GALLON CONCENTRATE TANK

3 D–3 D–8

4" SDR 35 PVC DRAIN

AIR COMPRESSOR FOR VALVE ACTUATORS (IGERSOLL RAND, 5HP, 14 CFM OR EQUAL)

CONTRACTOR TO ROUTE TREATED WATER LINE INTO BUILDING AS SHOWN FOR SAFETY SHOWER AND SAMPLE SINK

LOCATION OF FUTURE BACKUP GENERATOR

2– 75 GALLON CAUSTIC DAY TANK W/ 100 GALLON CONTAINMENT

2" SCH 80 PVC CONCENTRATE LINE

6" SCH 80 PVC PRODUCT LINE

1" PRESSURE REDUCING BACKFLOW PREVENTER ZURN MODEL 975XL2 OR EQUAL

6" PVC ELL

6" PVC ELL

2 D–3 D–7

1/2" AIR LINE TO RFRO UNIT ROUTED OVERHEAD. SEE PNID FOR DRY AIR CONNECTION TO RFRO UNIT

1" TREATED WATER LINE TO BE ROUTED ALONG WALL TO CIP

2" SCH 80 PVC BRINE FLUSH

SAMPLE SINK

1" SDR 9 POLY TREATED WATER LINE

SAFETY STATION W/ EYE WASH AND SHOWER, GUARDIAN 6195P OR EQUAL

CHEMICAL FEED LINES TO BE ROUTED OVERHEAD TO INJECTION POINTS ON SKIDS, SEE PNID FOR DETAILS

LOCATION OF FUTURE RFRO UNIT

A/C + HEAT PUMP WINDOW UNIT

OFF SPEC PRODUCT PROVIDE FLANGE TO CAMLOCK FITTING FOR HOSE ATTACHMENT

CIP DRAIN CONNECTION, PROVIDE 4" FLANGE TO CAMLOCK FITTING FOR 4" HOSE CONNECTION TO DRAIN CONNECTION

CONNECT 6" SCH 80 PVC TO PRODUCT CONNECTION, 4" SCH 80 FLANGE

RFRO UNIT

ELECTRICAL CONTROL PANELS

12" STUB AND PVC CAP

4" SCH 80 PVC

PROVIDE 4" BALL VALVE

12" STUB AND PVC CAP

1 D–3 D–6

1 D–3 D–6

FEED WATER CONNECTION, 4" SCH80 PVC FLANGE TO 4" SCH80 PVC AS SHOWN

3 D–3 D–8

6" SCH 8 PVC FEED LINE

CONCENTRATE CONNECTION 4" SCH80 FLANGE TO CONNECT TO 2" SCH80 PVC LINE AS SHOWN

BRINE FLUSH FLOW CONNECTION 2" SCH80 FLANGE TO 2" SCH80 PVC AS SHOWN

BOOSTER PUMP SKID

STATE OF TEXAS
JAMES A. PHILLIPS
105116
LICENSED PROFESSIONAL ENGINEER
10/14/22

JACOB MARTIN
3465 CURRY LANE
ABILENE, TX 79606
325-437-1010
1608 SANTA FE DR, STE 204
WEATHERFORD, TX 76086
817-594-9880
4920 S LOOP 289, STE 104
LUBBOCK, TX 79414
806-368-4375
FIRM # F-2448

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT

WTP BUILDING LAYOUT

SCALE	1/4"=1'
PROJECT #	19119
DESIGNED	JB/RF
DRAWN	JB/RF
CHECKED	AP

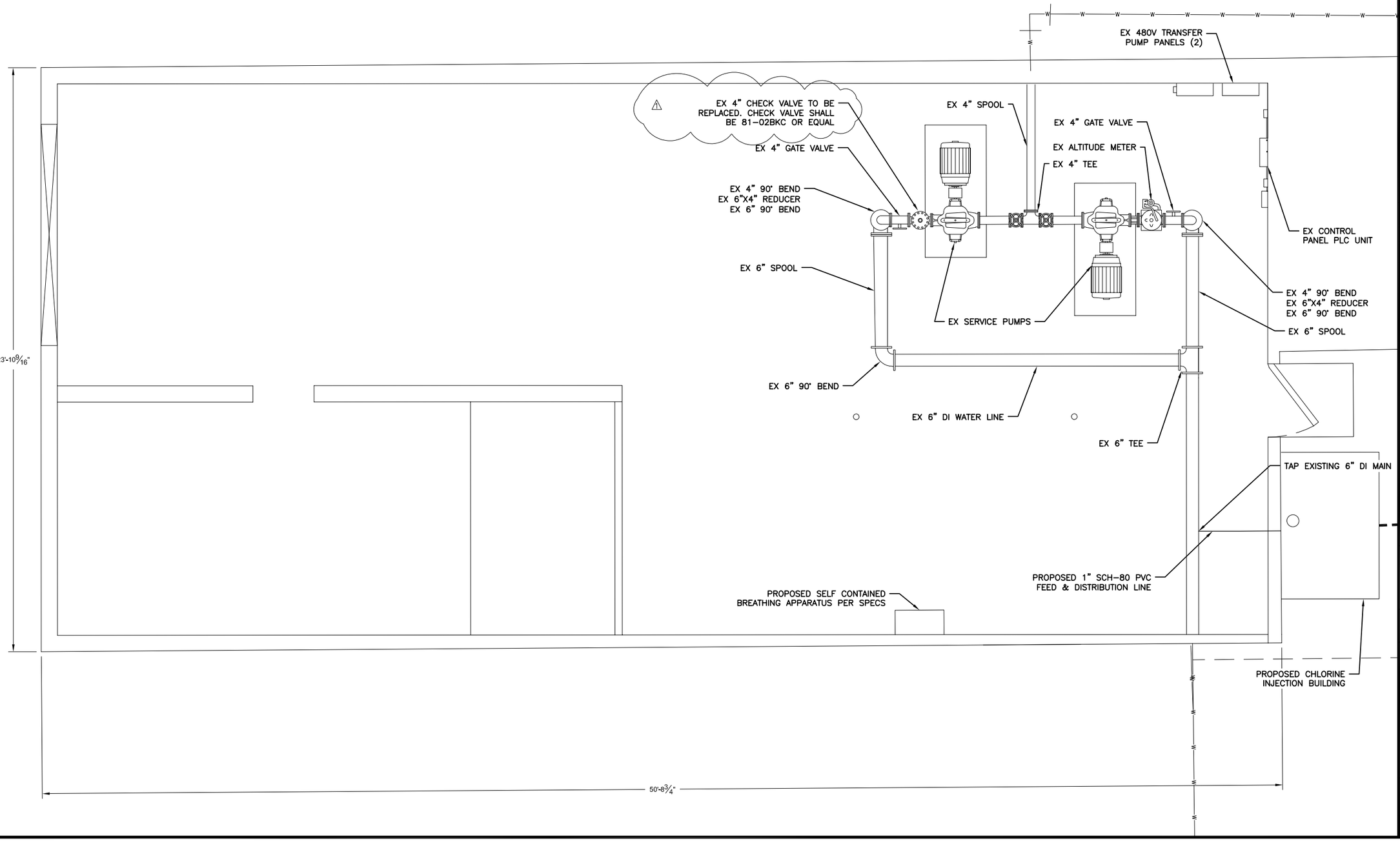
NO.	REVISION	DATE
1	TCEQ COMMENTS	1/24/2023
2	TREATED WATERLINE MATERIAL	9/18/2023

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET D–3

SEQ. 14 OF 35

X:\CL_Ropesville\19119 – TWDB DWSRF Water Treatment Plant\Drafting_Plans_D_Process\D–3 WTP BUILDING LAYOUT.dwg



JAMES A. PHILLIPS
105116
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
10/14/22

JACOB MARTIN

3455 CURRY LANE
ABILENE, TX 79606
325-695-1070

1508 SANTA FE DR. STE 204
WEATHERFORD, TX 76086
817-594-9880

4920 S LOOP 289, STE 104
LUBBOCK, TX 79414
806-368-4375

FIRM # F-2448

CITY OF ROPESVILLE

DWSRF WATER TREATMENT PLANT

EXISTING BUILDING LAYOUT

SCALE	1"=40'
PROJECT #	19119
DESIGNED	JB/RF
DRAWN	JB/RF
CHECKED	AP

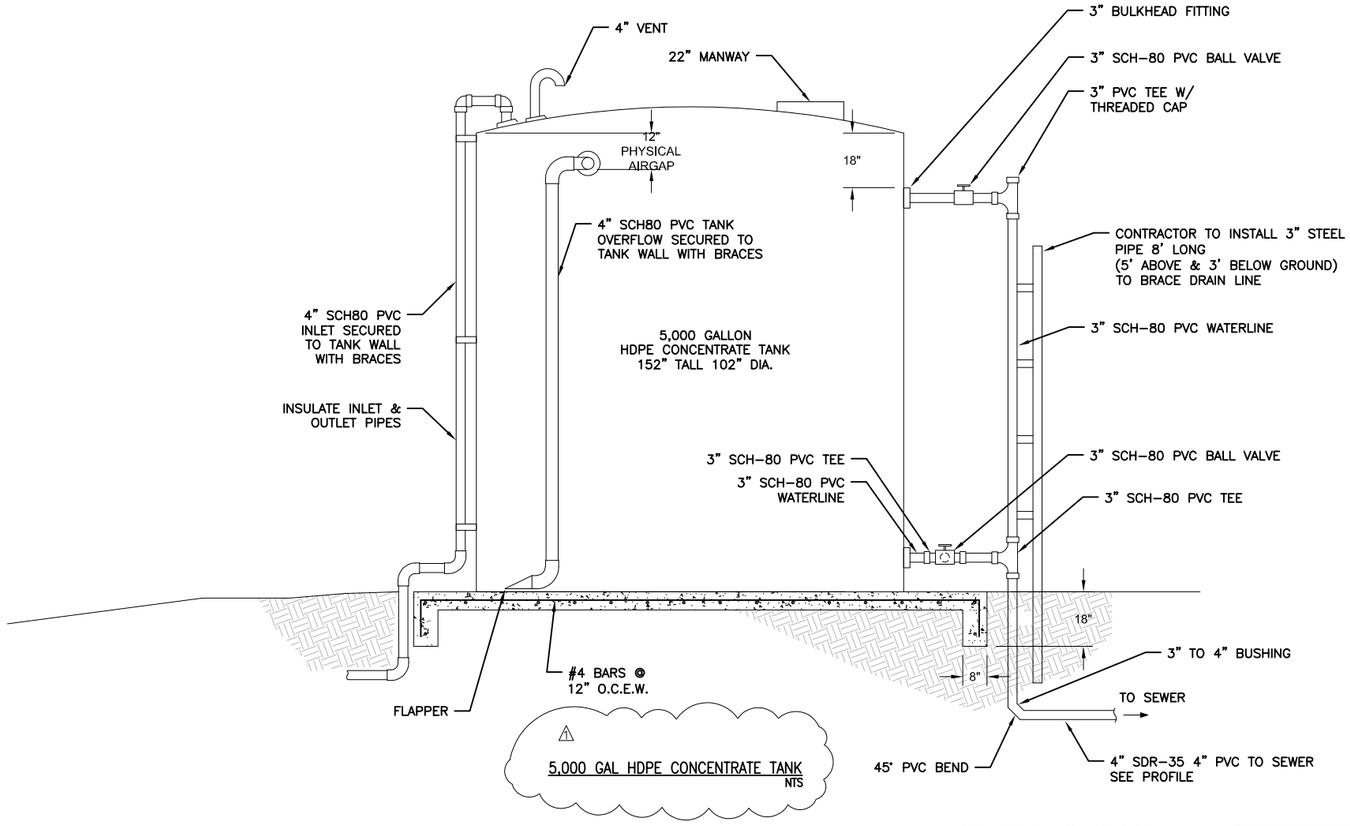
NO.	REVISION	DATE
1	CHECK VALVE DETAILS	9/18/2023

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET D-4

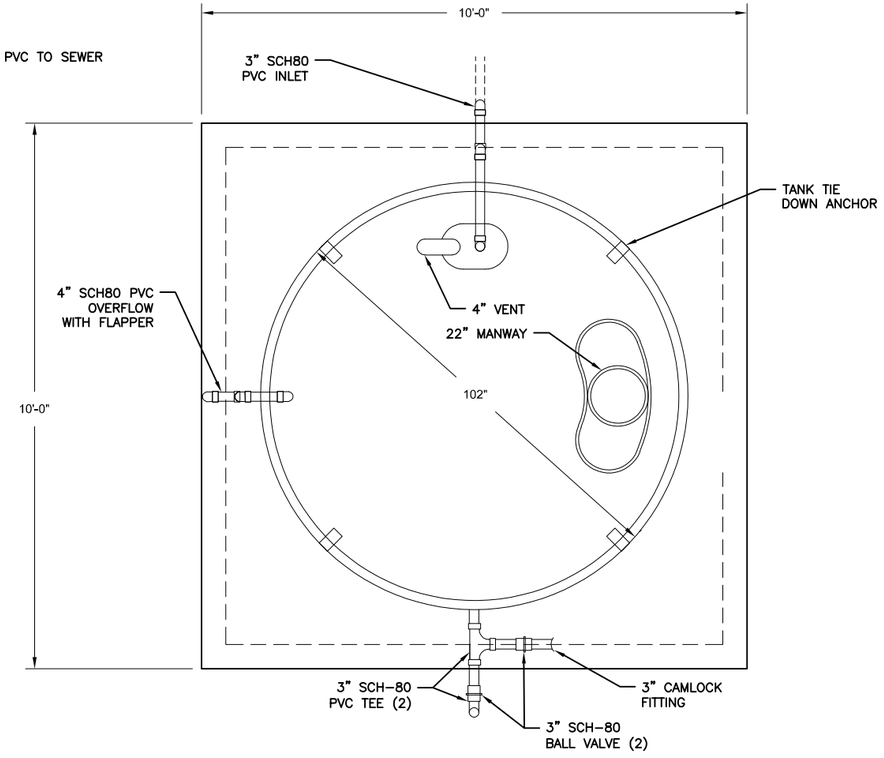
SEQ. 15 OF 35

X:\CL_Ropesville\19119 - TWDB DWSRF Water Treatment Plant\Drafting_Plans_D_Process\D-4 EX BUILDING LAYOUT.dwg



⚠ 5,000 GAL HDPE CONCENTRATE TANK
NTS

NOTE: INSTALL EYE-BOLTS IN COCNRETE TO TIE DOWN TANK. SECURE TANK TO EYE-BOLTS



NOTE: CONTRACTOR TO INSULATE ALL EXTERIOR PIPING PER SPECIFICATIONS

NORTH

STATE OF TEXAS — JAMES A. PHILLIPS — 105116 — LICENSED PROFESSIONAL ENGINEER — 10/14/22

3465 CURRY LANE
ABILENE, TX 79606
325-691-1070

1508 SANTA FE DR. STE 204
WEATHERFORD, TX 76086
817-594-9880

4920 S LOOP 289, STE 104
LUBBOCK, TX 79414
806-368-4375

FIRM # F-2448

JACOB MARTIN

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT
CONCENTRATE TANK DETAILS

SCALE	N.T.S.
PROJECT #	19119
DESIGNED	JB/RF
DRAWN	JB/RF
CHECKED	AP

NO.	REVISION	DATE
⚠1	TANK MATERIAL TYPE	9/18/2023

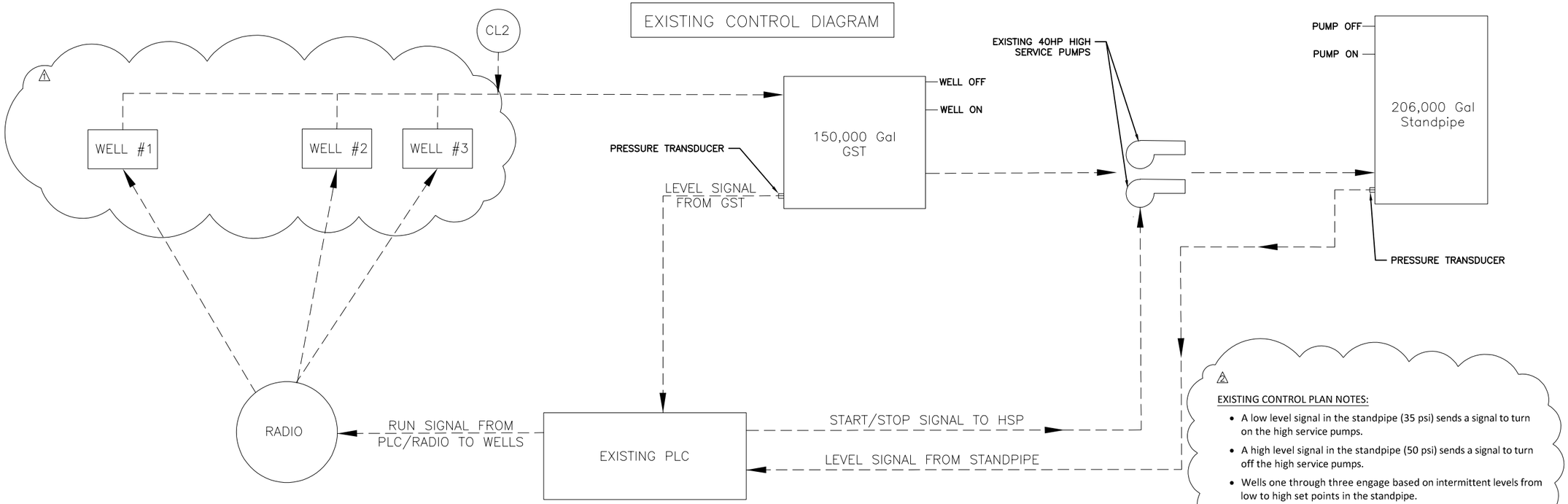
BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET D-10

SEQ. 21 OF 35

X:\CI_Ropesville\19119 - TWDB DWSRF Water Treatment Plant\Drafting_Plans_D_Process\21 D-10 CONCENTRATE TANK DETAILS.dwg

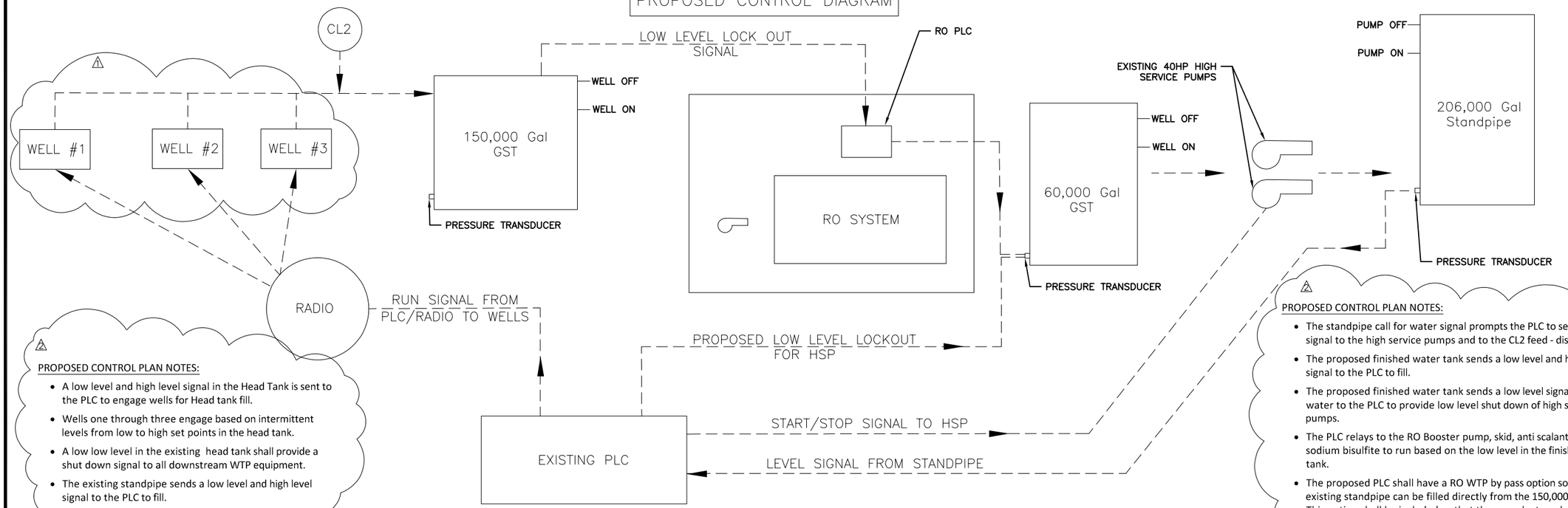
EXISTING CONTROL DIAGRAM



EXISTING CONTROL PLAN NOTES:

- A low level signal in the standpipe (35 psi) sends a signal to turn on the high service pumps.
- A high level signal in the standpipe (50 psi) sends a signal to turn off the high service pumps.
- Wells one through three engage based on intermittent levels from low to high set points in the standpipe.
- The existing CL2 system is engaged based on the on signal for the pumps.

PROPOSED CONTROL DIAGRAM



PROPOSED CONTROL PLAN NOTES:

- A low level and high level signal in the Head Tank is sent to the PLC to engage wells for Head tank fill.
- Wells one through three engage based on intermittent levels from low to high set points in the head tank.
- A low low level in the existing head tank shall provide a shut down signal to all downstream WTP equipment.
- The existing standpipe sends a low level and high level signal to the PLC to fill.

PROPOSED CONTROL PLAN NOTES:

- The standpipe call for water signal prompts the PLC to send a run signal to the high service pumps and to the CL2 feed - disinfection.
- The proposed finished water tank sends a low level and high level signal to the PLC to fill.
- The proposed finished water tank sends a low level signal to call for water to the PLC to provide low level shut down of high service pumps.
- The PLC relays to the RO Booster pump, skid, anti scalant, and sodium bisulfite to run based on the low level in the finished water tank.
- The proposed PLC shall have a RO WTP by pass option so that the existing standpipe can be filled directly from the 150,000 gallon tank. This option shall be included so that the new plant can be tested while continuing to operate through the existing system during the verification stage after startup per TCEQ requirements.

STATE OF TEXAS — JAMES A. PHILLIPS — 105116 — LICENSED PROFESSIONAL ENGINEER — 10/14/22

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JACOB MARTIN

CITY OF ROPESVILLE

DWSRF WATER TREATMENT PLANT

CONTROL DIAGRAM

SCALE	N.T.S.	DESIGNED	JB/RF
PROJECT #	19119	DRAWN	JB/RF
		CHECKED	AP

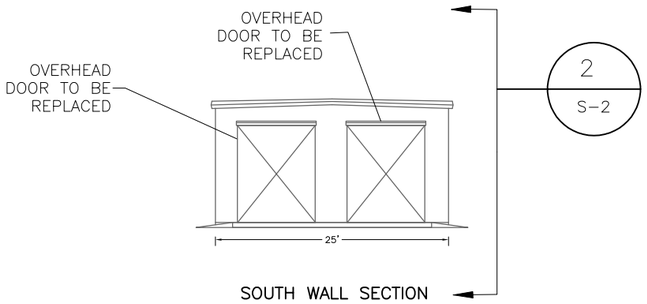
NO.	REVISION	DATE
1	TCEQ COMMENTS	1/24/2023
2	CONTROL NOTES	9/16/2023

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

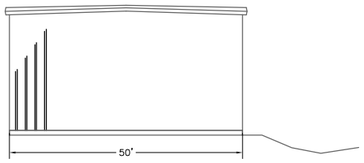
SHEET D–17

SEQ. 28 OF 35

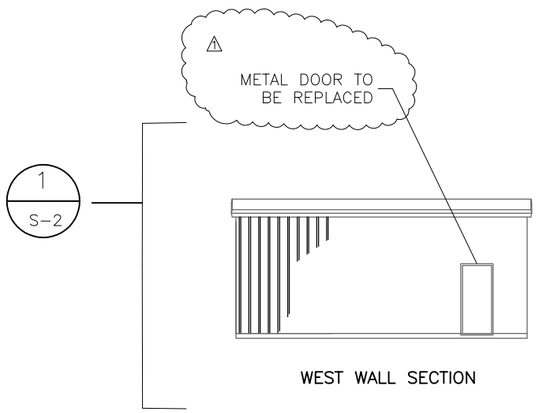
X:\CL_Ropesville\19119 – TW08 DWSRF Water Treatment Plant\Drafting_Plans_D_Process\D–17 CONTROL DIAGRAM.dwg



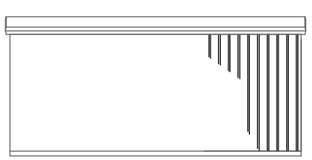
SOUTH WALL SECTION



NORTH WALL SECTION



WEST WALL SECTION



EAST WALL SECTION

⚠

DOOR SCHEDULE

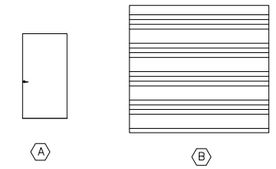
DOOR NO.	WIDTH HEIGHT	FIRE	DOOR TYPE	FRAME TYPE	DOOR GAGE	FRAME GAGE	
1	3'-0"X7'-0"	--	A	WELDED	16	16	7 3/4" FRAME W/ EXTERIOR FLASHING (2), (3)

OVERHEAD GARAGE DOOR SCHEDULE—MAUNFACTURER "OVERHEAD DOOR"

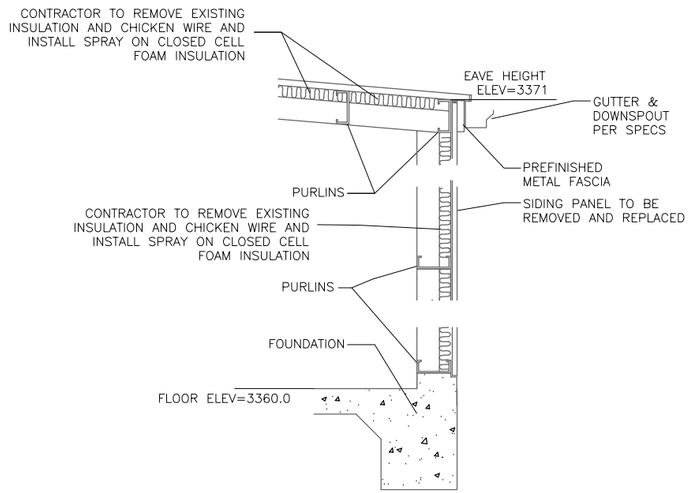
DOOR NO.	WIDTH HEIGHT	FIRE	DOOR TYPE	FRAME TYPE	DOOR GAGE	FRAME GAGE	
1	10'X10'	--	B	--	24	--	430 SERIES (1)
2	10'X10'	--	B	--	24	--	430 SERIES (1)

NOTE 1. OVERHEAD PANEL GARAGE DOORS TO BE GALVANIZED, AND RECEIVE A RUST-INHIBITIRE ROLL-COATING WITH A BAKED ON PRIME PAINT AND POLYESTER TOP COAT IN WHITE. PROVIDE DOOR COMPLETE WITH WEATHER SEALS.

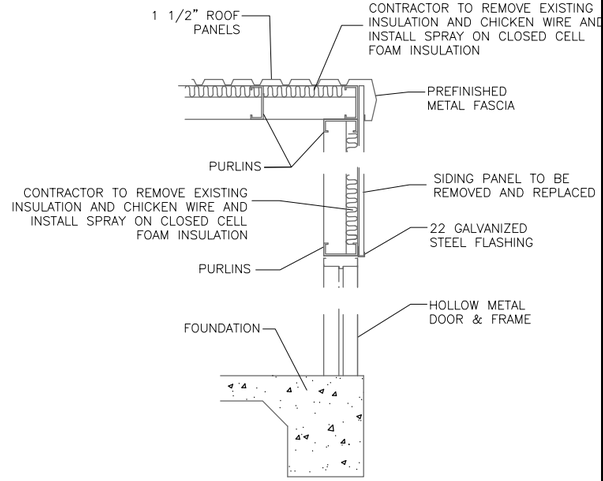
PANEL OH DOOR



Metal doors shall receive a primer coat and one coat of Benjamin Moore, Ironclad, alkyd enamel paint, semi gloss.



SECTION—END WALL 1 S-2
NTS



SECTION—SIDE WALL 2 S-2
NTS

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806-368-4375

FIRM # F-2448

JACOB MARTIN

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT
WTP BUILDING ELEVATIONS

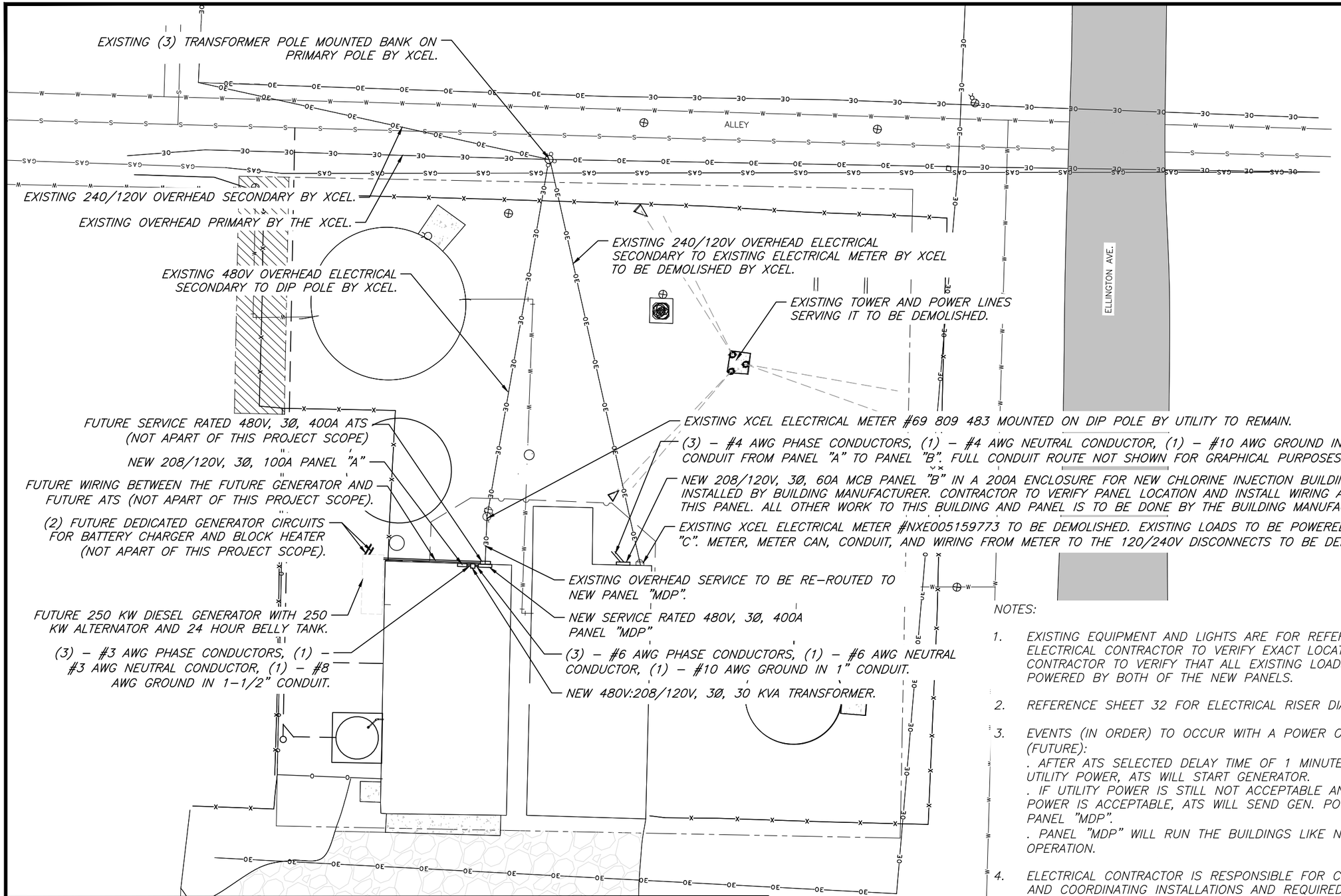
SCALE	1"=40'
PROJECT #	19119
DESIGNED	JB/RF
DRAWN	JB/RF
CHECKED	AP

NO.	REVISION	DATE
⚠	BUILDING DOOR MODIFICATIONS	12/1/2022

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET S-2
SEQ. 29 OF 35

X:\CI_Ropesville\19119 - TWDB DWSRF Water Treatment Plant\Drafting_Plans_S_Structural\S-2 WTP BUILDING ELEVATIONS.dwg



LIGHTING FIXTURE SCHEDULE

FIXTURE MARK	MANUFACTURER & CATALOG NUMBER	TYPE	LAMPS BULBS	VOLTAGE	SUPPORT	NOTES
A	COOPER MODEL #: 8TSNLED–LD5–83SL–LN–UNV–L840–CD1–U	1'X8'	LED	UNV	CEILING MOUNT (MOUNT ON BEAMS)	FIXTURE "A" IS THE ONLY NEW FIXTURE. TYPE "B", "C", "D" ARE EXISTING FIXTURES.
B	EXISTING	BULB	–	120V	CEILING MOUNT	
C	EXISTING	1'X4'	–	120V	CEILING MOUNT	
D	EXISTING	EXTERIOR WALL PACK	–	120V	WALL MOUNT	

NOTES:

1. EXISTING EQUIPMENT AND LIGHTS ARE FOR REFERENCE ONLY. ELECTRICAL CONTRACTOR TO VERIFY EXACT LOCATION. CONTRACTOR TO VERIFY THAT ALL EXISTING LOADS ARE POWERED BY BOTH OF THE NEW PANELS.
2. REFERENCE SHEET 32 FOR ELECTRICAL RISER DIAGRAM.
3. EVENTS (IN ORDER) TO OCCUR WITH A POWER OUTAGE (FUTURE):
   . AFTER ATS SELECTED DELAY TIME OF 1 MINUTE OF NO UTILITY POWER, ATS WILL START GENERATOR.
   . IF UTILITY POWER IS STILL NOT ACCEPTABLE AND GEN. POWER IS ACCEPTABLE, ATS WILL SEND GEN. POWER TO PANEL "MDP".
   . PANEL "MDP" WILL RUN THE BUILDINGS LIKE NORMAL OPERATION.
4. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR CONTACTING AND COORDINATING INSTALLATIONS AND REQUIRED INSPECTIONS WITH XCEL AND ANY ELECTRICAL COSTS BY THE UTILITY. XCEL CONTACT PERSON IS NOSA OSAGHAE, OFFICE PHONE #: (806)–796–3212 AND EMAIL: NOSAMUDIANA.A.OSAGHAE@XCELENERGY.COM.
5. DIESEL GENERATOR, ATS, GENERATOR PAD, AND RELATED CONDUIT AND WIRING ARE FUTURE AND NOT APART OF THIS PROJECT SCOPE.

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September 12, 2023

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FIRM # F-2448

JACOB MARTIN

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT
ELECTRICAL SITE PLAN

SCALE	1"=40'	PROJECT #	19119	DESIGNED	ERW
				DRAWN	CC
				CHECKED	ERW

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET E–1
SEQ. 30 OF 33

X:\CL_Ropesville\19119 – TWDB DWSRF Water Treatment Plant\Drafting_Plans_E_Electrical\E–1 ELECTRICAL SITE PLAN.dwg

LEGEND

(A)	1X8 LIGHT FIXTURE
(B)	CEILING MOUNTED BULB LIGHT FIXTURE
(C)	1X4 LIGHT FIXTURE
(D)	EXTERIOR WALL PACK LIGHT FIXTURE
$	LIGHT SWITCH
Ω	DUPLEX OUTLET
Ω	QUAD OUTLET

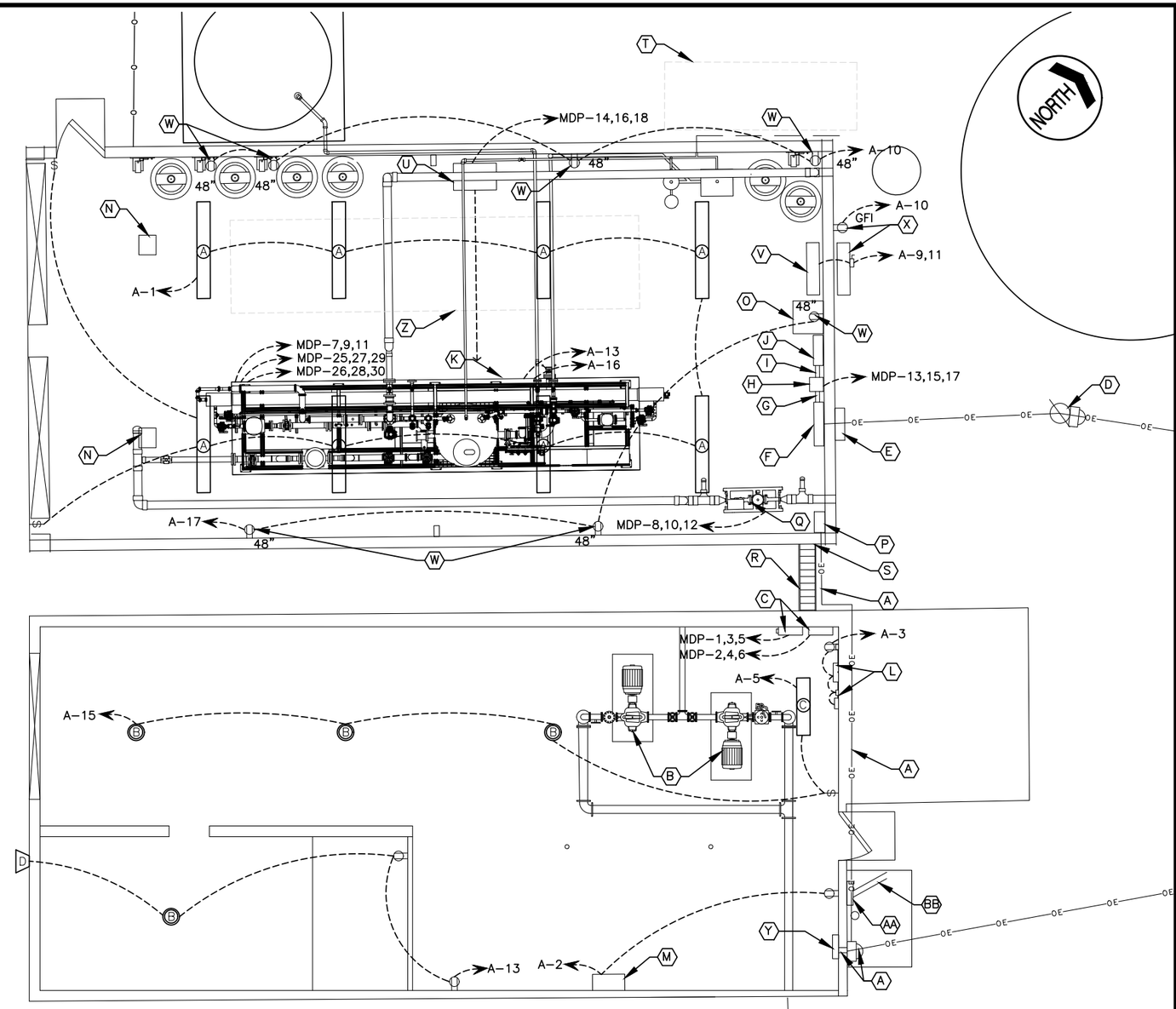
PANEL — C-5,7 — BREAKER #

HOMERUN

NOTE: X DENOTES FIXTURES SCHEDULE DESIGNATION

GENERAL ELECTRICAL NOTES:

1. NFPA 70 – NATIONAL ELECTRIC CODE: MOST RECENT EDITION ADOPTED BY AUTHORITY HAVING JURISDICTION, INCLUDING ALL APPLICABLE AMENDMENTS AND SUPPLEMENTS.
2. ALL CIRCUITS SHALL BE A MINIMUM SIZE OF 12 GAUGE AND A MINIMUM 3/4" CONDUIT.
3. ALL CIRCUITS SHALL CONTAIN A GROUND WIRE.
4. EACH CIRCUIT SHALL CONTAIN ITS OWN NEUTRAL WIRE. NO NEUTRAL SHARING SHALL BE ALLOWED.
5. ALL CONDUCTORS SHALL BE COPPER UNLESS OTHERWISE SHOWN ON PLAN. USE THHW, THW, THWN, OR XHHW.
6. ALL NEW INTERIOR CIRCUITS SHALL BE RAN IN IMT CONDUIT EXPOSED. HOLD CIRCUITS TIGHT TO CEILINGS AND WALLS. DO NOT SUPPORT OFF PIPING OR DUCTWORK. CONDUIT SHALL BE RAN PARALLEL TO BUILDING ELEMENTS AND SHALL BE WELL SUPPORTED.
7. CLEAR, READABLE PANEL DIRECTORIES ARE REQUIRED FOR ALL NEW PANELS & EXISTING PANELS THAT ARE MODIFIED UNDER THIS PROJECT.
8. LABEL ALL NEW PANELS, TRANSFORMERS, & DISCONNECT SWITCHES WITH ENGRAVED PLASTIC SIGNS, RED BACKGROUND WITH WHITE LETTERS. USE MINIMUM SIZE OF 4"X2". SCREW OR RIVIT TO PANEL. SIGN NEEDS TO GIVE PANEL NAME, AMPERAGE, VOLTAGE, & PHASE.
9. COORDINATE THE LOCATIONS OF ALL ELECTRICAL EQUIPMENT, DEVICES, FIXED EQUIPMENT, ETC. WITH WITH OWNER PRIOR TO ROUGH-IN-WORK. DO NOT SCALE ELECTRICAL DRAWINGS.
10. ELECTRICAL DESIGN PROVIDES A NUMBER OF BRANCH CIRCUITS, PHASES, AMPACITY AND OVERCURRENT PROTECTION CONFORMING TO MANUFACTURE'S SPECIFICATIONS AVAILABLE AT TIME OF DESIGN. IF REQUIREMENTS OF EQUIPMENT ACTUALLY PROVIDED UNDER CONTRACT FOR CONSTRUCTION ARE DIFFERENT, CONTRACTOR SHALL MAKE ALL CHANGES REQUIRED WITHOUT INCREASE IN THE CONTRACT AMOUNT. SUCH CHANGES MAY INCLUDE, BUT ARE NOT LIMITED TO: SIZE OF WIRES, SIZE OF CONDUIT, NUMBER, TYPE AND SIZE OF CIRCUIT BREAKERS, FUSE PROTECTION AND ADDITIONAL DISCONNECT SWITCHES.
11. JUNCTION/PULL BOXES LOCATED AT CEILING SHALL BE INSTALLED FACING DOWN AND SHALL BE ACCESSIBLE AFTER INSTALLATION. COORDINATE WITH OTHER TRADES AND STRUCTURE.
12. EXISTING UTILITIES. ELECTRICAL EQUIPMENT AND UNDERGROUND OR CONCEALED ITEMS ARE SHOWN FOR REFERENCE ONLY. ADDITIONAL ITEMS NOT SHOWN MAY BE PRESENT AND LOCATIONS MAY DIFFER FROM THAT SHOWN. CONTRACTOR SHALL PERFORM WORK AS TO AVOID DAMAGE TO EXISTING ITEMS, SHALL NOTIFY OWNER AND ENGINEER AT ONCE OF ALL DAMAGE AND SHALL REPAIR DAMAGE TO ORIGINAL CONDITION TO THE SATISFACTION OF OWNER AND ENGINEER AT NO CHANGE IN CONTRACT AMOUNT.
13. ELECTRICAL CONTRACTOR SHALL VERIFY EQUIPMENT AND CONDUCTOR SIZE PRIOR TO ORDERING AND INSTALLATION OF ANY EQUIPMENT OR CONDUCTORS. REPORT ALL DISCREPANCIES TO THE ENGINEER.
14. CONTRACTOR SHALL PROVIDE SUITABLE MATERIALS AND CONSTRUCTION METHODS TO PREVENT DAMAGE TO CONDUIT SWEEPS RESULTING FROM INSTALLATION OF LARGE CONDUCTORS.
15. PROVIDE GRAY SWITCHES AND OUTLETS WITH STAINLESS STEEL COVERS IN METAL ELECTRICAL BOXES.
16. ALL OUTLETS TO BE RATED AT A MINIMUM OF 20 AMPS
17. THE CONTRACTOR WILL LABEL THE SERVICE DISCONNECT WITH FOLLOWING " THE MAXIMUM AVAILABLE FAULT CURRENT IS_____ AMPS. CALCULATED_____, 2023" NOTE: CALCULATED"#" AND DATE TO BE SUPPLIED BY JACOB MARTIN. THE LABEL MUST "BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AS STATED IN THE NEC PARAGRAPH 110.24
18. CONTRACTOR WILL REMOVE ALL CABLE SPLICERS AND TWIST ON WIRE CONNECTORS. THEY ARE TO BE REPLACED WITH CIRCUIT CABLES CONNECTED TO BREAKERS OR FUSES FOR OVERCURRENT PROTECTION AS REQUIRED BY THE NEC.



PUMP STATION ELECTRICAL PLAN

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

PLAN NOTES

(A) EXISTING XCEL ELECTRICAL METER #NXE005159773, METER, METER CAN, CONDUIT, AND WIRING TO BE DEMOLISHED BY THE CONTRACTOR.

(B) EXISTING 40 HP PUMPS TO REMAIN.

(C) EXISTING PUMP PANELS TO REMAIN.

(D) EXISTING 480V XCEL METER #69 809 483 MOUNTED ON DIP POLE TO REMAIN.

(E) FUTURE SERVICE RATED 480V, 3Ø, 400A ATS (NOT APART OF THIS PROJECT SCOPE).

(F) NEW SERVICE RATED 480V, 3Ø, 400A PANEL "MDP".

(G) (3) – #6 AWG PHASE CONDUCTORS, (1) – #6 AWG NEUTRAL CONDUCTOR, (1) – #10 AWG GROUND IN 1" CONDUIT.

(H) NEW 480:208/120V, 3Ø, 30 KVA STEP DOWN TRANSFORMER.

(I) (3) – #3 AWG PHASE CONDUCTORS, (1) – #3 AWG NEUTRAL CONDUCTOR, (1) – #8 AWG GROUND IN 1-1/2" CONDUIT.

(J) NEW 208/120V, 3Ø, 100A PANEL "A"

(K) NEW RO SKID BY OTHERS. CONTRACTOR TO VERIFY CIRCUIT LOCATION AND WIRING METHOD.

(L) EXISTING CONTROL PANELS TO REMAIN.

(M) EXISTING 1200W WALL HEATER.

(N) EXISTING ½ HP GARAGE DOOR OPENERS TO BE DEMOLISHED.

(O) EXISTING 2000W WALL MOUNTED HEATER AND GAS PIPING TO BE DEMOLISHED.

(P) EXISTING DISCONNECT AND LOAD CENTER TO BE DEMOLISHED.

(Q) NEW 480V, 3Ø, 10 HP FEED PUMP.

(R) 6' LONG X 24" WIDE CABLE TRAY BETWEEN BUILDING WITH SEALING BOOT ON CABLE ENTRANCE HOLES THAT IS VARMINT PROOF AND WEATHER RESISTANT. SEALING BOOT TO BE REMOVABLE AND RESEALABLE PER MANUFACTURER'S INSTRUCTIONS REQUIRED FOR THIS PROCESS. CABLE TRAY TO PENETRATE BOTH WALLS. CONTRACTOR TO VERIFY CABLE TRAY SIZE TO ACCOMMODATE ALL CONDUIT NEEDED. CABLE TRAY TO BE INSTALLED ACCORDING TO 2017 NEC ARTICLE 392.

(S) EXISTING WALL PENETRATION TO EXISTING DISCONNECT TO BE RE-USED FOR CABLE TRAY. CABLE TRAY TO BE INSTALLED AT THE HEIGHT OF THE EXISTING PENETRATION.

(T) FUTURE 250 KW DIESEL GENERATOR. REFERENCE ELECTRICAL SITE PLAN (SHEET E-1) FOR MORE DETAILS.

(U) NEW 480V, 3Ø, 5 HP AIR COMPRESSOR FOR VALVE ACTUATORS.

(V) NEW INDOOR UNIT FOR THE MINISPLIT. BASIS OF DESIGN IS THE LG LSN240HEV2 UNIT. CONTRACTOR TO VERIFY LOCATION OF THE INDOOR UNIT.

(W) NEW RECEPTACLES MOUNTED AT 48" A.F.F. ALL EXISTING RECEPTACLES IN THE WTP BUILDING (METAL BUILDING) TO BE REMOVED.

(X) NEW OUTDOOR UNIT FOR THE MINISPLIT. BASIS OF DESIGN IS THE LG LSU240HEV2 UNIT. CONTRACTOR TO PROVIDE WITH 208V, 1Ø, 20A DISCONNECT AND GFI CONVENIENCE RECEPTACLE. CONTRACTOR TO VERIFY EXTERIOR LOCATION OF THE UNIT.

(Y) EXISTING LOAD CENTER AND ATTACHED CONVENIENCE RECEPTACLE TO BE DEMOLISHED. CONTRACTOR TO VERIFY THAT LOADS ARE MOVED TO PANEL "A".

(Z) FUTURE RO SKID LOCATION.

(AA) NEW 208/120V, 3Ø, 60A MCB PANEL "B" IN A 200A ENCLOSURE FOR THE NEW CHLORINE INJECTION BUILDING PROVIDED AND INSTALLED BY THE BUILDING MANUFACTURER. CONTRACTOR TO VERIFY PANEL LOCATION AND INSTALL WIRING AND CONDUIT TO THIS PANEL. ALL OTHER WORK TO THIS BUILDING AND PANEL IS TO BE DONE BY THE BUILDING MANUFACTURER.

(BB) (3) – #4 AWG PHASE CONDUCTORS, (1) – #4 AWG NEUTRAL CONDUCTOR, (1) – #10 AWG GROUND IN 1-1/4" CONDUIT FROM PANEL "A" TO PANEL "B". FULL CONDUIT ROUTE NOT SHOWN FOR GRAPHICAL PURPOSES.

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FIRM # F-2448

EDWARD R. WELLS, 86579, LICENSED PROFESSIONAL ENGINEER, STATE OF TEXAS

September 12, 2023

CITY OF ROPESVILLE

DWSRF WATER TREATMENT PLANT

ELECTRICAL FLOOR PLAN

SCALE	1/8"=1'
PROJECT #	19119
DESIGNED	ERW
DRAWN	CC
CHECKED	ERW

DATE | NO. | REVISION

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET E-2

SEQ. 31 OF 33

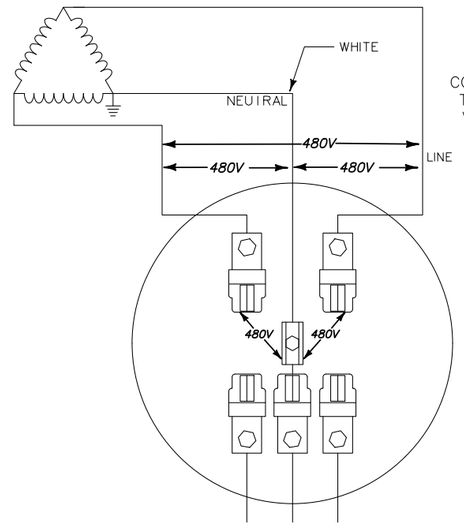
X:\CI_Ropesville\19119 - TWDB DWSRF Water Treatment Plant\Drafting_Plans_E_Electrical\E-2 ELECTRICAL FLOOR PLAN.dwg

BRANCH CIRCUIT AND SERVICE CONDUCTOR SIZING SCHEDULE

BRANCH CIRCUIT/ FEEDER IDENTIFICATION	OVERCURRENT DEVICE	PHASE AND NEUTRAL CONDUCTOR S (AWG/Kcmil)	EQUIPMENT GROUNDING CONDUCTOR(S) (AWG/Kcmil)	GROUNDING ELECTRODE CONDUCTOR (AWG/Kcmil)	CONDUIT
F20	20	12	12	---	1/2"
F25	25	10	10	---	1/2"
F30	30	10	10	---	1/2"
F35	35	8	10	---	1"
F40	40	8	10	---	1"
F45	45	8	10	---	1"
F50	50	8	10	8	1"
F60	60	6	10	8	1"
F70	70	4	8	8	1-1/4"
F80	80	4	8	8	1-1/4"
F90	90	2	8	8	1-1/4"
F100	100	2	8	8	1-1/2"
F125	125	1/0	6	6	2"
F150	150	1/0	6	6	2"
F175	175	2/0	6	4	2"
F200	200	3/0	6	4	2"
F225	225	4/0	4	2	2-1/2"
F250	250	250 kcmil	4	2	2-1/2"
F300	300	350 kcmil	4	2	3"
F350	350	500 kcmil	2	1/0	4"
F400	400	(2) 3/0	(2) 2	1/0	(2) 2-1/2"
F450	450	(2) 4/0	(2) 2	1/0	(2) 2-1/2"
F500	500	(2) 250 kcmil	(2) 2	1/0	(2) 2-1/2"
F600	600	(2) 350 kcmil	(2) 1/0	2/0	(2) 3"
F700	700	(2) 500 kcmil	(2) 1/0	2/0	(2) 4"
F800	800	(3) 300 kcmil	(3) 1/0	2/0	(3) 3"
F1000	1000	(3) 400 kcmil	(3) 2/0	3/0	(3) 3"
F1200	1200	(4) 350 kcmil	(4) 3/0	3/0	(4) 3"
F1600	1600	(5) 400 kcmil	(5) 4/0	3/0	(5) 3"
F2000	2000	(6) 400 kcmil	(6) 250 kcmil	3/0	(6) 3"
F2500	2500	(7) 500 kcmil	(7) 350 kcmil	3/0	(7) 4"
F3000	3000	(8) 500 kcmil	(8) 400 kcmil	3/0	(8) 4"
F4000	4000	(11) 500 kcmil	(11) 500 kcmil	3/0	(11) 4"

NOTES:

1. WHERE BRANCH CIRCUIT OR FEEDER IS NOT DESIGNATED ON THE DRAWINGS, BRANCH CIRCUIT OR FEEDER SHALL BE SIZED TO MATCH THE OVERCURRENT DEVICE LISTED ABOVE.
2. GROUNDING ELECTRODE CONDUCTORS FOR SEPERATELY DERIVED SYSTEMS SHALL BE SELECTED BASED ON THE SECONDARY FEEDER OVERCURRENT DEVICE RATING



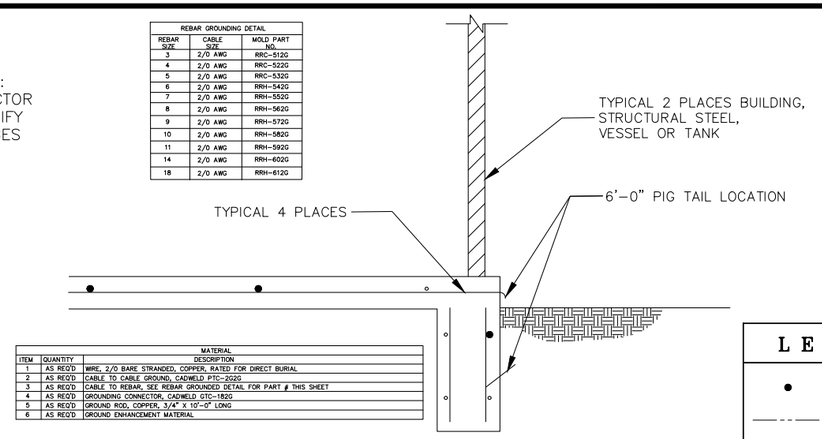
NOTE: CONTRACTOR TO VERIFY VOLTAGES

3 WIRE 480 VOLT THREE PHASE SELF CONTAINED CENTER PHASE DISCONNECT

EXISTING XCEL ELECTRICAL SERVICE

NTS

REBAR GROUNDING DETAIL		
REBAR SIZE	CABLE SIZE	MOLD PART NO.
3	2/0 AWG	RRC-512G
4	2/0 AWG	RRC-522G
5	2/0 AWG	RRC-532G
6	2/0 AWG	RRH-542G
7	2/0 AWG	RRH-552G
8	2/0 AWG	RRH-562G
9	2/0 AWG	RRH-572G
10	2/0 AWG	RRH-582G
11	2/0 AWG	RRH-592G
14	2/0 AWG	RRH-602G
18	2/0 AWG	RRH-612G



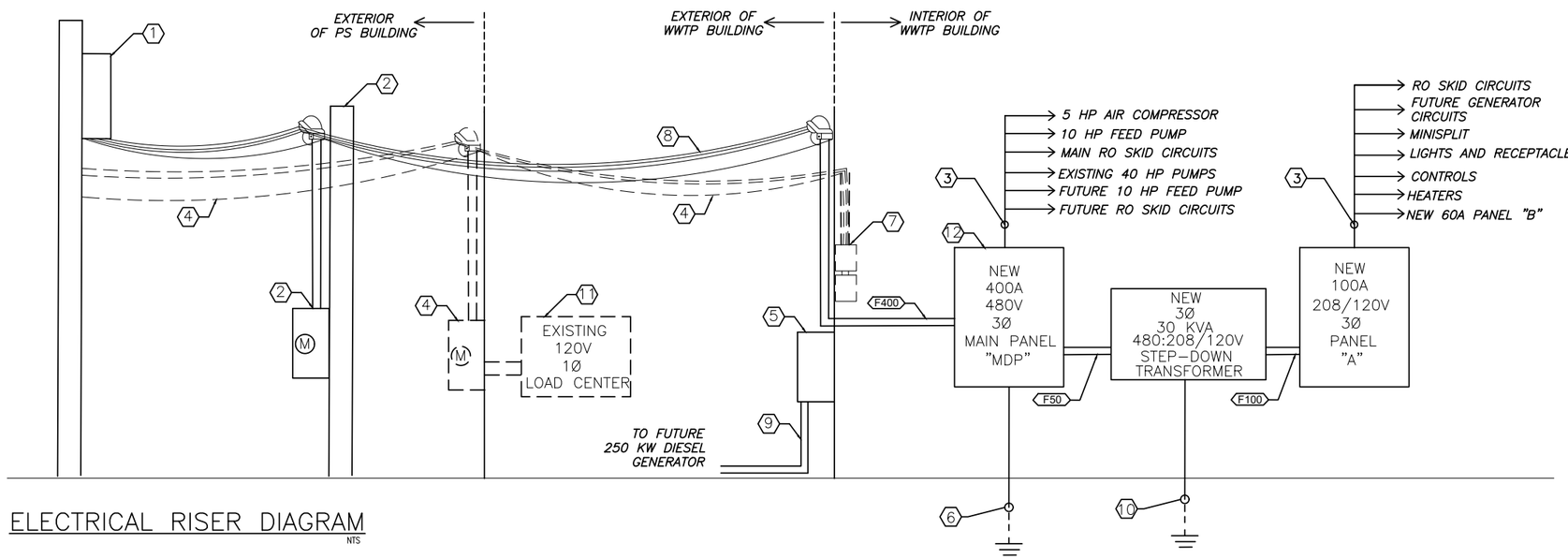
MATERIAL		
ITEM	QUANTITY	DESCRIPTION
1	AS REQ'D	WIRE, 2/0 BARE STRANDED, COPPER, RATED FOR DIRECT BURIAL
2	AS REQ'D	CABLE TO CABLE GROUND, CADWELD PTC-202G
3	AS REQ'D	CABLE TO REBAR, SEE REBAR GROUNDED DETAIL FOR PART # THIS SHEET
4	AS REQ'D	GROUNDING CONNECTOR, CADWELD GTC-182G
5	AS REQ'D	GROUND ROD, COPPER, 3/4" X 10'-0" LONG
6	AS REQ'D	GROUND ENHANCEMENT MATERIAL

GROUND LOOP DETAIL

NTS

LEGEND

- GROUND CONNECTION
- 4/0 MCM BARE COPPER GROUNDING CONDUCTOR
- 2/0 MCM BARE COPPER GROUNDING CONDUCTOR
- #2 THHN GREEN COVERED CABLE



ELECTRICAL RISER DIAGRAM

NTS

ELECTRICAL NOTES BY REFERENCE (#)

1. EXISTING XCEL PRIMARY POLE WITH (3) TRANSFORMER BANK FOR 480V, 3Ø SERVICE AND NETWORK SYSTEM FOR 240/120V, 1Ø SERVICE.
2. EXISTING DIP POLE WITH 480V METER #69 809 483 AND OVERHEAD SERVICE TO REMAIN.
3. REFERENCE CIRCUIT SIZE SCHEDULE FOR WIRE SIZES.
4. EXISTING 240/120V, 1Ø METER #NXE005159773 AND ELECTRICAL SERVICE TO BE DEMOLISHED. XCEL TO REMOVE OVERHEAD WIRING. CONTRACTOR TO REMOVE METER, METER CAN, AND CONDUIT AND WIRING TO EXISTING PANELS
5. FUTURE SERVICE RATED 480V, 3Ø, 400A ATS.
6. (1) – 1/0 GROUND IN 1/2" PVC CONDUIT. CADWELD TO 5/8" x 10'-0" COPPER CLAD STEEL GROUND ROD.
7. EXISTING DISCONNECT AND LOAD CENTER SERVED BY 240/120V, 1Ø SERVICE TO BE DEMOLISHED BY CONTRACTOR.
8. EXISTING OVERHEAD SECONDARY TO BE RE-ROUTED TO NEW PANEL "A" (REFERENCE ELECTRICAL SITE PLAN SHEET E-1). CONTRACTOR TO PROVIDE NEW WEATHERHEAD AND MAST PER XCEL'S REQUIREMENTS.
9. FUTURE GENERATOR CONDUIT AND WIRING (NOT APART OF THIS PROJECT SCOPE).
10. (1) – #8 AWG GROUND IN 1/2" PVC CONDUIT. CADWELD TO 5/8" x 10'-0" COPPER CLAD STEEL GROUND ROD.
11. EXISTING LOAD CENTER, WIRING, AND CONDUIT TO BE DEMOLISHED.
12. BOND NEUTRAL TO GROUND IN THIS PANEL.

STATE OF TEXAS — EDWARD R. WELLS — 66579 — LICENSED PROFESSIONAL ENGINEER
September 12, 2023

3465 CURRY LANE
ABILENE, TX 79606
325-691-1070

JACOB MARTIN

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT
ELECTRICAL RISER DIAGRAM AND DETAILS

SCALE NTS | PROJECT # 19119 | DESIGNED ERW | DRAWN CC | CHECKED ERW
DATE | NO. | REVISION
BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE & ADJUST ACCORDINGLY.

SHEET E-3
SEQ. 32 OF 33

326 SANTA FE DR, STE 204
WEATHERFORD, TX 76086
817-594-9880

4920 S LOOP 289, STE 104
LUBBOCK, TX 79414
806-368-4375
FIRM # F-2448

X:\GL_Ropesville\19119 – TWDB DWSRF Water Treatment Plant\Drafting_Plans_E_Electrical\E-3 RISER DIAGRAM & NOTES.dwg

Ropesville Water Treatment Plant
Panel "MDP" Schedule

Main Breaker Rating: 400 AMPS
M.L.O. Bus Rating: 400 AMPS
Sym. Inter. Cap.: > 22k AMPS

3 Phase 4 Wire
480V

Surface Mount.: X
Flush Mount.:

NEMA 1: X
NEMA 3R:

Conductor Color Code

Phase 1	BROWN
Phase 2	ORANGE
Phase 3	YELLOW
Neutral	WHITE or GRAY
Ground	GREEN

Load	
Phase 1 Load:	252
Phase 2 Load:	252
Phase 3 Load:	252

Note: Corner Grounded 480V Delta Service
Note: Contractor to provide Surge Protection Device (SPD)

POLE	SERVICE	W	LOAD PHASE 1	LOAD PHASE 2	LOAD PHASE 3	BREAKER POLES	POLE	PHASE 1	PHASE 2	PHASE 3	POLE	SERVICE	W	LOAD PHASE 1	LOAD PHASE 2	LOAD PHASE 3	BREAKER POLES	POLE
1	Existing 40 HP Pump # 1	43181	52			70 / 3	1	X			2	Existing 40 HP Pump # 2	43181	52			70 / 3	2
3	"			52			3		X		4	"			52			4
5	"				52		5			X	6	"				52		6
7	New High Pressure Pump on RO Skid	22421	27			40 / 3	7	X			8	New 10 HP Feed Pump	11626	14			30 / 3	8
9	"			27			9		X		10	"			14			10
11	"				27		11			X	12	"				14		12
13	30 KVA Stepdown Transformer	30000	36			50 / 3	13	X			14	New 5 HP Air Compressor	6311	8			20 / 3	14
15	277/480V 3P to 120/208V 3P			36			15		X		16	"			8			16
17	"				36		17			X	18	"				8		18
19	Future High Pressure Pump on RO Skid (Note #1)	22421	27			40 / 3	19	X			20	Future 10 HP Feed Pump (Note #1)	11626	14			30 / 3	20
21	"			27			21		X		22	"			14			22
23	"				27		23			X	24	"				14		24
25	New Stage 2 Booster Pump on RO Skid	2823	3			20 / 3	25	X			26	New CIP Skid (Pump and Heater)	15528	19			40 / 3	26
27	"			3			27		X		28	"			19			28
29	"				3		29			X	30	"				19		30
31	Future Stage 2 Booster Pump on RO Skid (Note #1)	2823	3			20 / 3	31	X			32	Future CIP Skid (Pump and Heater) (Note #1)	15528	19			40 / 3	32
33	"			3			33		X		34	"			19			34
35	"				3		35			X	36	"				19		36
37							37	X			38							38
39							39		X		40							40
41							41			X	42							42
43							43	X			44	SPD						44
45							45		X		46	SPD						46
47							47			X	48	SPD						48

Notes:
1. Future circuits are shown for reference only. No conduit, wiring, or breakers are to be installed for these loads.

Ropesville Water Treatment Plant
Panel "A" Schedule

Main Breaker Rating: 100 AMPS
M.L.O. Bus Rating: 200 AMPS
Sym. Inter. Cap.: AMPS

3 Phase 4 Wire
208/120 VAC

Surface Mount.: X
Flush Mount.:

NEMA 1: X
NEMA 3R:

Conductor Color Code

Phase 1	BLACK
Phase 2	RED
Phase 3	BLUE
Neutral	WHITE or GRAY
Ground	GREEN

Load	
Phase 1 Load	39
Phase 2 Load	59
Phase 3 Load	61

POLE	SERVICE	W	LOAD PHASE 1	LOAD PHASE 2	LOAD PHASE 3	BREAKER POLES	POLE	PHASE 1	PHASE 2	PHASE 3	POLE	SERVICE	W	LOAD PHASE 1	LOAD PHASE 2	LOAD PHASE 3	BREAKER POLES	POLE
1	Lights - WTP - Metal Building	720	6			20 / 1	1	X			2	2000W Wall Mounted Heater	2000	10			20 / 2	2
3	Controls & Convenience Receptacle	600		5		20 / 1	3		X		4	"			10			4
5	Lights - PS - Cinder Block	360			3	20 / 1	5			X	6	1200W Heater & Convenience Receptacle	1380			12	20 / 1	6
7	Future Generator Battery Charger (Note #1)	600	5			20 / 1	7	X			8	Heat Tape	180	2			20 / 1	8
9	New 2-ton Mini-Split	3120		15		20 / 2	9		X		10	Heat Tape	180		2		20 / 1	10
11	"				15		11			X	12	New 48" Duplex Receptacles	540			5	20 / 1	12
13	New Chemical Dosing Pumps	600	5			20 / 1	13	X			14	Convenience Receptacle for Mini-Split	180	2			20 / 1	14
15	Future Generator Block Heater (Note #1)	2500		12		20 / 2	15		X		16	New RO Skid Main Control Panel	600		5		20 / 1	16
17	"				12		17			X	18	Future RO Skid Main Control Panel (Note #1)	600			5	20 / 1	18
19	New Chlorine Injection Panel "B"	3598	10			60 / 3	19	X			20							20
21	"			10			21		X		22							22
23	"				10		23			X	24							24
25							25	X			26							26
27							27		X		28							28
29							29			X	30							30

Notes:
1. Future loads are for reference only. No breakers, conduit, or wiring is to be installed for these loads.

3465 CURRY LANE
ABILENE, TX 79606
325-691-1070

1508 SANTA FE DR, STE 204
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4020 S LOOP 289, STE 104
LUBBOCK, TX 79414
806-368-4375

FIRM # F-2448

JACOB MARTIN

STATE OF TEXAS — EDWARD R. WELLS — 86579 — LICENSED PROFESSIONAL ENGINEER

September 12, 2023

CITY OF ROPESVILLE
DWSRF WATER TREATMENT PLANT
PANEL SCHEDULES

SCALE	NTS	DESIGNED	ERW
PROJECT #	19119	DRAWN	CC
DATE		CHECKED	ERW

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE & ADJUST ACCORDINGLY.

NO.	REVISION

SHEET E-4
SEQ. 33 OF 33

X:\CL_Ropesville\19119 - TWDB DWSRF Water Treatment Plant\Drafting_Plans_E_Electrical\E-4 PANEL SCHEDULES.dwg

Attachment 5

Revised Technical Specifications

SECTION 01 03 01 - MEASUREMENT AND PAYMENT

PART 1 PAYMENT ITEMS

1.1 LUMP SUM PAYMENT ITEMS

A. Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.2 REFERENCE STANDARDS

1.3 BONDS, MOBILIZATION & INSURANCE

A. PAYMENT
The measurment and payment item shall be measured and paid for accordint to the lump sum in the bid proposal. Payment shall constitue full reimbursement for all mobilization to the site as well as all bonding and insurance required by the contract documents.

B. Unit of measure: LUMP SUM

1.4 RFRO WATER TREATMENT PLANT EQUIPMENT

A. PAYMENT
The RFRO Water Treatment Plant item shall be measured and paid for accoding to the lump sum in the bid proposal. Payment shall constiture full reimbursement for furnishing and installing all equipment and associated appurtenances in the interior of the RFRO WTP as described and shown in the construction documents and plans.

B. Unit of measure: LUMP SUM

1.5 RFRO WATER TREATMENT PLANT ELECTRICAL

A. PAYMENT
The RFRO Water Treatment Plant Electrical item shall be measured and paid for according to the lump sum in the bid proposal. Payment shall constitute full reimbursement for furnishing and installing all power, conduit, panels, etc. to energize all equipment in the RFRO WTP as shown and described in the contract documents and plans. This item shall also include coordination and payment to the utility for any upgrades to the electrical service described in the contract documents and plans.

B. Unit of measurement: LUMP SUM

1.6 EXISTING BUILDING IMPROVEMENTS

A. PAYMENT
The Existing Bulding Improvements item shall be measured and paid for according to the lump sum in the bid proposal. Payment shall constiture full reimbursement for furnishing and installing improvements as shown and described in the contract documents and plans.

B. Unit of measure: LUMP SUM

1.7 WATER TREATMENT PLANT CONTROL

A. PAYMENT
The Water Treatment Plant Control shall be measured and paid for according to the lump sum in the bid proposal. Payment shall constiture full reimbursement for furnishing and installing PLC programming, HMI, level/presure sensors, transmitors and incidentals as specified and

shown on the plans.

B. Unit of measure: LUMP SUM

1.8 GAS CHLORINE BUILDING

A. PAYMENT

The Gas Chlorine Building shall be measured and paid for according to the lump sum bid in the proposal. Payment shall constitue full reimbursement for furnishing and installing the gas chlorine building, foundation, electrical wiring, and appurtenances as specified and shown on the plans.

B. Unit of measure: LUMP SUM

1.9 GAS CHLORINE SYSTEM

A. PAYMENT

The Gas Chlorine System shall be measured and paid for according to the lump sum bid in the proposal. Payment shall constitue full reimbursement for all gas chlorine, new gas chlorine cylinders, scales, regulators, solenoids, booster pump, source water piping, chlorine feed equipment, appurtenances, and 3'8" solution tube and 1" SCH80 pvc from the chlorine building to the inject point as specified and shown on the plans.

B. Unit of measure: LUMP SUM

1.10 AIR COMPRESSOR

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install air compressor and air lines as required per equipment PNID to supply air to pnumatic valves for equipment.

B. Unit of measure: LUMP SUM

1.11 UNIT PRICE PAYMENT ITEMS

A. Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.12 WATER LINE

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install water line as specified and shown on the Plans. Water pipelines shall be measured and paid for at the unit prices for each size and class of water pipeline, which payment shall include trenching, laying, bedding, jointing, backfilling, connection to or plugging of existing water lines and furnishing water pipelines, fittings, couplings and accessories as specified, including labor, equipment, testing, sterilization, cleanup and supervision necessary to complete the water pipeline and place the water system in operation in accordance with these Specifications and may be directed by the ENGINEER.

No extra payment shall be made for special backfill in public ROW or gravel repair and asphalt repair. These shall be considered subsidiary to the pipeline installation and reimbursement for these items shall be included in the price bid for furnishing and installing the water line.

* Asphat repair shall be paid under the item "Asphalt Repair".

B. Unit of measure: LINEAR FOOT

1.13 GRAVITY SEWER LINE

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install gravity sewer line as specified and shown on the Plans. Sewer pipe of the size shown on the Plans will be measured by the linear foot of pipe from the center of manhole to center of manhole, center of manhole to center of cleanout, or from the face of the structure to the center of manhole or end of pipe. Payment will be at the unit price bid in the Proposal, per linear foot, for the respective size and type sewer pipe, which payment shall constitute reimbursement in full for furnishing and installing the material.

Trenching, laying and backfilling for gravity sewer lines of the size shown on the Plans will be included in the per linear foot price. Payment shall include furnishing and installing the bedding material as specified and shall constitute reimbursement in full for all labor, equipment, materials, and incidentals required for performing the trenching, appurtenances, and testing in accordance with the Plans and Specifications. The same unit price will be used no matter the depth of the cut required to install the sewer pipe.

B. Unit of measure: LINEAR FOOT

1.14 TRENCH SAFETY

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install trench safety as specified and shown on the plans. Measurment and payment for the trench safety system required, furnished and utilized by the CONTRACTOR to meet OSHA standards and all depth of trench construction and these plans and specifications shall be made at the price per linear foot of "Trench Safety" as bid in the proposal.

B. UNIT OF MEASURE: LINEAR FOOT

1.15 FENCING AND GATES

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install fencing and gates as specified and shown on the plans. All gates, fencing material, posts, etc. shall be measured and paid for at the unit price per linear foot of fencing as bid in the proposal.

B. Unit of measure: LINEAR FOOT

1.16 METAL TAPE

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install metal detectable tape as specified and shown on the plans. Measurment and payment for the metal detectable tape required, furnished and installed shall be made at the price per linear foot as bid in the proposal.

B. Unit of measure: LINEAR FOOT

1.17 GATE VALVES

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install gate valves as specified and shown on the Plans. Gate valves, tapping valves, and sleeves with Valve Boxes shall be measured and paid for at the unit price bid for each size valve, and incidentals furnished and installed.

B. Unit of measure: EACH

1.18 60,000 GALLON FINISHED WATER TANK

A. PAYMENT

The 60,000 Gallon Finished Water Tank shall be measured and paid for costs associated with operations necessary to furnish and install a 60,000 gallon finished water tank, foundation, coatings, connections, level controls, and TCEQ required tank appurtenances as specified and

shown on the plans.

B. Unit of measure: EACH

1.19 5,000 GALLON HDPE CONCENTRATE TANK

A. PAYMENT

The 5,000 Gallon HDPE Concentrate Tank shall be measured and paid for costs associated with operation necessary to furnish and install a 5,000 gallon HDPE concnetrate tank, foundation, connections, level controls, and TCEQ required tank appurtenances as specified and shown on the plans.

B. Unit of measure: EACH

1.20 MINISPLIT AC & HEATING UNIT

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install the Minisplit AC & Heating Unit as specified and shown on the Plans. The Minisplit AC & Heating Unit will be measured and paid for at the unit price bid in the Proposal. Payment shall include all labor, materials and incidentals required for construction and full operation as specified and shown on the plans.

B. Unit of measure: EACH

1.21 WASH SINK & SHOWER

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install a Wash sink and Shower as specified and shown on the Plans.

B. Unit of measure: EACH

1.22 VALVE VAULT

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install valve vaults as specified and shown on the Plans.Valve /Vaults, excavation, bedding, and other incidentals shall be measured and paid for at the unit price bid as shown in the bid schedule.

B. Unit of measure: EACH

1.23 CHECK VALVES

A. PAYMENT

Payment will made for costs associated with operations necessary to furnish and install check valves as specified and shown on the Plans.

B. Unit of measure: EACH

1.24 SEWER LINE CONNECTIONS

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install sewer line connections as specified and shown on the Plans. Sewer line connections including piping, fittings, and manholes shall be measured and paid for at the unit price bid for each size and type of water line connection and incidentals furnished and installed.

B. Unit of measure: EACH

1.25 WATER LINE CONNECTIONS

A. PAYMENT

Payment will be made for costs associated with operations necessary to furnish and install water line connections as specified and shown on the Plans. Water line connections including piping, fittings, and coupling shall be measured and paid for at the unit price bid for each size and type of water line connection and incidentals furnished and installed.

B. Unit of measure: EACH

PART 2 NOT USED

PART 3 NOT USED

-- END OF SECTION --

SECTION 11 03 02 - GALVANIZED BOLTED TANK

PART 1 GENERAL

1.1 REFERENCE STANDARDS

ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2015.
ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2015.
ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
AWWA C652 - Disinfection of Water-Storage Facilities 2011.
AWWA D103 - Factory-Coated Bolted Steel Tanks for Water Storage 2010.
ISO 9001 - Quality Management Systems-Requirements 2008.
NACE No. 2 - Joint Surface Preparation Standard Near-White Metal Blast Cleaning 1994 (Reaffirmed 2006).
NSF 61 - Drinking Water System Components - Health Effects 2014 (Errata 2015).
SSPC-SP 10 - Near-White Blast Cleaning 2007.

1.2 WORK INCLUDED

This item of the Specifications is for the furnishing and installing 1 - 60,000 gallon galvanized bolted steel ground storage tanks with accessories.

1.3 FACTORY PACKAGING

A. All sheets that pass Factory Inspection and Quality Control checks shall be protected from damage prior to packing for shipment.
B. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
C. Individual stacks of panels will be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels. This procedure eliminates contact or movement of finished panels during shipment.

1.4 DELIVERY, HANDLING AND STORAGE

A. Shipment from the factory will be by truck, hauling the tank components exclusively.
B. All plates, supports, members and miscellaneous parts shall be packaged for shipment in such a manner to prevent abrasion or scratching of the finished coating. All scratching or damage to the coating system shall be corrected to the satisfaction of the ENGINEER.

PART 2 PRODUCTS

2.1 BOLTED STEEL TANK

The steel bolted tank(s) shall be of dimensions as shown on the Plans. The tanks and accessories shall conform to AWWA D103. When complete, the tanks shall be plumb and without undue or noticeable warping or irregularities and as determined acceptable by the ENGINEER.

2.2 TANK FOUNDATION

The foundation shall consist of a galvanized steel grade ring and an 8" thick pea gravel foundation as shown on the Plans. Tank(s) shall be located at the site as shown on the Plans. The CONTRACTOR shall provide all site grading, 8" depth galvanized steel ring and provide a pea gravel foundation in the ringwall as shown on the Plans. Prior to setting the tank(s), CONTRACTOR shall lay 30# roof felt on the pea gravel foundation and trim the felt neatly to

tank diameter. The CONTRACTOR shall provide minor site grading as required to drain site.

2.3 TANK DESIGN

Bolted tank(s) shall be designed to conform to AWWA D103. The shell foundation and anchoring system shall be designed to withstand 100 miles per hour winds. Bottom of the tanks shall be flat. Roof of the tanks shall have a minimum slope of 1.0 inches in 12 feet. Shell material shall be sheet steel, minimum ASTM A1011/A1011M, Grade 40, or plate steel meeting ASTM A36/A36M standards. Roof system and roof shall have a 25 pound per square foot live deck load design.

2.4 TANK ACCESSORIES

A. Vent: An 18" mushroom vent with a screen of #16 mesh stainless steel wire shall be provided. The vent shall be adequate to handle pressure differential caused when withdrawing water at a maximum rate of 1000 GPM.

B. Manhole: A 30" x 46" flush bolted water tight manway shall be furnished in the first ring of the tank shell at the location shown and indicated on the Plans.

C. Inlet, Outlet Drain and Overflow: Inlet, outlet, drain and overflow shall be provided as indicated on the Plans.

D. Hatch: Two roof entrance hatches shall be installed. One 30" diameter entrance hatch shall have 4" raised lip and 2" turn- down ring on the cover and hinged with a hasp for padlock shall be furnished in the roof as shown on the Plans. One hatch shall be 12" diameter or square flanged hatch installed over the overflow weir box.

E. Ladders: An outside ladder and an inside ladder shall be provided and shall meet all current State and Federal safety regulations for water tank ladders, including the safety requirements set out in the Williams-Steiger Safety Act of 1970, and subsequent revisions. Safety climb system for the ladder may be used in lieu of a cage. Safety climb system shall be as manufactured by Tower Specialties, Ltd, Kitchener, Ontario, Part No. 10540 and Belt by TUFF-BILT or approved equal. Ladder rungs and side rails shall be hot-dipped galvanized steel per ASTM A123/A123M and ASTM A153/A153M or powder coated.

F. Control System Accessories: A 2" and 3" threaded collar and plug shall be provided in the top of the tanks as detailed on the Plans. Collar shall be fitted with a 3" PVC cap securely tightened to prevent any drainage into the tank.

G. Splash Pad: The CONTRACTOR shall furnish and install 6 inch thick 3000 psi concrete overflow and drain splash pad as shown on the Plans.

H. Overflow: Overflow pipe shall include an 6" down pipe with flap gate meeting AWWA and TNRCC requirements.

I. Gaskets: Gaskets shall be thick double row, double punched or triple row, triple punched gasket material.

J. Liquid Level Gauge: Varec or approved equal, tank liquid level indicator with stainless steel float and target board shall be furnished. Level indicator shall indicate each foot of water with a dash and number at every 5 foot interval.

K. Tank Fill Pipe: Tank manufacturer shall include an 6" hot-dipped galvanized or powder coated pipe with goose neck end for a fill pipe as detailed on the Plans.

L. Tank Drain Valve and Blind Flanges: Provide a 2" flanged, resilient wedge drain valve, Clow or equal, and blind flanges with gasket bolts for the inlet and outlet to the tank for testing purposes.

2.5 TANK COATING

All interior tank coating must be approved as required by NSF 61 and CONTRACTOR shall furnish a certificate certifying such approval.

A. GALVANIZED COATING

1. Surface Preparation and Coating:
   a. Prior to application of the coating, all metal plates, supports, members and miscellaneous parts, other than fasteners, shall be thoroughly cleaned by a hot wash-rinse process followed immediately by hot air drying.
   b. Following the wash-rinse and drying, the parts shall be steel grit-blasted to the equivalent of "near white finish" per SSPC-SP 10/NACE No. 2 by steel blasting or by a wheelabrator to obtain equivalent of SSPC-SP 10/NACE No. 2. The surface anchor pattern shall be a minimum of 1 mil.
2. Coating: After surface preparation has been completed as specified, the exterior and interior surfaces of the tank shall be hot-dipped galvanized per AAWWA D103 and ASTM A123/A123M and ASTM A153/A153M. Galvanizing shall meet requirements of NSF 61.

B. THERMOSET EPOXY POWDER COATING
1. Cleaning: After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.
2. Surface Preparation:
   a. Following cleaning, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-SP 10/NACE No. 2. Sand blasting and chemical pickling of steel sheets is not acceptable.
   b. The surface anchor pattern shall be not less than 1.0 mil.
3. Coating:
   a. No shaping, bending, punching, flanging, or grinding may be done on the steel after blasting and before coating. Field coating, except for touch-up will not be permitted.
   b. Coatings shall be in accordance with AWWA D103 and interior coatings shall be NSF 61 approved. Interior coating shall be ThermalBond 579 applied to 5-7 mils average film thickness (DFT). Exterior coating system shall be as follows:
      1) Primer - One coat ThermalBond 579 thermoset epoxy powder primer applied to 3-5 mils DFT.
      2) Topcoat - One coat Super Durable Polyester powder coating applied to 2-3 mils DFT.
   c. The same thermoset epoxy powder coating as applied to the sheet surfaces shall be applied to the exposed edges and to other tank appurtenances unless otherwise specified.

PART 3 EXECUTION

3.1 FACTORY INSPECTION

A. The manufacturer's quality system shall conform to ISO 9001.
B. Coated sheets shall be inspected for mil thickness (Mikrotest or equal).
C. An electrical leak detection test shall be performed on the inside surface after fabrication of the sheet. Sheets with excessive electrical leaks shall be rejected so as to minimize field touch up.

3.2 INSTALLATION

Field erection of factory-coated bolted steel tank components shall be in strict accordance with AWWA's specifications and recommendation of the tank supplier. Particular care shall be exercised in handing and bolting of the tank plates, supports and members to avoid abrasion or scratching of the coating.

3.3 FIELD TESTING

A. Following completion of erection and cleaning of the tanks, the tanks shall be tested by the erector for leaks by filling the tanks to its overflow elevation.
B. After each tank has been completely erected and the connections have been made by the CONTRACTOR's personnel, the erector of the tanks shall clean, fill and sterilize the tanks by chlorination in accordance with AWWA C652 with liquid chlorine or an equivalent amount of powder form, and the exterior surfaces of the tanks inspected for leaks. In the event any leaks are found, they shall be repaired by the erector to the entire satisfaction of the ENGINEER, and

the disinfection process repeated.

-- END OF SECTION --

SECTION 46 01 01

PACKAGED REVERSE OSMOSIS TREATMENT SYSTEM

PART 1 GENERAL

1.01 WORK INCLUDED

A. This Section covers the work necessary by the Reverse Osmosis Treatment System (ROTS) Supplier to supply, startup and commission for operation an on- site total dissolved solids reduction system utilizing a Reverse Osmosis Treatment Process. Additional work includes the integration of the Pre-Filter and Feed Pump Controls as part of this design. The ROTS shall be supplied as single skid mounted unit by a single-source supplier who shall take overall responsibility for integration of the entire water treatment equipment package. Chemical Feed Systems (CFS) for antiscalant and acid will be included in addition to an integrated CIP System. It is the requirement of this specification for all components of the integrated system to be supplied by a single-source supplier and factory tested prior to shipment.

B. The ROTS Supplier shall furnish the following components of the ROTS:
1. Skid support frame with anchor plates
2. Pressure vessels housings for RO Membranes
3. Internal mechanical components: piping, fittings, flanges and supports
4. Process control valves, flow control valves, isolation valves
5. Instruments to measure flow, pressure and perform water sampling
6. Instruments to monitor water quality including conductivity, ORP, pH and temperature
7. Skid-mounted control panel with PLC, HMI, and electrical components

C. The NTS Supplier shall be responsible for the following deliverables:
1. Submit with Bid Package ROTS Supplier’s Qualifications
2. Submit with Bid Package ROTS Supplier’s Warranty Information
3. Submit with Bid Package ROTS Supplier’s Scope of Supply
4. Submit with Bid Package ROTS Supplier’s Estimated Shipping Costs
5. In-house Manufacture of final ROTS equipment
6. Size all equipment to be supplied per this specification
7. Prepare submittals with design report, shop drawings, equipment specs
8. Procure / Fabricate final ROTS equipment
9. Conduct in-house Quality Assurance & Quality Control prior to shipment
10. Deliver the equipment to the project job site
11. Provide as-built P&ID, GA and electrical single-line diagrams
12. Provide O&M Manual with as-built documents
13. Provide a pre-installation checklist or System Commissioning Plan

14. Collaborate with contractor during installation to ensure proper installation
15. Field start-up, commissioning, and operator training
16. Perform field-tests to demonstrate contaminant removal compliance
17. Perform optimization of system recovery in a 2-month period after successful system startup

D. The Contractor shall be responsible for the following deliverables:
1. Submit with Bid Package contractor's costs for First Compliance Sample.
2. Interface with engineer during the submittal's approval process.
3. Build the facility housing and foundation (if applicable).
4. Receive, offload and store all equipment delivered by the ROTS Supplier
5. Install the ROTS equipment and provide anchoring to structural pad.
6. Prepare a structural concrete pad to set the skid-mounted systems.
7. Install interconnecting piping to all tie points, hosing, joints, fittings and valves between equipment supplied by ROTS supplier and adjacent equipment.
8. Provide control connections from the ROTS's control panel to adjacent equipment.
9. Providing electrical supply connections to ROTS main electrical distribution panel.
10. Providing chemicals necessary during startup.
11. Correcting installation-related problems if they occur.
12. Perform lab-tests (as directed by the Engineer) to demonstrate contaminant removal compliance

E. Following the completion of installation by the Contractor, the ROTS Supplier shall perform functional, performance and start-up testing of the System to demonstrate that performance criteria are being achieved. The ROTS Supplier shall train Owner's personnel and provide detailed instructions in the operation of the Treatment Equipment. This training shall be provided at the time of startup and coordinated closely with the Owner's operator.

1.02 RELATED DOCUMENTS

1.03 GENERAL

A. All civil, structural, electrical, mechanical, and painting work included herein shall conform to the applicable Sections or Divisions of this project except as otherwise shown or specified and shall be the responsibility of the Contractor.

B. The Drawings show details of the components and their overall relationships. Not all items incidental to the ROTS are shown or specified. It is the intent of these Contract Documents that the ROTS Supplier is to provide a complete workable system whether any specific component is shown or specified.

1.04 REFERENCES

A. The following references apply:
   1. American National Standards Institute (ANSI).
   2. American Society of Mechanical Engineers (ASME).
   3. American Society for Testing Materials (ASTM).
   4. American Water Works Association (AWWA).
   5. Confinement of Substances Hazardous to Health (COSHH).
   6. Institute of Electrical and Electronics Engineers (IEEE).
   7. International Standards Organization (ISO).
   8. National Electrical Code (NEC).
   9. National Electrical Manufacturers Association (NEMA).
   10. National Institute of Occupational Safety & Health (NIOSH).
   11. Occupational Safety and Health Administration (OSHA).
   12. Water Environment Federation (WEF)
   13. National Sanitation Foundation (NSF)

1.05 SUBMITTALS AND O&M MANUAL

A. System Description Documents: Submit for review/approval the following in one comprehensive submittal package within 4 weeks of project award:
   1. Complete design report including description of technology and system operation, membrane process and its expected performance, any required chemical addition, description and location of valves and instruments, wastewater flows and volumes, and other required technical information required to describe a fully functioning system.
   2. Complete Equipment Scope of Supply for a fully functioning system.
   3. Electrical Connections Table
   4. Manufacturer's literature, cut sheets, illustrations, specifications, and engineering data, including dimensions, materials, size, weight, and performance data for all components including valves, instruments, pumps, and other ancillary equipment.

B. Shop Drawings: Submit for review/approval the following in one comprehensive submittal package within 4 weeks of project award:
   1. Shop drawings shall include, but not be limited to the following:
      a. General Arrangement (GA) drawings showing general dimensions, connections, elevations, and overall system configuration
      b. Process Flow Diagram (PFD) and Process & Instrumentation Diagrams (PID) showing the general process, valves and instruments used to control and monitor the system.

C. Post Installation Documents: Submit
   1. Operation & Maintenance Manuals:
      a. As-built shop drawings: PFD, PID, GA and electrical drawings including one-line diagrams, control schematics, panel drawings.

b. Provide one (1) hard copy and one (1) electronic at project completion. Manuals shall include complete installation instructions; operation procedures (including start-up and shut-down procedures for all modes of operation); preventative maintenance procedures and schedules; lubrication charts and schedules; spare parts list and any tools required for general operation and maintenance; troubleshooting instructions; safety considerations; names, addresses, and telephone numbers of Contractor, Treatment System manufacturer, and major system component manufacturers; and copies of all approved shop drawings.

c. Format Requirements: Use 8-1/2 inch by 11-inch paper and provide in a PDF format on compact disk. Larger drawings or illustrations are acceptable if folded neatly to the specified size in a manner which will permit easy unfolding without removal from the binder. Provide reinforced punched binder tab. All text shall be legible typewritten, or machine printed or high-quality copies of same.

d. Each page shall have a binding margin of 1-inch and be punched for placement in a triple post binder.

e. Use dividers and indexed tabs between major categories of information. Provide a table of contents for each complete O&M.

2. SPARE PARTS: A list of recommended spare parts must be provided in the O&M Manual identifying part number, Supplier, and contact information. Any special tools required for operation and maintenance of the system shall be identified and listed in the O&M Manual.

1.06 QUALIFICATIONS

A. ROTS Supplier's Qualifications

1. The ROTS Supplier shall have experience in furnishing packaged membrane treatment equipment of similar capacity and service capability to the equipment described herein. As part of their bid submittal package (to be submitted with the bid), the ROTS Supplier shall provide the following:

a. Evidence of successfully deploying and implementing Membrane Treatment Systems in the U.S. for Municipal, Public and Community Water Systems for at least five (5) or more years

b. Evidence of a minimum of three (3) reverse osmosis systems with a permeate capacity of at least 100 gallons per minute which are currently in service.

1.07 QUALITY ASSURANCE

A. Factory Acceptance Test (FAT)
   1. The ROTS supplier shall certify Piping Hydrostatic Pressure Test passed:
      a. System Hydrotest administered at Maximum Working Pressure for a period of 60 minutes with no leaks observed.
   2. The ROTS supplier shall certify Function Test passed:
      a. Automatic system valves and pumps are in their correct positions during all cycles of operation.
      b. Instruments have been calibrated and their readings have been verified against known control values
      c. All required factory settings have been loaded onto the PLC
   3. System dimensions match submittal drawings

1.08 WARRANTY REQUIREMENTS

A. As part of their Bid Submittal Package (to be submitted with the bid), the ROTS Supplier shall provide the equipment warranty associated with their system to address any material or component defects during the warranty period.
   a. Standard warranty for ROTS shall be for a period of 12 months after start-up.
   b. Should any component experience a structural failure or material defect under the designed operating conditions within the warranty period, the component shall be replaced or repaired free of charge, exclusive of labor, or shipping costs, assuming operation of the system per O&M procedures with documentation log.

B. Provide a written warranty from the ROTS Supplier on the O&M Manual

C. The ROTS Supplier shall provide the following after sales services:
   a. Availability of technician to timely respond to and address any warranty issues that arise with the system during the warranty period.
   b. Must maintain an inventory of spare parts on this system such as valves, actuators, and instruments.

PART 2 PRODUCTS

2.01 PRODUCTS / MANUFACTURER

A. Acceptable Manufacturer: AdEdge Water Technologies, LLC; Rotec, USA or Engineer Pre- Approved Equal

B. Acceptable Model: ADRO8-8L-4H-FR or Engineer Pre-Approved Equal
   a. Manufacturer's requesting pre-approval as an Alternate shall provide the following information to the Engineer at least 14 days prior to the bid date and in accordance with instruction to bidders:
      i. All information and proof as required in Qualifications.

ii. Proof of ability to meet Performance Requirements.
iii. Drawings, specifications, cut sheets, product literature with adequate detail to determine that what is proposed will meet the requirements of the plans and specifications. This design pre-submittal shall be complete and shall include the following as a minimum:
    1. Detailed Layout Drawings
    2. Detailed Component Specifications and Catalogue Cut Sheets
    3. Process P&ID
    4. Detailed list of variations from required design, referencing appropriate sections of the specifications and locations on the plans.
    5. Performance data of the proposed process offered.
    6. Detailed System Performance Guarantee

b. Pre-Approval of any Alternate suppliers will be added via a written Addendum.
c. Pre-Approval shall not constitute final approval of the specific equipment, but rather constitutes acceptance of the respective equipment manufacturers to provide price quotations based on equipment meeting the Specifications. Shop submittals will be required as specified herein. Approval of alternate equipment does not guarantee approval of submittals. Alternates will only be considered after the award of the project.
d. Alternate equipment manufacturers shall modify their standard products as necessary to meet all provisions of the specifications without exception.
e. Contractor shall assume overall undivided responsibility for the functioning of the Alternate Suppliers equipment. The cost of any changes incidental to the installation of the alternate equipment such as electrical wiring, relocation of piping, engineering design or supervision, as-built drawings etc., shall be borne by the Contractor with no additional cost to the Owner.
f. Contractors shall include a copy of the Alternate Supplier's proposal with their bid to assure that the equipment is in accordance with the equipment that has been pre-approved.

C. The Owner reserves the right to reject a bid that, in their sole opinion, fails to meet the design intent of the project and/or proposes a substitution that is deemed to be not equal to the specified system.

2.02 FUNCTIONAL REQUIREMENTS

A. The ROTS shall consist of a single pass two-stage systems.
B. Pressure vessels shall be constructed from FRP and shall utilize 8" diameter membranes, 400 ft^2 active membrane area.
C. The ROTS shall be wired, piped, tested, and programmed at the factory.
D. The ROTS unit shall be mounted onto a frame and shipped as a complete pre-wired, pre-piped, tested, and programmed unit to the site.
E. The ROTS control panel shall provide "lock-out" functionality.
F. The ROTS shall be fitted with 4" raw water inlet flange, 4" product outlet flange, 1-1/4" reject outlet flange.

G. All high pressure piping shall be 316SS piping.
H. All low pressure piping shall be SCH80 PVC.
I. Automatic system operations shall be controlled by a PLC housed in a NEMA 4X SS Control Panel enclosure mounted on the ROTS skid. The operator will interface with the PLC through a panel-mounted touch-screen HMI.
J. The system shall be supplied with a stainless steel water quality panel.
K. A portion of the raw water shall be by-passed and blended to achieve the goals set out under the Performance Requirements. The bypass line and all necessary valves and instruments shall be skid mounted.
L. The ROTS shall contain the following components which shall be pre-plumbed, wired, integrated, and shop tested prior to shipment:
   a. Reverse Osmosis System (ROTS)
   b. Master Control Panel
   c. CIP / Flush tank
M. All materials that have direct contact with water shall be NSF 61 certified.

2.03 SERVICE CONDITIONS

A. The system shall be designed and constructed for installation indoors and continuous operation with the following service conditions and shall conform to the following design parameters:
   1. RO Permeate Flow: 110 gpm
   2. Electrical Requirements: 480 VAC, 3PH, 60 Hz
   3. Feed Water Temperature Range: Based on 70 degrees F.
   4. Feed Inlet Pressure: Min 30 psi to RO
   5. Permeate Back Pressure: 10-15 psi (actual to be based on storage tank height and pressure drop in the piping feeding the tank)

B. The feedwater to the RO will be from Well 1 and Well 2. Table 1 presents the water quality data which shall be used in the development of the ROTS design:

Table 1

Constituent	Unit	Raw Water
Hardness	mg/L $CaCO_3$	448.31
Calcium	mg/L	56.70
Magnesium	mg/L	74.80
Sodium	mg/L	80.00
Potassium	mg/L	14.2
Carbonate	mg/L	3.62
Bicarbonate	mg/L	285.00
Sulfate	mg/L	131.00
Chloride	mg/L	119.00
Fluoride	mg/L	5.18

Nitrate	mg/L	30.00
Phosphate	mg/L	0.00
Silica	mg/L	46.70
Boron	mg/L	0.00
Total Dissolved Solids	mg/L	846.20
Arsenic III	mg/L	0.0001
Arsenic V	mg/L	0.008

2.04 PERFORMANCE REQUIREMENTS

A. Under the service conditions set forth in Paragraph 2.03, the ROTS shall conform to the following:
   1. RO System Recovery: 89%
   2. RO Reject: 13.6 gpm
   3. Required System Feed Flow: 162 gpm
   4. Design Membrane flux: 12.3 gfd
   5. Consistently produce a final blended effluent that meets or exceeds the following parameters:

      i. Blended fluoride: ≤ 1.8 mg/L at specified maximum recovery
      ii. Blended nitrate: ≤ 10 mg/L at specified maximum recovery
      iii. Blended Arsenic: ≤ 10 µg/L at specified maximum recovery

B. Field Compliance: ROTS Supplier shall perform field tests for the following parameters: TDS, pH, ORP, As, NO3, F

C. Lab Compliance: The Contractor shall perform the First Compliance Sample through lab tests

2.05 MEMBRANE FILTRATION

A. Cartridge Filters – Membrane Prefilters
   1. Five (5) Micron, polypropylene cartridges, with integral compression end.
   2. Rosedale Model FT12 or equal.
   3. Maximum loading of 5.0 GPM per 10-inch equivalent length of cartridge element. ROTS supplier to select length and number of cartridges in each housing and provide calculations with shop drawing submittals.
   4. Clean filter pressure drops not to exceed 5 psi at design flow.
   5. Housing - 304 stainless steel.
   6. Each filter cartridge housing shall be provided with a valved drain line and an air bleed valve.
   7. Pressure rating of housing 150 psig.
   8. Housings shall be located on the front of the membrane skid to facilitate convenient replacement of filter elements.

9. Pressure gauges on the common inlet and outlet to determine pressure drop through cartridge filters.
10. Housings shall be built to ASME code standards and shall not contain springs or special compression parts that are able to fall into the housings. No code stamp required.
1. Housings shall be swing bolt closures.

B. Vessels:
1. General: The pressure vessels
2. Specification:
a. Type: FRP Pressure Vessel with stainless steel ports
b. Materials: Filament Wound Reinforced Plastic
c. Operating Pressure: 300 psi max
d. Manufacturer: Protec, or Engineer-approved equal

C. Membranes:
1. General: Membranes shall be housed within the pressure vessels
2. Specification:
a. Type: Spiral Wound
b. Application: Brackish Water
c. Membrane Polymer: Composite Polyamide
d. Size: 8” diameter x 40” long
e. Salt Rejection: 99.6% minimum
f. Membrane Active Area: 400 square feet minimum
g. Wet Test: 1500 ppm (minimum) NaCl solution @ 150 psi
h. Manufacturer: Hydranautics CPA6-LD, or Engineer-approved equal

2.06 RO HIGH PRESSURE PUMPS

A. High Pressure Pumps:
1. General: The high pressure and booster pumps shall provide pressure to the membrane system. The VFD is needed to reduce water hammer in the piping system and to maintain constant flow.
2. Specification:
a. Type: Multi-stage Vertical Centrifugal
b. Motor: TEFC Enclosure, NEMA Mounting, 460V / 3PH / 60Hz
c. Shaft Seal: Cartridge-type Silicon Carbide
d. Wetted Materials: Stainless Steel AISI 316 or greater grade
e. O-Ring Materials: EPDM
f. Manufacturer: Grundfos CRN, CRNE series or Engineer-Approved equal

B. Pump Protection:
1. General: All pumps shall be protected through the following:
a. Low Suction Pressure: Pressure Transmitter and Switch on suction

b. High Discharge Pressure: Pressure Transmitter and Switch on discharge
c. Electric Overload: Overload Relay

2.07 SYSTEM INSTRUMENTATION

A. Flow Sensors:
1. General: Flow sensors shall be installed on system inlet, brine outlet and on booster pump feed
2. Specification
a. Type: Electromagnetic Flow Sensor, Insertion-type
b. Materials:
i. Sensor Body: PVC
ii. O-Rings: EPDM
iii. Electronics Housing: Cast powder – coated aluminum
iv. Electrodes: Carbon Graphite
c. Accuracy: ±1.0% of full scale
d. Output: Square wave, opto-isolated
e. Range: 0.2-20 ft/sec
f. Manufacturer: Endress Hauser Promag W400

B. Pressure Sensors:
1. General: Pressure sensors shall be installed on system inlet and outlet, and on the suction and discharge side of each high pressure/booster pump.
2. Specification:
a. Type: Electronic Pressure Sensor, IP 65 enclosure
b. Materials: 316SS housing and 316SS wetted parts
c. Accuracy: < ±0.4%
c. Output: 4-20 mA analog output
d. Pressure Range: 0-362 psi
e. Manufacturer: Endress + Hauser PMP21, PMP51,IFM or Engineer-approved equal

C. Pressure Gauges:
1. General: Pressure gauges shall be installed on the suction and discharge of each high pressure/booster pump, and the feed, permeate and brine tie in point.
2. Specification:
a. Type: Glycerin-filled 2.5” dial, ¼-inch NPT connection
b. Materials: Brass or 316SS internals; 304SS case
c. Accuracy: ±2.5% of full scale
d. Output: Local reading only
e. Pressure Range: 0-100 psi, 0-300 psi
f. Manufacturer: Environmental World Products, WIKA, or Engineer-Approved Equal

D. Temperature Sensor:
1. General: Temperature sensor shall be installed on feed line and shall provide feedback to the PLC to alert the operator if the feed temperature is outside the design range and could present a performance problem.
2. Specification:
a. Accuracy: ±0.5 ºC
3. Manufacturer: IFM or Engineer-Approved Equal

E. pH Sensor:
1. General: pH sensor shall be installed on feed line and shall provide feedback to the PLC to assess performance, and adjust chemical pump dosage.
2. Manufacturer: GF Signet or Engineer-Approved Equal

F. ORP Sensor:
1. General: ORP sensor shall be installed on feed line, and shall provide feedback to the PLC to alert the operator if the feed ORP is outside the design range and could present a performance problem.
2. Manufacturer: GF Signet or Engineer-Approved Equal

G. Conductivity Sensor:
1. General: Conductivity sensor shall be installed on the feed, permeate and blend lines, and shall provide feedback to the PLC to assess performance.
2. Manufacturer: GF Signet or Engineer-Approved Equal

H. Sample Ports:
1. General: PVC ball valves shall be installed on the low pressure feed and permeate piping. 316SS ball valves shall be installed on the high pressure concentrate piping.
2. PVC ball valve specification:
a. Type: PVC ball valves, ¼-inch, rugged unibody construction
b. Material: PVC body conforming to ASTM D1784, EPDM O-rings
c. Operation: 150 psi @ 70° F; lever handle for 90° turn operation
d. Manufacturer: Asahi or Engineer-approved equal
3. SS ball valve specification:
a. Type: SS ball valves, ¼-inch NPT
b. Material: 316 SS body conforms to ASTM A351 Gr CF8M
c. Operation: 1000 psi max working pressure
d. Manufacturer: Flowtek or Engineer-approved equal

2.08 SYSTEM CONTROL

A. The ROTS Supplier shall provide a Master Control Panel for the RO, which shall house the logic controller, HMI, power supply, relays, terminal blocks and other ancillary components for complete operation of the ROTS and integration to other site components. All wiring to field devices shall be terminated at a numbered

terminal strip mounted directly in the panel.

B. Master Panel Controls:
   1. Main Disconnect Switch: Power to ALL components
   2. ON/OFF Power Switch: Power to PLC, HMI
   3. System Alarm Light: RED

C. Enclosure:
   1. General: The Master Control Panel components shall be mounted on the front of the RO frame, or as required by site conditions, and shall be positioned to avoid interference with other system components.
   2. Specification:
      a. Type: Skid Mounted Enclosure
      b. Rating: NEMA 4X
      c. Materials: 304 Stainless Steel
      d. Panel Door: Fitted with quarter-turn latches; no window door
      e. Manufacturer: Hoffman or Engineer-approved equal

D. Logic Controller:
   1. General: A Programmable Logic Controller (PLC) shall control all automatic operations of the treatment system and shall provide external communication ports. PLC shall be fully programmed, staged, and debugged at the manufacturer's facility.
   2. Specification:
      a. Type: Programmable logic controller
      b. I/O Capabilities: Digital and analog inputs / outputs
      c. Communication: Serial RS243C/RS485, RJ-45 10/100 Mbps
      d. Ethernet Protocols: Ethernet/IP, Modbus TCP/IP
      e. Internal Clock: Embedded Real Time Clock
      f. Configuration: Embedded LCD display for user configuration
      g. Memory: Non-volatile battery-backed RAM
      h. Programming: Studio 5000
      i. Manufacturer: Allen Bradley CompactLogix

E. HMI Interface:
   1. General: A Human Machine Interface (HMI) shall provide the operator a touch-screen interface to view current states of the general system parameters and operational settings.
   2. Alarms: The HMI shall also display system alarms and provide an alarm log. The following alarms are required as a minimum:
      a. High Flux Rate (optional)
      b. High System Differential Pressure
      c. High TDS
      d. Low Feed Pressure
   3. Specification:
      a. Manufacturer: Allen Bradley PanelView Plus 7
      b. Type: Color TFT LCD touch screen with 64K colors

c. Size: 10-inch nominal (10.4” diagonal)
d. Resolution: 640 x 480 pixels
e. Backlight: 50,000 hour lifetime, user replaceable
f. Communication: USB, Serial RS232/422/485, RJ-45 10/100 Mbps
g. Ethernet Protocols: EtherNet/IP, Modbus TCP/IP

2.09 MECHANICAL COMPONENTS

A. Stainless Steel Piping, Fittings and Flanges (High Pressure Piping):
1. Piping: 316 Stainless Steel, ASTM A312, ANSI B36.19M
2. Fittings: 316 Stainless Steel
3. Pipe threads: ANSI B1.20.1
4. Flanges: 316 SS, ASTM A105
   a. Type: Raised Face, Slip-On, 2-holed
   b. Bolt hole pattern: ANSI B16.5
   c. Material: 316 Stainless Steel
   d. Mounting: ANSI Class 300

B. PVC Piping, Fittings and Flanges (Low Pressure Piping):
1. Piping: Schedule 80 PVC: IPS, ASTM D1785
2. Fittings: Schedule 80 PVC, ASTM D2467
3. Pipe Threads: ASTM F1498, ANSI B1.20.1
4. Flanges:
   a. Type: Van-Stone
   b. Bolt hole pattern: ANSI B16.5, ASTM D4024
   c. Material: ASTM D1784, PVC Cell Classification 12454-B
   d. Mounting: ANSI Class 150

C. Anchor Bolts, Nuts, and Washers
Type 316 stainless steel

D. Valves
1. General: Process valves shall be installed for the control of all automatic system operations required by the system.
2. Butterfly Valves
   a. Type: Lug-style butterfly valves
   b. Materials: Ductile Iron body, EPDM seat, 416 SS stem, and Ductile Iron with Nylon 11 Coated disc
   c. Operation: 175 psi max pressure
   d. Process Mounting: ANSI class 125/150 flanges
   e. Actuator Mounting: ISO 5211-compliant
   f. Manufacturer: Bray or Engineer-approved equal
3. Ball Valves
   a. Type: Three-piece full-port ball valve
   b. Materials: 316SS, ASTM A351 Gr CF8M body
   c. Operation: 1000 psi service rating

d. Manufacturer: Sharpe, Flowtek or Engineer-approved equal.

4. Valve Actuators
   a. Pneumatic actuators shall be sized for 75-90 psig air pressure.
   b. All automatically controlled pneumatic open/close valves shall be equipped with both open and closed limit switches and shall be prewired to the control panel.
   c. All automatically controlled valve actuators shall be from the same manufacturer.
   d. Manufacturer: RCEL, Sharpe or Engineer-approved equal

5. Access to end caps for membrane removal should require minimal piping removal. No high-pressure piping removal should be required and minimal low-pressure PVC. Piping that must be removed to access pressure vessel end caps should be equipped with unions to facilitate pipe removal and reinstallation.

2.10 CLEAN IN PLACE SYSTEM (CIP)

A. One (1) cleaning tank, installed on the main RO skid, pre-plumbed and wired.
B. One (1) electrical immersion heater pre-mounted in tank wall.
C. One (1) temperature transmitter pre-mounted in tank wall.
D. One (1) pressure transmitter pre-mounted in tank wall.

2. 11 CHEMICAL FEED MODULES

PRODUCTS / MANUFACTURER

A. Model AdIN Chemical Feed System as manufactured by AdEdge Water Technologies, LLC or Engineer Pre-Approved Equal.

B. Engineer approved equal. Alternate suppliers are acceptable but demonstrations of equivalency must be submitted to the Engineer and approved in writing at least 21 days prior to bid date for consideration and approved in writing. Included must be drawings, submittals, and cut sheets of sufficient detail to determine equivalency for Engineer review and written approval prior to bid.

FUNCTIONAL REQUIREMENTS

A. Chemical injection pump(s) shall inject a chemical into the water stream based on a changing process water flowrate. The pump shall operate ONLY when process water is flowing.
B. Chemical Day Tank(s) shall have sufficient capacity to store greater than a 15-day volume of chemical(s).

C. Static Mixer shall be sized for the Line Size at Inlet of Treatment System.

SERVICE CONDITIONS

A. Chemical Requirements:
   1. Sulfuric Acid (35%)
   2. Antiscalant (100%)
   3. SMBS (40%)
   4. Caustic Soda (55%)

CHEMICAL DELIVERY PUMP

A. Dosing Pump
   1. Type: Microprocessor-based diaphragm solenoid metering pump
   2. Operation:
      a. Stroke: Manual stroke length adjustment from 0-100%
      b. Frequency: 180 strokes per minute, optimal 30-100%
   3. Working Pressure: 290 psig max
   4. Materials:
      a. Liquid ends: Acrylic
      b. Suction/Discharge valves: PVC
      c. Seals: EPDM
      d. Valve Balls: Ceramic
      e. Diaphragm: PTFE
   5. External Frequency Control: 4-20mA analog or digital pulsing input
   6. Enclosure: NEMA 4X enclosure
   7. Electrical: 115VAC, 1 PH, 60 Hz; universal control cable, 15 feet long
   8. Display: LCD display with keypad
   9. Manufacturer: Prominent Gamma or Engineer-approved equal

CHEMICAL STORAGE

A. Day Tank
   1. Design: Cylindrical, flat-bottom
   2. Materials: Polyethylene body
   3. Specific Gravity: 1.5 minimum
   4. Appurtenances: Polypropylene lid with child resistant lock and rain roof for pump mounting
   5. Visual Level Indication: Grooved into tank wall
   6. Fittings: Polyethylene suction tubing and PVC foot valve

REPLACEMENT PARTS, SPECIALTY TOOLS, MISCELLANEOUS

A. Fittings and Additional Components
   1. Fittings shall be threaded PVC Bulkheads
   2. Fittings shall be installed away from knuckle radius
   3. Polyethylene suction tubing and PVC foot valve

B. Static Mixer
   1. Type: Wafer-style Mixer Plate
   2. Design: .8 Beta Mixer Plate for 3-8 fps pipe velocities
   3. Material: PVC body and mixer plate
   4. Manufacturer: Westfall Model 2800

PART 3 EXECUTION

3.01 SYSTEM COMMISSIONING PLAN

A. The ROTS Supplier shall provide a detailed pre-installation checklist and System Commissioning Plan (SCP) as a communication tool for proper installation and shall work closely with the Contractor to ensure the system is installed in accordance with the manufacturer's recommendations.

3.02 TRANSPORTATION AND PREPARATION

A. ROTS Supplier shall coordinate with the Contractor to arrange for transportation and delivery of the ROTS equipment. Estimated shipping costs shall be provided by the ROTS Supplier in their bid. The equipment shall be delivered to the site Monday through Friday only (excluding holidays) during the hours between 8 AM and 3 PM local time and consigned to the proper party giving name of the project and the full address of Owner's project site. Notify Contractor's representative by telephone 48 hours prior to the anticipated arrival at the project site.

B. Throughout shipment, all pipe ends, or flanged connections shall remain sealed with watertight caps or blind flanges/plates that remain in place until installation of the equipment and completion of all piping connections.

C. The Contractor shall offload and inspect all equipment and materials against approved Shop Drawings at time of delivery and before installation. Equipment and materials damaged or not conforming to the approved Shop Drawings shall be noted. The ROTS supplier shall be notified immediately and the necessary steps shall be taken to repair or replace damaged and non-conforming equipment. DO NOT INSTALL DAMAGED EQUIPMENT.

D. Equipment and materials received by the Contractor are under the care and responsibility of the Contractor. These items shall be stored by the Contractor in a dry location and protected from the elements and shall be handled in an approved manner in accordance with the ROTS Supplier's recommendations. Contractor shall make provisions to protect materials on-site from theft, damage, or vandalism. Contractor is responsible for replacement of all damaged or stolen materials at the work site until final acceptance by Owner.

3.03 INSTALLATION

A. Installation of the ROTS and related appurtenances shall be performed by the Contractor and shall be in accordance with the Engineer's Drawings and with the ROTS Supplier's drawings, instructions and recommendations. Conflicts of information shall be called to the attention of the Engineer.

B. Contractor shall support external piping or tubing tying to the ROTS components so as to impose minimal loads and stresses on the ROTS equipment.

3.04 START-UP SERVICES AND TESTING

A. Two (2) field technicians shall be retained for a period of not less than Twelve (12) 8-hr days for startup and commissioning.

B. The ROTS Supplier's representative shall perform the following services:

1. Inspect the completed installation and prepare an inspection report
2. Supervise the correction of any defective or faulty work by the Contractor
3. Test, calibrate and adjust all components for optimum performance
4. Install the membranes and perform initial flush
5. Instruct Owner's personnel in the operation and maintenance of all components and conduct a training seminar at the site
6. Perform field-tests to demonstrate contaminant removal compliance

C. The ROTS Supplier and Engineer shall verify that ROTS, as installed by the Contractor, is compatible with other adjacent equipment, instruments, controls, and structures; and that all necessary external connections, being electrical and hydraulic, have been properly made to provide for a complete and working system. The ROTS Supplier or Engineer shall supervise the correction of any defective or faulty work by the Contractor.

D. The Contractor and ROTS Supplier shall make equipment adjustments required to place system in proper operating conditions and shall test the ROTS for proper operation in the presence of the Owner and Engineer.

E. The Contractor shall be responsible for first compliance sample through a State-certified laboratory. Costs for this analysis should be included in the Contractor's bid. If any sample indicates non-compliance, that sample will be re-run. Results shall be provided to the Engineer and Owner. Additional future sampling shall be the responsibility of the Owner.

F. If the treatment system fails to meet any of the specified performance requirements, the Contractor and ROTS Supplier shall modify and/or replace the necessary equipment to bring the system into compliance. After the modifications, the finished water shall be re-sampled and analyzed to verify satisfactory

operation.

END OF SECTION