

# Aboveground Storage Tank Facility Plan Checklist

- **Edwards Aquifer Application Cover Page (TCEQ-20705)** Included
- **General Information Form (TCEQ-0587)** Included
  - Attachment A - Road Map Included
  - Attachment B - USGS / Edwards Recharge Zone Map Included
  - Attachment C - Project Description Included
- **Geologic Assessment Form (TCEQ-0585)** Included
  - Attachment A - Geologic Assessment Table (TCEQ-0585-Table) Included
  - Attachment B - Stratigraphic Column Included
  - Attachment C - Site Geology Included
  - Attachment D - Site Geologic Map(s) Included
- **Aboveground Storage Tank Facility Plan (TCEQ-0575)** Included
  - Attachment A - Alternative Methods of Secondary Containment (if proposed) Included
  - Attachment B - Scaled Drawing(s) of Containment Structure NA
  - Attachment C - Exception to the Geologic Assessment (if requested) NA
  - Attachment D - Spill and Overfill Control Included
  - Attachment E - Response Actions to Spills Included
  - Site Plan Included
- **Temporary Stormwater Section (TCEQ-0602)** Included
  - Attachment A - Spill Response Actions NA
  - Attachment B - Potential Sources of Contamination NA
  - Attachment C - Sequence of Major Activities Included
  - Attachment D - Temporary Best Management Practices and Measures Included
  - Attachment E - Request to Temporarily Seal a Feature (if requested) NA
  - Attachment F - Structural Practices NA
  - Attachment G - Drainage Area Map NA
  - Attachment H - Temporary Sediment Pond(s) Plans and Calculations NA
  - Attachment I - Inspection and Maintenance for BMPs NA
  - Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices NA
- **Agent Authorization Form (TCEQ-0599), if application submitted by agent** Included
- **Application Fee Form (TCEQ-0574)** Included
- **Check Payable to the "Texas Commission on Environmental Quality"** Further instruction needed
- **Core Data Form (TCEQ-10400)** Included

# Edwards Aquifer Application Cover Page

(TCEQ - 20705)



# Texas Commission on Environmental Quality

## Edwards Aquifer Application Cover Page

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### Our Review of Your Application

The Edwards Aquifer Program staff conducts an administrative and technical review of all applications. The turnaround time for administrative review can be up to 30 days as outlined in 30 TAC 213.4(e). Generally administrative completeness is determined during the intake meeting or within a few days of receipt. The turnaround time for technical review of an administratively complete Edwards Aquifer application is 90 days as outlined in 30 TAC 213.4(e). Please know that the review and approval time is directly impacted by the quality and completeness of the initial application that is received. In order to conduct a timely review, it is imperative that the information provided in an Edwards Aquifer application include final plans, be accurate, complete, and in compliance with [30 TAC 213](#).

### Administrative Review

1. [Edwards Aquifer applications](#) must be deemed administratively complete before a technical review can begin. To be considered administratively complete, the application must contain completed forms and attachments, provide the requested information, and meet all the site plan requirements. The submitted application and plan sheets should be final plans. Please submit one full-size set of plan sheets with the original application, and half-size sets with the additional copies.

To ensure that all applicable documents are included in the application, the program has developed tools to guide you and web pages to provide all forms, checklists, and guidance. Please visit the below website for assistance: <http://www.tceq.texas.gov/field/eapp>.

2. This Edwards Aquifer Application Cover Page form (certified by the applicant or agent) must be included in the application and brought to the administrative review meeting.
3. Administrative reviews are scheduled with program staff who will conduct the review. Applicants or their authorized agent should call the appropriate regional office, according to the county in which the project is located, to schedule a review. The average meeting time is one hour.
4. In the meeting, the application is examined for administrative completeness. Deficiencies will be noted by staff and emailed or faxed to the applicant and authorized agent at the end of the meeting, or shortly after. Administrative deficiencies will cause the application to be deemed incomplete and returned.

An appointment should be made to resubmit the application. The application is re-examined to ensure all deficiencies are resolved. The application will only be deemed administratively complete when all administrative deficiencies are addressed.

5. If an application is received by mail, courier service, or otherwise submitted without a review meeting, the administrative review will be conducted within 30 days. The applicant and agent will be contacted with the results of the administrative review. If the application is found to be administratively incomplete, it can be retrieved from the regional office or returned by regular mail. If returned by mail, the regional office may require arrangements for return shipping.
6. If the geologic assessment was completed before October 1, 2004 and the site contains “possibly sensitive” features, the assessment must be updated in accordance with the *Instructions to Geologists* (TCEQ-0585 Instructions).

### Technical Review

1. When an application is deemed administratively complete, the technical review period begins. The regional office will distribute copies of the application to the identified affected city, county, and groundwater conservation district whose jurisdiction includes the subject site. These entities and the public have 30 days to provide comments on the application to the regional office. All comments received are reviewed by TCEQ.
2. A site assessment is usually conducted as part of the technical review, to evaluate the geologic assessment and observe existing site conditions. The site must be accessible to our staff. The site boundaries should be

clearly marked, features identified in the geologic assessment should be flagged, roadways marked and the alignment of the Sewage Collection System and manholes should be staked at the time the application is submitted. If the site is not marked the application may be returned.

3. We evaluate the application for technical completeness and contact the applicant and agent via Notice of Deficiency (NOD) to request additional information and identify technical deficiencies. There are two deficiency response periods available to the applicant. There are 14 days to resolve deficiencies noted in the first NOD. If a second NOD is issued, there is an additional 14 days to resolve deficiencies. If the response to the second notice is not received, is incomplete or inadequate, or provides new information that is incomplete or inadequate, the application must be withdrawn or will be denied. Please note that because the technical review is underway, whether the application is withdrawn or denied **the application fee will be forfeited**.
4. The program has 90 calendar days to complete the technical review of the application. If the application is technically adequate, such that it complies with the Edwards Aquifer rules, and is protective of the Edwards Aquifer during and after construction, an approval letter will be issued. Construction or other regulated activity may not begin until an approval is issued.

### Mid-Review Modifications

It is important to have final site plans prior to beginning the permitting process with TCEQ to avoid delays.

Occasionally, circumstances arise where you may have significant design and/or site plan changes after your Edwards Aquifer application has been deemed administratively complete by TCEQ. This is considered a “Mid-Review Modification”. Mid-Review Modifications may require redistribution of an application that includes the proposed modifications for public comment.

If you are proposing a Mid-Review Modification, two options are available:

- If the technical review has begun your application can be denied/withdrawn, your fees will be forfeited, and the plan will have to be resubmitted.
- TCEQ can continue the technical review of the application as it was submitted, and a modification application can be submitted at a later time.

If the application is denied/withdrawn, the resubmitted application will be subject to the administrative and technical review processes and will be treated as a new application. The application will be redistributed to the affected jurisdictions.

Please contact the regional office if you have questions. If your project is located in Williamson, Travis, or Hays County, contact TCEQ’s Austin Regional Office at 512-339-2929. If your project is in Comal, Bexar, Medina, Uvalde, or Kinney County, contact TCEQ’s San Antonio Regional Office at 210-490-3096

Please fill out all required fields below and submit with your application.

<b>1. Regulated Entity Name:</b> Raw Water Intake Facility				<b>2. Regulated Entity No.:</b> RN 104348768			
<b>3. Customer Name:</b> Brushy Creek Municipal Utility District				<b>4. Customer No.:</b> CN 600646574			
<b>5. Project Type:</b> (Please circle/check one)	<input checked="" type="radio"/> New	Modification		Extension	Exception		
<b>6. Plan Type:</b> (Please circle/check one)	WPAP	CZP	SCS	UST	<input checked="" type="radio"/> AST	EXP	EXT
					Technical Clarification	Optional Enhanced Measures	
<b>7. Land Use:</b> (Please circle/check one)	Residential	<input checked="" type="radio"/> Non-residential			<b>8. Site (acres):</b>		<5 acres
<b>9. Application Fee:</b>	\$650	<b>10. Permanent BMP(s):</b>				Double Wall Secondary Containment Integral Base Fuel Tank for New Generator	

<b>11. SCS (Linear Ft.):</b>		<b>12. AST/UST (No. Tanks):</b>	One Fuel Tank for New Generator at Raw Water Intake Facility
<b>13. County:</b>	Williamson	<b>14. Watershed:</b>	Lake Georgetown State Waterbody ID: TX-1249-01

## Application Distribution

Instructions: Use the table below to determine the number of applications required. One original and one copy of the application, plus additional copies (as needed) for each affected incorporated city, county, and groundwater conservation district are required. Linear projects or large projects, which cross into multiple jurisdictions, can require additional copies. Refer to the “Texas Groundwater Conservation Districts within the EAPP Boundaries” map found at:

[http://www.tceq.texas.gov/assets/public/compliance/field\\_ops/eapp/EAPP%20GWCD%20map.pdf](http://www.tceq.texas.gov/assets/public/compliance/field_ops/eapp/EAPP%20GWCD%20map.pdf)

For more detailed boundaries, please contact the conservation district directly.

Austin Region			
County:	Hays	Travis	Williamson
Original (1 req.)	—	—	—
Region (1 req.)	—	—	—
County(ies)	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Barton Springs/ Edwards Aquifer <input type="checkbox"/> Hays Trinity <input type="checkbox"/> Plum Creek	<input type="checkbox"/> Barton Springs/ Edwards Aquifer	NA
City(ies) Jurisdiction	<input type="checkbox"/> Austin <input type="checkbox"/> Buda <input type="checkbox"/> Dripping Springs <input type="checkbox"/> Kyle <input type="checkbox"/> Mountain City <input type="checkbox"/> San Marcos <input type="checkbox"/> Wimberley <input type="checkbox"/> Woodcreek	<input type="checkbox"/> Austin <input type="checkbox"/> Bee Cave <input type="checkbox"/> Pflugerville <input type="checkbox"/> Rollingwood <input type="checkbox"/> Round Rock <input type="checkbox"/> Sunset Valley <input type="checkbox"/> West Lake Hills	<input type="checkbox"/> Austin <input type="checkbox"/> Cedar Park <input type="checkbox"/> Florence <input type="checkbox"/> Georgetown <input type="checkbox"/> Jerrell <input type="checkbox"/> Leander <input type="checkbox"/> Liberty Hill <input type="checkbox"/> Pflugerville <input type="checkbox"/> Round Rock

San Antonio Region					
County:	Bexar	Comal	Kinney	Medina	Uvalde
Original (1 req.)	—	—	—	—	—
Region (1 req.)	—	—	—	—	—
County(ies)	—	—	—	—	—
Groundwater Conservation District(s)	<input type="checkbox"/> Edwards Aquifer Authority <input type="checkbox"/> Trinity-Glen Rose	<input type="checkbox"/> Edwards Aquifer Authority	<input type="checkbox"/> Kinney	<input type="checkbox"/> EAA <input type="checkbox"/> Medina	<input type="checkbox"/> EAA <input type="checkbox"/> Uvalde
City(ies) Jurisdiction	<input type="checkbox"/> Castle Hills <input type="checkbox"/> Fair Oaks Ranch	<input type="checkbox"/> Bulverde <input type="checkbox"/> Fair Oaks Ranch <input type="checkbox"/> Garden Ridge	NA	<input type="checkbox"/> San Antonio ETJ (SAWS)	NA

	<input type="checkbox"/> Helotes <input type="checkbox"/> Hill Country Village <input type="checkbox"/> Hollywood Park <input type="checkbox"/> San Antonio (SAWS) <input type="checkbox"/> Shavano Park	<input type="checkbox"/> New Braunfels <input type="checkbox"/> Schertz			
--	--	--	--	--	--

I certify that to the best of my knowledge, that the application is complete and accurate. This application is hereby submitted to TCEQ for administrative review and technical review.	
Yue Sun	
Print Name of Customer/Authorized Agent	1/17/2024
Signature of Customer/Authorized Agent	Date

<b>**FOR TCEQ INTERNAL USE ONLY**</b>			
Date(s) Reviewed:		Date Administratively Complete:	
Received From:		Correct Number of Copies:	
Received By:		Distribution Date:	
EAPP File Number:		Complex:	
Admin. Review(s) (No.):		No. AR Rounds:	
Delinquent Fees (Y/N):		Review Time Spent:	
Lat./Long. Verified:		SOS Customer Verification:	
Agent Authorization Complete/Notarized (Y/N):		Fee Check:	Payable to TCEQ (Y/N):
Core Data Form Complete (Y/N):			Signed (Y/N):
Core Data Form Incomplete Nos.:			Less than 90 days old (Y/N):

# General Information Form

(TCEQ - 0587)

# General Information Form

## Texas Commission on Environmental Quality

For Regulated Activities on the Edwards Aquifer Recharge and Transition Zones and Relating to 30 TAC §213.4(b) & §213.5(b)(2)(A), (B) Effective June 1, 1999

***To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.***

***Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.***

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **General Information Form** is hereby submitted for TCEQ review. The application was prepared by:

Print Name of Customer/Agent: Yue Sun

Date: 12/12/2023

Signature of Customer/Agent:



## Project Information

1. Regulated Entity Name: Brushy Creek Municipal Utility District Water Treatment Plant Raw Water Intake Facility
2. County: Willimson
3. Stream Basin: Lake Georgetown
4. Groundwater Conservation District (If applicable): NA
5. Edwards Aquifer Zone:  
☒ Recharge Zone  
☐ Transition Zone
6. Plan Type:  

<input type="checkbox"/> WPAP	<input type="checkbox"/> Modification
<input type="checkbox"/> SCS	<input checked="" type="checkbox"/> AST

☐ UST

☐ Exception Request

7. Customer (Applicant):

Contact Person: Amy Giannini

Entity: Brushy Creek Municipal Utility District

Mailing Address: 16318 Great Oaks

City, State: Round Rock, TX

Zip: 78681

Telephone: 512-255-7871 x 237

FAX: \_\_\_\_\_

Email Address: A.Giannini@bcmud.org

8. Agent/Representative (If any):

Contact Person: Yue Sun

Entity: Ardurra Group, Inc

Mailing Address: 3115 Allen Parkway, Suite 300

City, State: Houston, TX

Zip: 77019

Telephone: 713-208-9463

FAX: \_\_\_\_\_

Email Address: ysun@ardurra.com

9. Project Location:

☒ The project site is located inside the city limits of Georgetown.

☐ The project site is located outside the city limits but inside the ETJ (extra-territorial jurisdiction) of \_\_\_\_\_.

☐ The project site is not located within any city's limits or ETJ.

10. ☒ The location of the project site is described below. The description provides sufficient detail and clarity so that the TCEQ's Regional staff can easily locate the project and site boundaries for a field investigation.

The address of the project site is 2040 Cedar Breaks Rd, Georgetown, TX 78628

11. ☒ **Attachment A – Road Map.** A road map showing directions to and the location of the project site is attached. The project location and site boundaries are clearly shown on the map.

12. ☒ **Attachment B - USGS / Edwards Recharge Zone Map.** A copy of the official 7 ½ minute USGS Quadrangle Map (Scale: 1" = 2000') of the Edwards Recharge Zone is attached. The map(s) clearly show:

☒ Project site boundaries.

☒ USGS Quadrangle Name(s).

☒ Boundaries of the Recharge Zone (and Transition Zone, if applicable).

☒ Drainage path from the project site to the boundary of the Recharge Zone.

13. ☒ **The TCEQ must be able to inspect the project site or the application will be returned.** Sufficient survey staking is provided on the project to allow TCEQ regional staff to locate the boundaries and alignment of the regulated activities and the geologic or manmade features noted in the Geologic Assessment.

**Reference to Attachment A - Road Map for the N/E coordinates of the generator and survey control points.**

☒ Survey staking will be completed by this date: 1/31/2024

14. ☒ **Attachment C – Project Description.** Attached at the end of this form is a detailed narrative description of the proposed project. The project description is consistent throughout the application and contains, at a minimum, the following details:

- ☒ Area of the site
- ☒ Offsite areas
- ☒ Impervious cover
- ☒ Permanent BMP(s)
- ☒ Proposed site use
- ☒ Site history
- ☒ Previous development
- ☒ Area(s) to be demolished

15. Existing project site conditions are noted below:

- ☒ Existing commercial site    **This is a Raw Water Intake Facility**
- ☐ Existing industrial site
- ☐ Existing residential site
- ☐ Existing paved and/or unpaved roads
- ☐ Undeveloped (Cleared)
- ☐ Undeveloped (Undisturbed/Uncleared)
- ☐ Other: \_\_\_\_\_

### ***Prohibited Activities***

16. ☒ I am aware that the following activities are prohibited on the Recharge Zone and are not proposed for this project:

- (1) Waste disposal wells regulated under 30 TAC Chapter 331 of this title (relating to Underground Injection Control);
- (2) New feedlot/concentrated animal feeding operations, as defined in 30 TAC §213.3;
- (3) Land disposal of Class I wastes, as defined in 30 TAC §335.1;
- (4) The use of sewage holding tanks as parts of organized collection systems; and
- (5) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41(b), (c), and (d) of this title (relating to Types of Municipal Solid Waste Facilities).
- (6) New municipal and industrial wastewater discharges into or adjacent to water in the state that would create additional pollutant loading.

17. ☐ I am aware that the following activities are prohibited on the Transition Zone and are not proposed for this project:

- (1) Waste disposal wells regulated under 30 TAC Chapter 331 (relating to Underground Injection Control);



- (2) Land disposal of Class I wastes, as defined in 30 TAC §335.1; and
- (3) New municipal solid waste landfill facilities required to meet and comply with Type I standards which are defined in §330.41 (b), (c), and (d) of this title.

## ***Administrative Information***

18. The fee for the plan(s) is based on:

- ☐ For a Water Pollution Abatement Plan or Modification, the total acreage of the site where regulated activities will occur.
- ☐ For an Organized Sewage Collection System Plan or Modification, the total linear footage of all collection system lines.
- ☒ For a UST Facility Plan or Modification or an AST Facility Plan or Modification, the total number of tanks or piping systems.
- ☐ A request for an exception to any substantive portion of the regulations related to the protection of water quality.
- ☐ A request for an extension to a previously approved plan.

19. ☒ Application fees are due and payable at the time the application is filed. If the correct fee is not submitted, the TCEQ is not required to consider the application until the correct fee is submitted. Both the fee and the Edwards Aquifer Fee Form have been sent to the Commission's:

- ☐ TCEQ cashier
- ☒ Austin Regional Office (for projects in Hays, Travis, and Williamson Counties)
- ☐ San Antonio Regional Office (for projects in Bexar, Comal, Kinney, Medina, and Uvalde Counties)

20. ☐ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office. **Electronic version has been submitted to the TCEQ FTP site. Further**

**instruction will be needed for the hard copy requirement**

21. ☒ No person shall commence any regulated activity until the Edwards Aquifer Protection Plan(s) for the activity has been filed with and approved by the Executive Director.

# General Information Form

(TCEQ - 0587)

Attachment A - Road Map





- GENERAL NOTES:
1. THERE ARE NO TREES LOCATED WITHIN THE LIMITS OF CONSTRUCTION.
  2. THE IMPERVIOUS AREA WILL INCREASE BY 55 SF. THE INCREASE OF STORMWATER RUNOFF IS NEGLIGIBLE.
  3. THE TOTAL AREA OF EARTH DISTURBANCE IS 196.40 SF.

CONSTRUCTION NOTES:

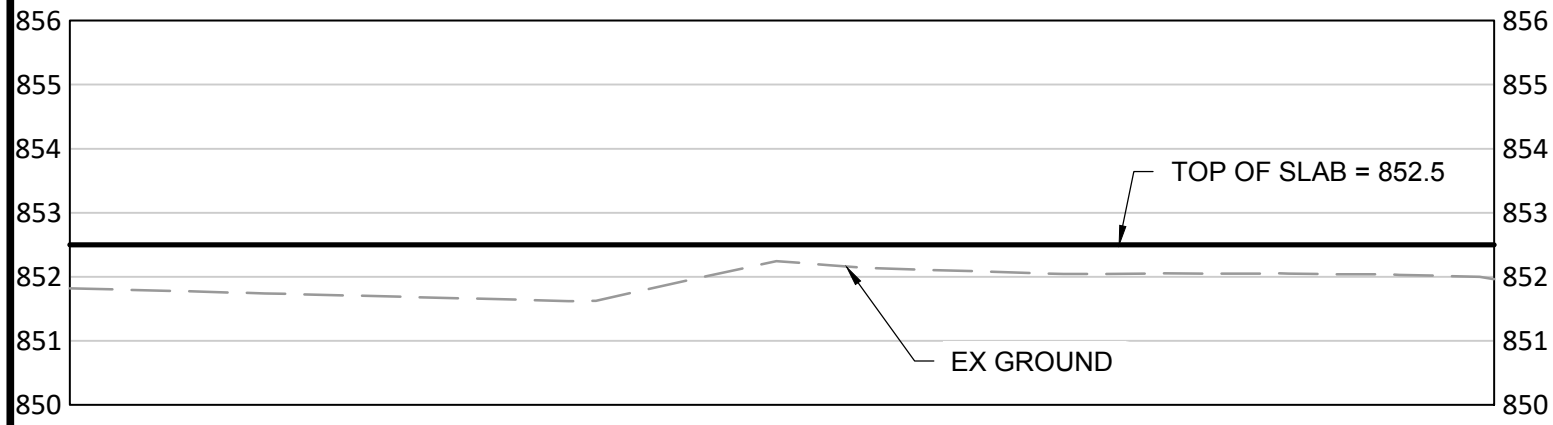
1. ALIGN WEST SIDE OF GENERATOR FOUNDATION WITH THE EXIST. BLDG WEST SIDE.
2. SAWCUT EXISTING PAVEMENT AS SHOWN PRIOR TO REMOVAL.
3. EXCAVATE HMAC AND ALL BROWN SILTY CLAY AND ANY ORGANIC MATERIAL WITHIN THE STRUCTURE FOOTPRINT AND AT LEAST 4' OUTSIDE THE FOOTPRINT.
4. SCARIFY THE EXCAVATED, PRE-FILL SUBGRADE AT LEAST 8" AND RECOMPACT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX-114-E. KEEP MOISTURE CONTENT WITHIN OPTIMUM TO +3 PERCENT OF OPTIMUM.
5. BACKFILL WITH CRUSHED LIMESTONE DERIVATIVE BASE MATERIAL (SELECT FILL) CONFORMING TO THE FOLLOWING:

RETAINED ON 2-1/2" SCREEN	0%
RETAINED ON 7/8" SCREEN	5% - 50%
RETAINED ON 3/8" SCREEN	25% - 65%
RETAINED ON No. 4 MESH	35% - 75%
RETAINED ON No. 40 MESH SIEVE	60% - 90%

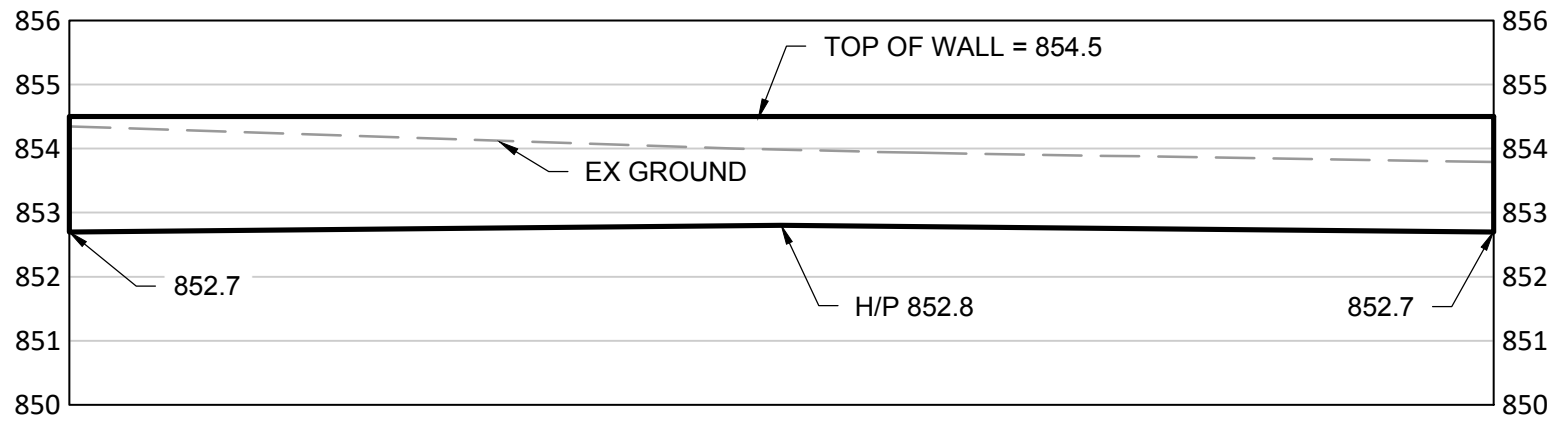
MATERIAL PASSING THE No. 40 SIEVE SHALL MEET THE FOLLOWING PLASTICITY REQUIREMENTS:

PASSING No. 40 SIEVE	MAXIMUM PLASTICITY INDEX	MINIMUM PLASTICITY INDEX
25% - 40%	15	3
10% - 25%	20	4

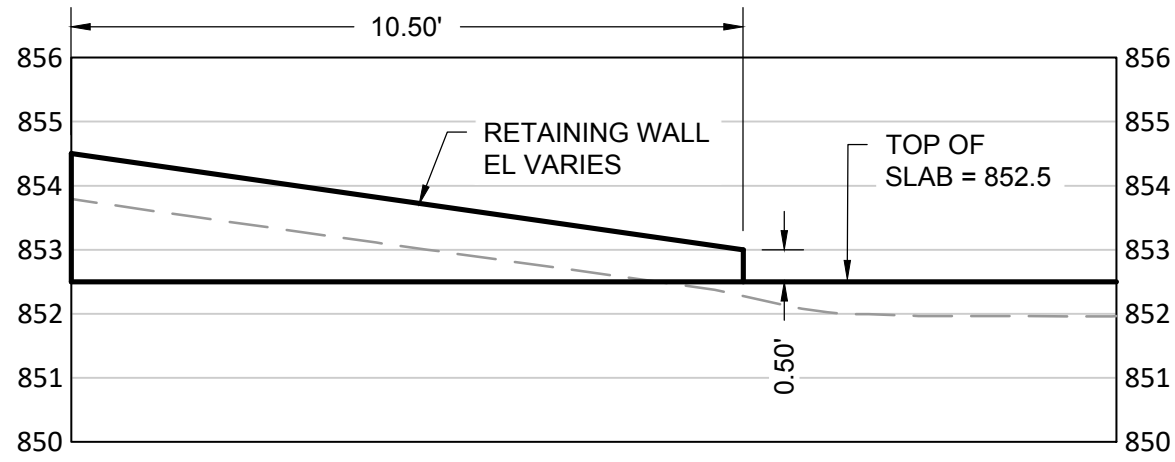
6. PLACE FILL MATERIAL IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACT TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX 113-E. MAINTAIN MOISTURE CONTENT WITHIN 2% OF OPTIMUM.
7. REMOVE HMAC AND EXCAVATED MATERIALS FROM PROJECT SITE AND DISPOSE OFFSITE PER SPECIFICATION SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
8. AFTER COMPLETION OF THE GENERATOR TESTING, REPAIR REMOVED HMAC. FURNISH AND INSTALL FULL DEPTH 6" TYPE "D" HMAC PER CITY OF GEORGETOWN STANDARD SPECIFICATION, SECTION S01 - HOT MIX CONCRETE PAVEMENT.
9. SLOPE NEW HMAC AWAY FROM NEW CONCRETE FOUNDATION.
10. RE-GRADE DISTURBED AREAS TO PROVIDE POSITIVE STORMWATER DRAINAGE AWAY FROM STRUCTURE AND RESTORE EXISTING VEGETATION AFTER COMPLETION OF ALL CONSTRUCTION WORK.



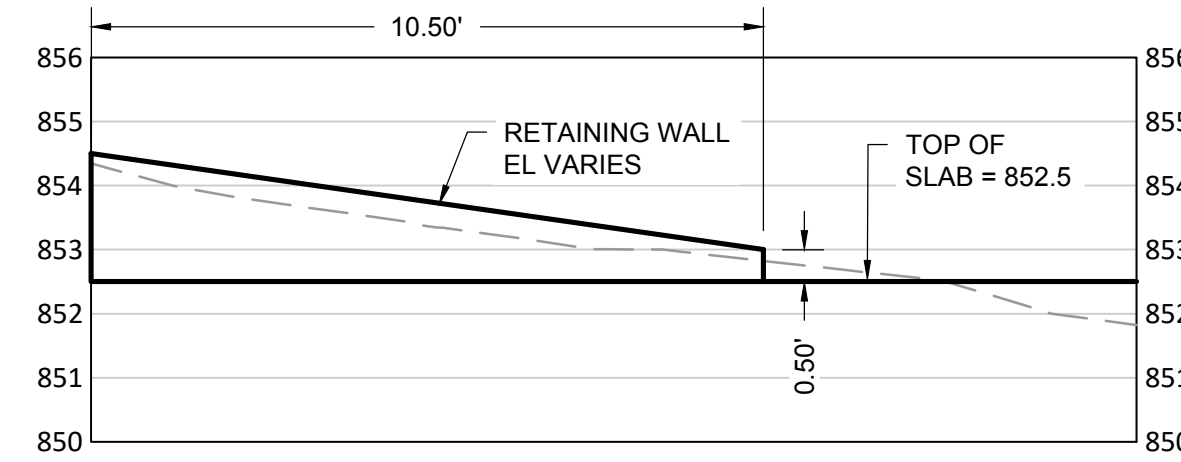
NORTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



SOUTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



EAST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



WEST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
CIVIL  
RAW WATER INTAKE  
SITE & DEMO PLAN - GENERATOR E-5 PAD - INTAKE SITE

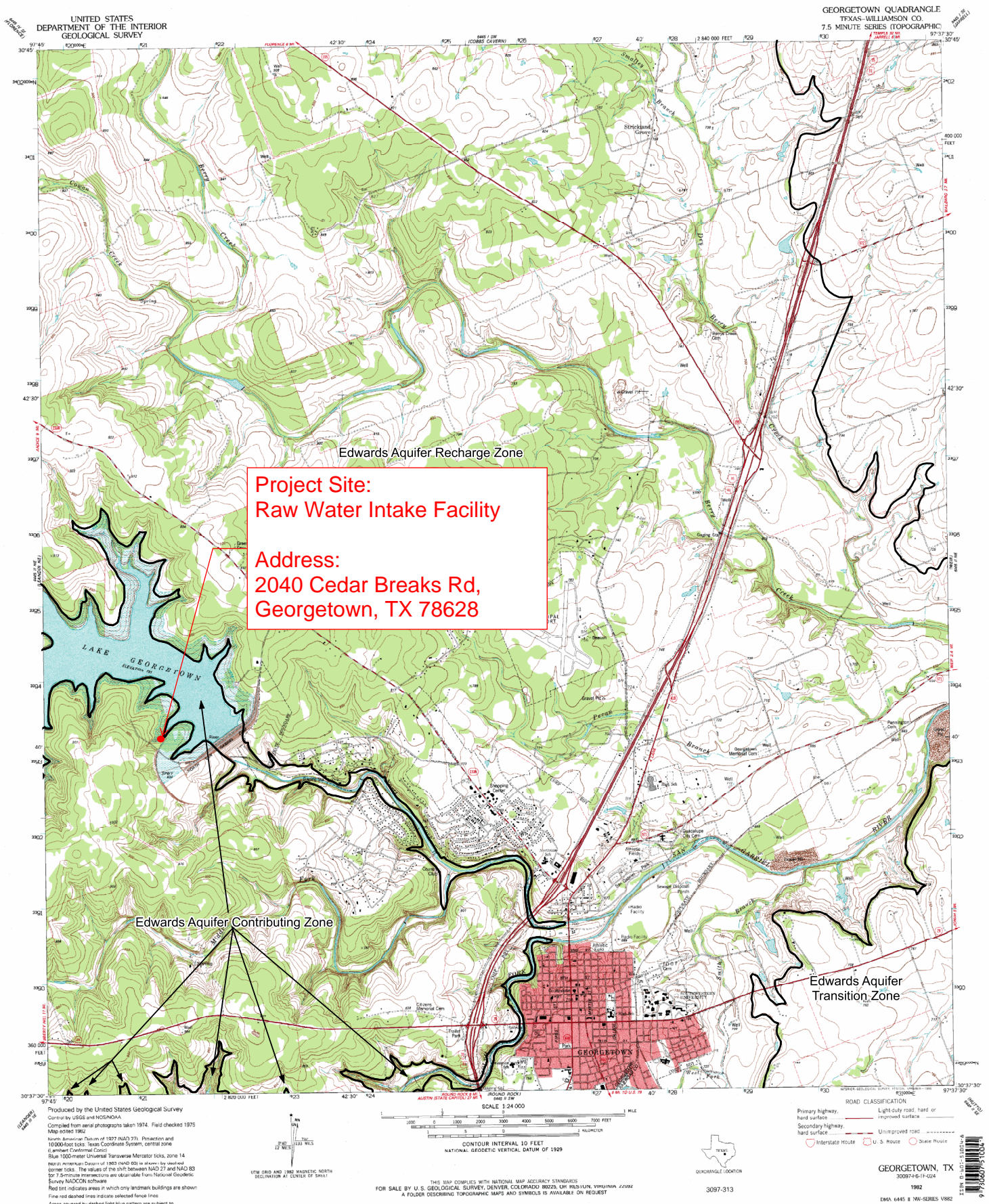
DESIGNED	J. LEVITT
DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN
Seq.	of XXX
Dwg. No.	C-3
2023-0002-00	



# General Information Form

(TCEQ - 0587)

Attachment B - USGS/Edwards  
Recharge Zone Map

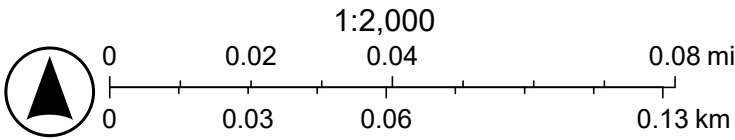




# Edwards Recharge Zone Map



12/13/2023  
Edwards Aquifer  
Edwards Aquifer Contributing Zone  
Edwards Aquifer Recharge Zone



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



# Raw Water Intake Facility Map



12/14/2023

Edwards Aquifer

Edwards Aquifer Contributing Zone

Edwards Aquifer Recharge Zone

00.040.070.15 mi

00.050.10.2 km

1:4,000

Williamson County TX, Maxar



# General Information Form

(TCEQ - 0587)

Attachment C - Project Description





## Attachment C – Project Description

December 15, 2023

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

**Subject:** Brushy Creek Municipal Utility District (PWS No.2460061)  
Winterization and Electrical Improvements  
**Project Description**  
Ardurra Project No.: 2023-0002-00

To whom it may concern:

Ardurra Group, Inc has prepared design drawings and specifications for the Brushy Creek Municipal Utility District (BCMUD) Winterization and Electrical Improvements project. The purpose of this letter is to describe general information of this project and provide a project description for TCEQ Above Storage Tank Facility Review. The proposed aboveground generator fuel storage tank will be located at BCMUD Water Treatment Plant Raw Water Intake Facility. The address is 2040 Cedar Breaks Rd, Georgetown, TX 78628. Facility ID is No.S2460061A.

### Project Background

The Raw Water Intake Facility was constructed in 2006, consisting of a raw water intake and pump station, an electrical building and a copper ion generator building. The land is owned by the U.S. Army Corps of Engineer, 60-percent of the area is impervious cover. The impervious covers are concrete pavement, gravel roads, pump stations and concrete buildings. The facility takes water sources from Lake of Georgetown and transfers water to the Water Treatment Plan located at 2300 Great Oaks Drive, Round Rock, TX 78681 (Facility ID: TP16772) for further treatment.

The project improvements specifically related to the BCMUD Raw Water Intake Site Facility include the following:

1. Installation of a Backup Power Generator at Raw Water Intake Facility.
2. Motor control center improvements at the Raw Water Intake Facility.

All proposed improvements are on the developed site inside the existing fence line. The project site has No major site or ground improvements will take place. No site demolition or structure demolition will occur. The proposed generator fuel tank will be a double wall secondary containment type, UL 208 rated, integral/subbase fuel storage tank installed on a concrete pad. Any spills or leakages will be collected inside the double wall secondary containment. The proposed location of the generator will be at the backside of the electrical building. We do not anticipate any impacts on environment and natural and culture resources.



## Attachment C – Project Description

The following drawings will be of particular interest to TCEQ:

C-1	Topographic Survey
C-3	Existing and Proposed Site Plan
E-3	Intake Site Overview
E-4	Intake One Line
E-5	Intake Generator Site Plan
E-6	Intake Panel and Conduit Cable Schedules
I-4	Intake Generator Process and Instrumentation Diagram

The proposed new generator improvements are funded via American Rescue Plan Act (ARPA) fund and BCMUD is required to enter a construction contract no later than December 2024. Therefore, we would appreciate if you could expedite review of this application.

Upon your review, we will incorporate any necessary changes to the bid documents. Should you have any questions or need further information, please contact me at 713-208-9463, or by email [ysun@ardurra.com](mailto:ysun@ardurra.com).

Yours truly,

Yue Sun, P.E., BCEE

Project Director

TBPE Firm Registration No F-10053

December 15, 2023

cc: Amy Giannini, Brushy Creek Municipal Utility District (without attachments)

### Attachments

- A. 22" x 34" drawings
- B. Project Specifications.

# Geologic Assessment

(TCEQ - 0585)

# Geologic Assessment

## Texas Commission on Environmental Quality

For Regulated Activities on The Edwards Aquifer Recharge/transition Zones and Relating to 30 TAC §213.5(b)(3), Effective June 1, 1999

*To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.*

*Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.*

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

Print Name of Geologist: Robert S. Kier

Telephone: 512-461-5099

Date: 02/02/24

Fax: \_\_\_\_\_

Representing: Robert S. Kier Consulting, TBP 196 (Name of Company and TBP or TBPE registration number)

Signature of Geologist:



1/7/24

Regulated Entity Name: Brushy Creek Water Intake

## Project Information

1. Date(s) Geologic Assessment was performed: 01/12/2024

2. Type of Project:

- ☐ WPAP  
☐ SCS

- ☐ AST  
☐ UST

3. Location of Project:

- ☒ Recharge Zone  
☐ Transition Zone  
☐ Contributing Zone within the Transition Zone

4. ☒ **Attachment A - Geologic Assessment Table.** Completed Geologic Assessment Table (Form TCEQ-0585-Table) is attached.
5. ☒ Soil cover on the project site is summarized in the table below and uses the SCS Hydrologic Soil Groups\* (Urban Hydrology for Small Watersheds, Technical Release No. 55, Appendix A, Soil Conservation Service, 1986). If there is more than one soil type on the project site, show each soil type on the site Geologic Map or a separate soils map.

**Table 1 - Soil Units, Infiltration Characteristics and Thickness**

Soil Name	Group*	Thickness(feet)
Eckrant-Rock Association, 1-10% slopes	D	0-80 inches: bedrock

*\* Soil Group Definitions (Abbreviated)*

- A. Soils having a high infiltration rate when thoroughly wetted.
- B. Soils having a moderate infiltration rate when thoroughly wetted.
- C. Soils having a slow infiltration rate when thoroughly wetted.
- D. Soils having a very slow infiltration rate when thoroughly wetted.

6. ☒ **Attachment B – Stratigraphic Column.** A stratigraphic column showing formations, members, and thicknesses is attached. The outcropping unit, if present, should be at the top of the stratigraphic column. Otherwise, the uppermost unit should be at the top of the stratigraphic column.
7. ☒ **Attachment C – Site Geology.** A narrative description of the site specific geology including any features identified in the Geologic Assessment Table, a discussion of the potential for fluid movement to the Edwards Aquifer, stratigraphy, structure(s), and karst characteristics is attached.
8. ☒ **Attachment D – Site Geologic Map(s).** The Site Geologic Map must be the same scale as the applicant's Site Plan. The minimum scale is 1": 400'  
 Applicant's Site Plan Scale: 1" = \_\_\_\_\_'  
 Site Geologic Map Scale: 1" = 400'  
 Site Soils Map Scale (if more than 1 soil type): 1" = n/a'
9. Method of collecting positional data:
  - ☒ Global Positioning System (GPS) technology.
  - ☐ Other method(s). Please describe method of data collection: \_\_\_\_\_
10. ☒ The project site and boundaries are clearly shown and labeled on the Site Geologic Map.
11. ☒ Surface geologic units are shown and labeled on the Site Geologic Map.

12. ☐ Geologic or manmade features were discovered on the project site during the field investigation. They are shown and labeled on the Site Geologic Map and are described in the attached Geologic Assessment Table.
- ☒ Geologic or manmade features were not discovered on the project site during the field investigation.
13. ☒ The Recharge Zone boundary is shown and labeled, if appropriate.
14. All known wells (test holes, water, oil, unplugged, capped and/or abandoned, etc.): If applicable, the information must agree with Item No. 20 of the WPAP Application Section.
- ☐ There are \_\_\_\_\_ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply.)
- ☐ The wells are not in use and have been properly abandoned.
- ☐ The wells are not in use and will be properly abandoned.
- ☐ The wells are in use and comply with 16 TAC Chapter 76.
- ☒ There are no wells or test holes of any kind known to exist on the project site.

### ***Administrative Information***

15. ☒ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office.

# Geologic Assessment

(TCEQ - 0585)

Attachment A - Geologic  
Assessment Table

* DATUM:			8A INFILLING	
2A TYPE	TYPE	2B POINTS	N	None, exposed bedrock
C	Cave	30	C	Coarse - cobbles, breakdown, sand, gravel
SC	Solution cavity	20	O	Loose or soft mud or soil, organics, leaves, sticks, dark colors
SF	Solution-enlarged fracture(s)	20	F	Fines, compacted clay-rich sediment, soil profile, gray or red colors
F	Fault	20	V	Vegetation. Give details in narrative description
O	Other natural bedrock features	5	FS	Flowstone, cements, cave deposits
MB	Manmade feature in bedrock	30	X	Other materials
SW	Swallow hole	30		
SH	Sinkhole	20		
CD	Non-karst closed depression	5		
Z	Zone, clustered or aligned features	30		

My signature certifies that I am qualified as a geologist as defined by 30 TAC Chapter 213.

2/7/24

Sheet 1 of 1

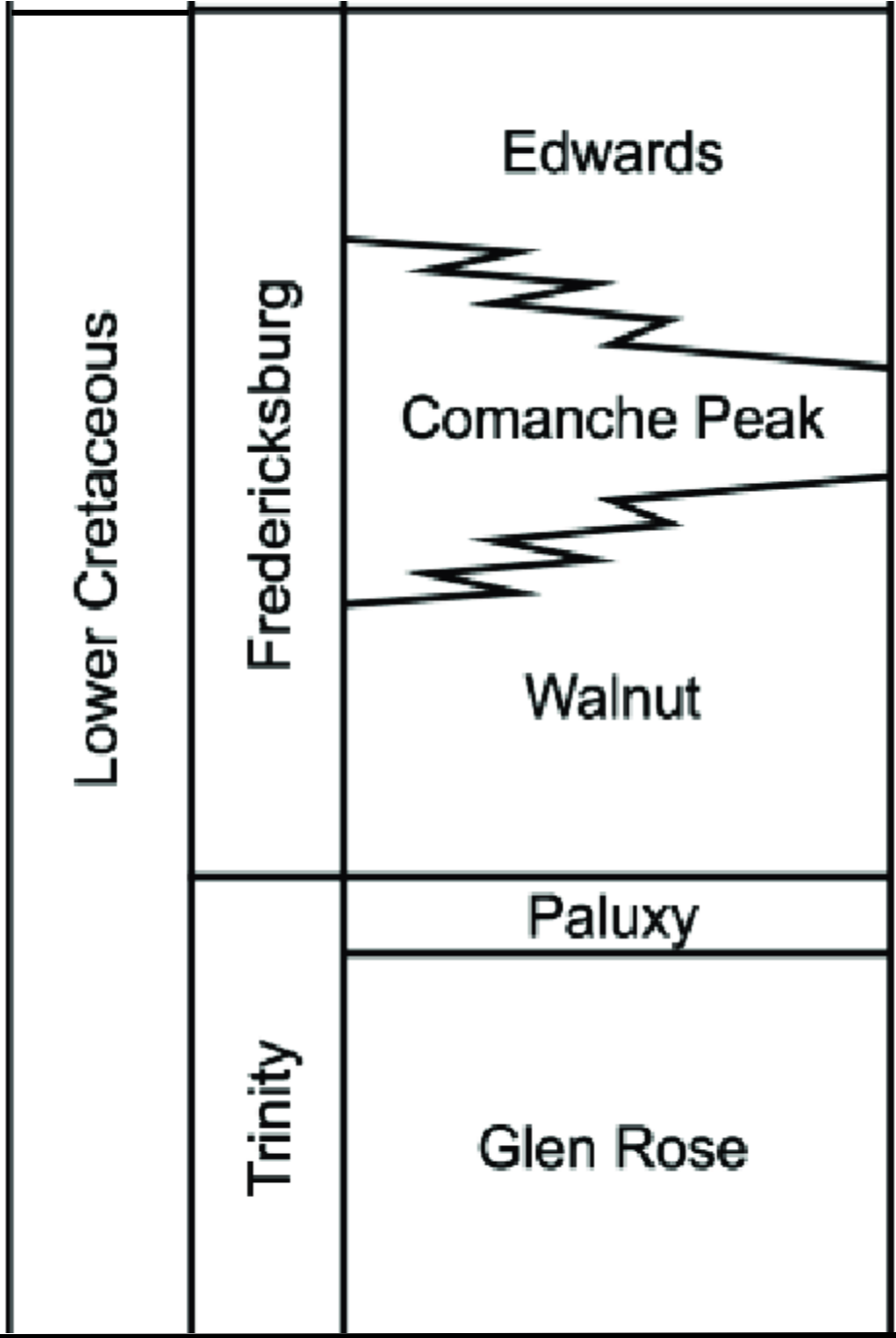


# Geologic Assessment

(TCEQ - 0585)

Attachment B - Stratigraphic  
Column

Attachment B: BCMUD Raw Water Intake Site Stratigraphic Column



BCMUD: approximately 40 ft of Edwards LS at site; underlain by the Comanche Peak FM.

# Geologic Assessment

(TCEQ - 0585)

Attachment C - Site Geology

## **Attachment C: Geologic Assessment, BCMUD Raw Water Intake**

Dr. Robert S. Kier, PG, and Ms. Katie Kaighin, PG, visited the site of the proposed Brushy Creek Municipal Utility District (BCMUD) Raw Water Intake Construction Area on January 12, 2024, to perform the field investigation for the required Geologic Assessment, 30 TAC §213.5. The site is located on the south side of Lake Georgetown in Williamson County adjacent to the Lake Georgetown dam. Attachment D identifies the proposed new construction area (red square). Cedar Breaks Road, which leads to the Lake Georgetown dam, is immediately south of the site.

The BCMUD site, including the entire BCMUD Raw Water Intake site, is on the lower part of the Edwards Formation. Forty to fifty feet of the Edwards Formation underlies the site. Subdivision of the Edwards Group encompassing two or more formations has not been performed. Based on available geologic mapping the Comanche Peak Formation underlies the Edwards at the site (Attachment D); however, the thickness of the Comanche Peak Formation cannot be ascertained. There are no dominant structural trends or faults within the immediate area of the area of the site.

The BCMUD site is located on a bluff ridge and slopes generally to the north. The area to the east of the existing facility and between the existing facility and Cedar Breaks Road is densely covered by what is most commonly known as cedar.

The entire area of the BCMUD is underlain by soil that is a part of the Eckrant-Rock outcrop association, 1 to 10 percent slopes. Eckrant soils form ridges and their parent soils are from weathered limestone (in this case, Edwards Limestone). Typical soil profile from 0 to 4 inches is very cobbly clay, from 4 to 11 inches is extremely cobbly clay, and from 11 to 80 inches is bedrock. Typical slope is 1 to 10 percent and the surface area is covered with cobbles, stones or boulders. This description is consistent with observations at the site. Eckrant-Rock soils are part of hydrologic soil group D which is defined as soils that have a very low infiltration rate when thoroughly wetted.

Based on the records at the Texas Commission of Environmental Quality and the Texas Railroad Commission, no known water or oil and gas wells have been drilled at the facility, and none were apparent based on the site inspection.

The entire site was walked systematically in spaced transects 5-10 feet apart. No recharge features, natural or manmade, were observed at the site. It is noted that the area of observation is quite small in size, less than 200 square feet, so additional observations were taken from immediately outside the area of interest. The road cut associated with Cedar Breaks Road to the south of the facility provides the best depiction of the geology and hydrogeology underlying the site. Previous solution-collapse features observed on the north side of the road cut, perhaps more recent, had been subsequently refilled with rubble and cemented by precipitation of calcium carbonate (limestone) providing no preferred flow path. No vugular limestone was observed in the Cedar Breaks Road cut. No fractures were observed in the Cedar Breaks Road cut or in the area of interest.

Although the site is located on the outcrop of the Edwards Aquifer and subsequently the recharge zone for the Edwards Aquifer, there are no features observed through which recharge would be enhanced. These observations, or lack thereof, are captured in Attachment A, the Geologic Assessment Table.

# Geologic Assessment

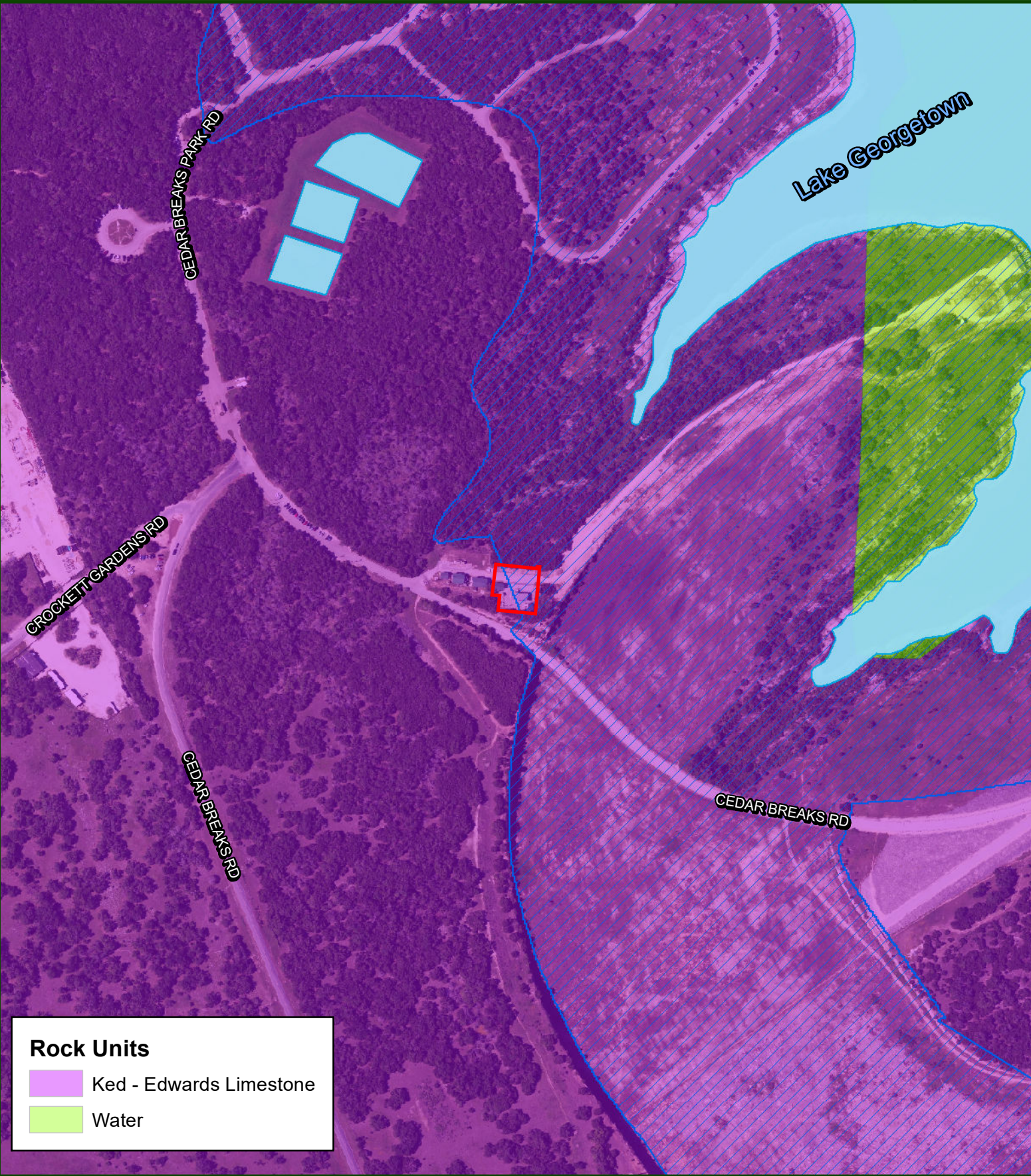
(TCEQ - 0585)

Attachment D - Site Geologic  
Map







Brushy Creek MUD  
Williamson County



**Rock Units**

-  Ked - Edwards Limestone
-  Water



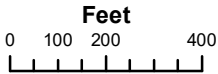
Extent



Reservoir



100 Year Flood Zones





# Aboveground Storage Tank Facility Plan

(TCEQ - 0575)



# Aboveground Storage Tank Facility Plan Application

## Texas Commission on Environmental Quality

For Permanent Storage on The Edwards Aquifer Recharge and Transition Zones And Relating to 30 TAC §213.5(e), Effective June 1, 1999

*To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.*

*Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.*

## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Aboveground Storage Tank Facility Plan Application** is hereby submitted for TCEQ review and Executive Director approval. The application was prepared by:

Print Name of Customer/Agent: Yue Sun

Date: 12/15/2023

Signature of Customer/Agent:



Regulated Entity Name: Brushy Creek Municipal Utility District Water Treatment Plant Raw Water Intake Facility

## Aboveground Storage Tank (AST) Facility Information

1. Tanks and substance stored:

**Table 1 - Tank and Substance Storage**

<i>AST Number</i>	<i>Size (Gallons)</i>	<i>Substance to be Stored</i>	<i>Tank Material</i>
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<i>AST Number</i>	<i>Size (Gallons)</i>	<i>Substance to be Stored</i>	<i>Tank Material</i>
1	1,367	Diesel Fuel	Double Wall Secondary Containment Type Integral Base Corrosion Resistant Steel Fuel Sstorgae Tank, UL-2085
2			
3			
4			
5			

**Total x 1.5 = 2050.5 Gallons**

2. ☐ The AST will be placed within a containment structure that is sized to capture one and one-half (1 1/2) times the storage capacity of the system. For facilities with more than one tank system, the containment structure is sized to capture one and one-half (1 1/2) times the cumulative storage capacity of all systems.

☒ **Attachment A - Alternative Methods of Secondary Containment.** Alternative methods for providing secondary containment are proposed. Specifications that show equivalent protection for the Edwards Aquifer are attached.

The proposed tank is a double wall secondary containment type integral/sub base fuel storage tank UL-2085.  
The tank material is corrosion resistant carbon steel. See details in Specification 26 32 13.13

3. Inside dimensions and capacity of containment structure(s):

**Table 2 - Secondary Containment**

<i>Length (L) (Ft.)</i>	<i>Width (W) (Ft.)</i>	<i>Height (H) (Ft.)</i>	<i>L x W x H = (Ft3)</i>	<i>Gallons</i>

**Total: \_\_\_\_\_ Gallons**

4. ☐ All piping, hoses, and dispensers will be located inside the containment structure.
- ☐ Some of the piping to dispensers or equipment will extend outside the containment structure.
- ☐ The piping will be aboveground
- ☐ The piping will be underground

All fuel piping connections are integral to generator

5. ☒ The containment area must be constructed of and in a material impervious to the substance(s) being stored. The proposed containment structure will be constructed of double wall fuel tank material is corrosion resistant carbon steel.
6. ☐ **Attachment B - Scaled Drawing(s) of Containment Structure.** A scaled drawing of the containment structure that shows the following is attached:
- ☐ Interior dimensions (length, width, depth and wall and floor thickness).
  - ☐ Internal drainage to a point convenient for the collection of any spillage.
  - ☐ Tanks clearly labeled.
  - ☐ Piping clearly labeled.
  - ☐ Dispenser clearly labeled.
- No containment structure is proposed for this application. The proposed tank is a double wall secondary containment type integral/sub base fuel storage tank. See details in Specification 26 32 13.13 and Drawing C-3.

## **Site Plan Requirements**

**Items 7 - 18 must be included on the Site Plan.**

7. ☒ The Site Plan must have a minimum scale of 1" = 400'.  
Site Plan Scale: 1" = 20'.
8. 100-year floodplain boundaries:
- ☐ Some part(s) of the project site is located within the 100-year floodplain. The floodplain is shown and labeled.
  - ☒ No part of the project site is located within the 100-year floodplain.
  - ☐ The 100-year floodplain boundaries are based on the following specific (including date of material) sources(s): \_\_\_\_\_.
9. ☒ The layout of the development is shown with existing and finished contours at appropriate, but not greater than ten-foot contour intervals. Show lots, recreation centers, buildings, roads, etc.
- ☐ The layout of the development is shown with existing contours. Finished topographic contours will not differ from the existing topographic configuration and are not shown.
10. All known wells (oil, water, unplugged, capped and/or abandoned, test holes, etc.):
- ☐ There are \_\_\_\_\_ (#) wells present on the project site and the locations are shown and labeled. (Check all of the following that apply):
    - ☐ The wells are not in use and have been properly abandoned.
    - ☐ The wells are not in use and will be properly abandoned.
    - ☐ The wells are in use and comply with 16 TAC § 76.
  - ☒ There are no wells or test holes of any kind known to exist on the project site.
11. Geologic or manmade features which are on the site:
- ☐ All sensitive geologic or manmade features identified in the Geologic Assessment are shown and labeled.

- ☐ No sensitive geologic or manmade features were identified in the Geologic Assessment.
- ☐ **Attachment C - Exception to the Geologic Assessment.** A request and justification for an exception to a portion of the Geologic Assessment is attached.  
*Geologic Assessment is processing.*
12. ☒ The drainage patterns and approximate slopes anticipated after major grading activities.  
*The drainage and slope shall stay as is. More details are included in Drawing C-3.*
13. ☒ Areas of soil disturbance and areas which will not be disturbed.  
*More details are included in Drawing C-3.*
14. ☒ Locations of major structural and nonstructural controls. These are the temporary and permanent best management practices.  
*More details are included in Drawing C-3.*
15. ☒ Locations where soil stabilization practices are expected to occur.  
*More details are included in Drawing C-3.*
16. ☐ Surface waters (including wetlands).  
☒ N/A
17. ☐ Locations where stormwater discharges to surface water or sensitive features.  
☒ There will be no discharges to surface water or sensitive features.  
*More details are included in Drawing C-3.*
18. ☒ Legal boundaries of the site are shown.  
*More details are included in Drawing C-3.*

### ***Best Management Practices***

19. ☐ Any spills must be directed to a point convenient for collection and recovery. Spills from storage tank facilities must be removed from the controlled drainage area for disposal within 24 hours of the spill. *N/A*
- ☐ In the event of a spill, any spillage will be removed from the containment structure within 24 hours of the spill and disposed of properly.
- ☐ In the event of a spill, any spillage will be drained from the containment structure through a drain and valve within 24 hours of the spill and disposed of properly. The drain and valve system are shown in detail on the scaled drawing.
20. ☐ All stormwater accumulating inside the containment structure will be disposed of through an authorized waste disposal contractor. *N/A*
- ☐ Containment area will be covered by a roof.
- ☐ Containment area will not be covered by a roof.
- ☐ A description of the alternate method of stormwater disposal is submitted for the executive director's review and approval and is attached. *N/A*
21. ☒ **Attachment D - Spill and Overfill Control.** A site-specific description of the methods to be used at the facility for spill and overfill control is attached.

22. ☒ **Attachment E - Response Actions to Spills.** A site-specific description of the planned response actions to spills that will take place at the facility is attached.

### ***Administrative Information***

23. A Water Pollution Abatement Plan (WPAP) is required for construction of any associated commercial, industrial or residential project located on the Recharge Zone.

- ☐ The WPAP application for this project was approved by letter dated \_\_\_\_\_. A copy of the approval letter is attached at the end of this application.
- ☐ The WPAP application for this project was submitted to the TCEQ on \_\_\_\_\_, but has not been approved.
- ☐ A WPAP application is required for an associated project, but it has not been submitted.
- ☐ There will be no building or structure associated with this project. In the event a building or structure is needed in the future, the required WPAP will be submitted to the TCEQ.
- ☐ The proposed AST is located on the Transition Zone and a WPAP is not required. Information requested in 30 TAC 213.5 subsection (b) (4)(B) and (C) and (5) is provided with this application. (Forms TCEQ-0600 Permanent Stormwater Section and TCEQ-0602 Temporary Stormwater Section or Stormwater Pollution Prevention Plan/SW3P).

24. ☒ This facility is subject to the requirements for the reporting and cleanup of surface spills and overfills pursuant to 30 TAC 334 Subchapter D relating to Release Reporting and Corrective Action.

25. ☐ Submit one (1) original and one (1) copy of the application, plus additional copies as needed for each affected incorporated city, groundwater conservation district, and county in which the project will be located. The TCEQ will distribute the additional copies to these jurisdictions. The copies must be submitted to the appropriate regional office. **The AST Facility Plan submittal is submitted to the TCEQ FTP site. An email is sent to [EAPP@tceq.texas.gov](mailto:EAPP@tceq.texas.gov) per request.**

26. ☒ Any modification of this AST Facility Plan application will require executive director approval, prior to construction, and may require submission of a revised application, with appropriate fees.

# Aboveground Storage Tank Facility Plan

(TCEQ - 0575)

Attachment A - Spill and Overfill  
Control, Specification 26 32  
13.13

SECTION 26 32 13.13  
DIESEL ENGINE DRIVEN GENERATOR SETS

PART 1 GENERAL TECHNICAL REQUIREMENTS

1.01 COMPOSITION

- A. The Diesel Generator Units (GENSET) shall consist of the following:
- Diesel Generator Set
  - Integral/Subbase Fuel Tank
  - Exhaust System
  - Outdoor Weather Protective and Sound Attenuating (where indicated) Enclosure
- B. The GENSET shall be supplied as a complete pre-integrated and pre-assembled unit.

1.02 MANUFACTURE

- A. The GENSET shall be internationally reputed make. GENSET shall be supplied from original suppliers and locally assembled units are not acceptable.

1.03 SERVICE CONDITIONS

- A. The GENSET shall be designed to be operated at following worse case conditions:

Altitude	Up to 300 meters above sea-level
Maximum outdoor	+45° C
Maximum outdoor daily average	+30° C
Minimum outdoor	-10° C
Highest one day variation	+25° C
Relative Humidity: Maximum Minimum	100%/25%

1.04 SYSTEM CONDITIONS

- A. The GENSET sets shall be designed to be operated under following system parameters:

Nominal System Voltage	480 V / 277 V
Highest System Voltage	528 V / 306 V
Number of Phases	3 ph, 4 wire
Frequency	60Hz
Neutral Point	Solidly Earthed

## PART 2 PARTICULAR TECHNICAL REQUIREMENTS

### 2.01 STANDARDS

- A. The GENSET shall be designed, manufactured, and tested in compliance with the latest versions of the following standards:
  - 1. IEC 60034 Rotating Electrical Machines
  - 2. IEC 60085 Thermal Evaluation and Classification of Electrical Insulation
  - 3. IEC 60529 Degrees of Protection provided by Enclosures (IP Code)
  - 4. ISO 10816 Specification for Mechanical Performance Vibration
  - 5. ISO 3046 Specification for Reciprocating Internal Combustion Engines
  - 6. ISO 9000 Quality Assurance

### 2.02 RATINGS

- A. The GENSET shall be rated for: 480 V AC, 3 phase, 60 Hz.
- B. Required rated emergency standby capacities (kW) at an outdoor operating temperature of 40 deg is as indicated on drawings with a .85 power factor.

### 2.03 PERFORMANCE

- A. The GENSET sets shall be capable of delivering rated kVA indicated under 2.02 B emergency standby service conditions.
- B. Voltage regulation:  $\pm 0.5\%$
- C. Frequency regulation: Random frequency variation with any steady load from no load to full load shall not exceed  $\pm 0.25\%$ .

### 2.04 DIESEL ENGINE

- A. The diesel engine shall comply with the specified International IEC Standards or an equivalent international standard and shall be of the four-stroke, multi-cylinder, water-cooled, cold start, direct fuel injection, compression ignition, and preferably turbo-charged type. The crankshaft speed shall not exceed 1800 RPM.
  - 1. Speed Governor - The diesel engine shall be fitted with a speed governor capable of accuracy to Class A2 of ISO 3046/IV. The governor is to be fitted with speed control facilities to enable the engine speed to be adjusted from the local control panel.
  - 2. Shutdown System - The engine shall be fitted with a mechanically operated device which will shut off the fuel supply to engine when any of the specified alarm conditions occur.



3. Cooling System - The cooling system shall be filled with chemically treated water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact in accordance with standard requirements.
- B. A vertical fan cooled sectional radiator, rated for the tropical site conditions shall be mounted at the end of the combined under base and driven from the diesel engine. The radiator shall be arranged to cool the engine jacket water and lubricating oil. The radiator must be generously sized to permit operation at full load and overload in the specified ambient conditions. The radiator shall be integral with the generating set. The radiator shall be provided complete with fan claw and guards.
1. Pumps - Cooling water, lubricating and fuel oil pressurizing pumps shall be provided and mounted on the engine and shall be gear driven from the crankshaft.
  2. Lubrication - Lubrication shall be by means of an engine-driven gear pump and the system shall include full flow oil filters with replaceable elements.
  3. Safety Guards - All moving parts shall be adequately guarded, in order to prevent danger to personnel.
  4. Fuel - The engine shall be designed for operation on diesel fuel.
  5. Lubricating and Fuel Oil Filters - The lubricating and fuel oil filters shall be of the fuel flow type.
  6. Air Filters - Air filters shall be suitable for use in the environmental conditions which are likely to arise locally and the service conditions described in Part 1.
  7. Starting System - The set shall be supplied with a completely self-contained starting system consisting of an engine driven dynamo, a lead acid battery and battery charger.
- C. The starting system shall be designed such that at engine speeds in excess of the minimum firing speed it shall be impossible to complete the starting circuit. The starting system shall preclude excessive consecutive starting attempts.
1. Exhaust System - The engine shall be efficiently silenced and be complete with primary and terminal silencer arrangements.

## 2.05 ALTERNATOR

- A. The alternator shall be synchronous, four pole and brushless excitation type and shall comply with the relevant requirements of Specification IEC 60034 or an equivalent international standard.
- B. The alternator shall be designed for operation of 10% engine overload at any power factor between unity and rated power factor for a maximum period of one hour in any 12 hour period as permitted by ISO 3046/II.

- C. The alternator shall be rated for IP-23 protection. The insulation of the winding shall be class H. All winding shall be tropicalized and suitably impregnated to withstand the site ambient conditions.
- D. The alternator shall be complete with all necessary cooling fans, excitation and voltage regulating equipment. The alternator shall be capable of maintaining its continuous maximum rated output when operating within + 5% of rated voltage and at rated power factor.
- E. The alternator shall be brushless rotating field, self-exciting and self-regulating type complete with permanent magnets and fully connected damper windings. The stator winding shall be star-connected and shall be brought out together with the neutral point to terminals located in a sheet steel box mounted on top of the generator to facilitate connection of a power cable of suitable capacity.
- F. The following protection shall be provided for the alternator:
  - 1. Over Current Protection
  - 2. Earth Fault Protection

## 2.06 MOUNTING

- A. Complete unit to be mounted on robust skid frame. Vibration mountings to be used where required.
- B. Skid frame to be dimensioned to accommodate generator/alternator assembly, all accessories, soundproof canopy. Skid frame to be of rigid construction suitable for locating on level ground surfaces ranging from compacted earth, crushed rock or a concrete pad.

## 2.07 FUEL TANKS

- A. Built-in Fuel Tank: A minimum capacity of not less than 24 hours full running time built in fuel tank shall be provided. Design shall be capable of preventing accidental spilling of fuel and hand pump feeding on emergencies is possible.
- B. Tank Construction
  - 1. Provide a double wall secondary containment type integral/sub base fuel storage tank. The tank shall be constructed of corrosion resistant steel and shall be type UL listed (UL-2085, UL-142) as indicated per location on drawings and shall include the following features:
  - 2. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure.
  - 3. Windows for bottom entry electrical stub up(s)
  - 4. Normal & emergency vents
  - 5. Lockable fuel fill

6. Mechanical fuel level gauge
7. Low level switches to indicate fuel level
8. Leak detector switch - Rupture switch
9. Tank shall include a welded steel containment basin to prevent escape of fuel into the environment in the event of a tank rupture. For UL 142 listed tanks size of the containment shall be a minimum of 10% of the tank capacity.
10. The tank shall be externally coated with 2 layers of coatings. The prime layer using Red Oxide paint and the top layer using waterproof plastic layer.
11. Tank shall comply with the normal and emergency venting requirements NFPA 30. Tank shall carry a two (2) years warranty including materials and workmanship.
12. Fuel tank to have, lowest point drain facility for water and sludge, fuel level gauge direct mounted or remote electric, filler pipe and locking cap.

C. Accessories

1. The tank shall be manufactured to support the following accessory equipment and shall be provided with suitably located lifting lugs:
  - a. Direct Level Indicator: A steel pipe of suitable size shall protect the level indicating, the level indicator shall be made of plastic pipe connected through suitable valves and approved by the supervising engineer.
  - b. Inspection Port Adapter Cap: Tank shall be equipped with a not less than 300 mm adapter and lockable cap for inspection and manual gauging of fuel level. Gauge port shall be accessible from steps or ladder.
  - c. Tank Fill Opening: The tank shall be provided with a suitable sized filling opening that will minimize the oil spilling during tank filling operation.
  - d. Vent Opening: The tank shall be provided with a suitable sized venting pipe to prevent the increase of gas pressure inside the tank. The vent opening should be covered with a wire mesh to prevent anything from entering and blocking the vent.
  - e. Supply Pipe Connection: The tank shall be provided with a suitable sized ASME B36.10, Schedule 40 Black steel supply pipe connection with a stainless steel two – piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union Ball Valve.
2. Drainpipe Connection: The tank shall be provided with a suitable sized ASME B 36.10, Schedule 40 Black Steel Drain pipe connection with a Carbon Steel, Stainless ball, with Viton seals Spill Sump Drain Valve.
3. Access Steps and Ladders: The Tank shall be equipped with access steps or ladder. Steps and ladder shall be of welded steel construction with prime and finish paint of industrial enamel or aluminum and shall be designed to conform to OSHA requirements. If breaker handle height is above 6'8" then please provide platforms to conform to NEC requirements.

D. Fuel Distribution Pipe and Pipe Fittings

1. The design criteria shall conform to the following minimum requirements: Steel Pipe: ASME B36.10, Schedule 40 Black Steel Fittings:
  - a. ASTM B16.3, 300 lb. Threaded malleable iron, or ASTM A234, forged steel welding type. Finish: Prime and finish paint with industrial enamel.

E. Drawings

1. The contractor should submit design (shop) drawings for the tank and fuel pipe distribution, location of fittings and accessories with specific dimensions, for approval by UNDP prior to product fabrication.

F. Test

1. The tank shall withstand an internal air pressure test of 3-5 psi.

G. Welding

1. Welding shall be carried out in accordance with an approved standard or code of practice. The welding plants and processes used shall be suitable to the materials, configurations and purposes of the welded parts.
2. Only qualified welders, certified for the type of welding required, shall be employed. The Contractor shall exercise strict control over the welding conditions and parameters and shall continuously monitor the standard of welding achieved in accordance with the requirements of the Clause on Quality Control and Quality Assurance.

2.08 CONCRETE FOUNDATION / PAD DRAWINGS

- A. Detailed drawings of the concrete/pad foundations required for mounting/installation of generators shall be provided with all necessary details within three (03) weeks of award of contract.

2.09 OUTDOOR WEATHER PROTECTIVE SOUND ATTENUATING ENCLOSURE

- A. The generator set shall be provided with a sound attenuated housing which allows the generator set to operate at full rated load in the ambient conditions. The enclosure shall reduce the sound level of the generator set while operating at full rated load to below 65 dBA at 7 meters from the generator set. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustic materials used shall be oil and water resistant. No foam materials shall be used.
- B. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. A panel viewing window shall be provided. Key locking door latches shall be provided for all doors. Door hinges shall be stainless steel.
- C. The enclosure shall be provided with an exhaust silencer, which is mounted outside of the enclosure, and allows the generator set package to meet specified sound level requirements. Silencer and exhaust shall include a rain cap and rain shield. Muffler location: within the enclosure.

2.10 TYPE TESTS

- A. Type test reports/certificates of generators need to be submitted with the bid.
- B. Type tests shall be carried out at an independent laboratory or witnessed by a representative of such laboratory.
- C. Testing at manufacture's works:

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components, and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
  - 2. Full load run.
  - 3. Maximum power.
  - 4. Voltage regulation.
  - 5. Steady-state governing.
  - 6. Single-step load pickup.
  - 7. Simulated safety shutdowns.
  - 8. The supplier shall submit full details of the methods of testing including connection diagrams for approval at least one (1) month before testing.
  - 9. The supplier shall give a minimum of two (2) weeks' notice that the generators are ready for testing.
  - 10. All costs in connection with the testing shall be borne by the supplier who shall provide OWNER with all the facilities free of charge.

2.12 OTHER REQUIREMENTS

- A. Generator set shall have the following facility. Forklift Pockets within Base Frame.
- B. The control panel shall have the following provisions for the control of GENSET:
  - 1. Master engine control which for OFF/AUTO/MANUAL/TEST with a facility for starting and stopping of the set.
  - 2. Selectable Multifunction meter
  - 3. Engine control monitor.
  - 4. Alternator voltage monitor.
  - 5. Engine hours run counter.
  - 6. Voltmeter and Ammeter
  - 7. Combined frequency and tachometer
- C. The diesel generator shall automatically shut down under following conditions.
  - 1. Low Oil Pressure
  - 2. High Engine Temperature
  - 3. Low Fuel Level
  - 4. Over/Under Speed
- D. Earthing studs need to be provided.

2.13 WARRANTY-

- A. Warranty period shall be two year /1000 hours operation whichever occurs first.

2.14 SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
  - 1. Thermal damage curve for generator.
  - 2. Time-current characteristic curves for generator protective device.
  - 3. Sound test data, based on a free field requirement.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.
  - 1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
  - 2. Wiring Diagrams: Control interconnection, Customer connections.
- C. Certifications:
  - 1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location for EPA, stationary emergency application.

## 2.15 INFORMATIONAL SUBMITTALS

- A. Source quality-control test reports.
  - 1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.
  - 2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.
  - 3. List of factory tests to be performed on units to be shipped for this Project.
  - 4. Report of exhaust emissions and compliance statement certifying compliance with applicable regulations.
- B. Warranty:
  - 1. Submit manufacturer's warranty statement to be provided for this Project.

## 2.16 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001. Maintain, within 100 miles of the project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. Comply with NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).

- E. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).
- F. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.
- G. Comply with UL 2200.

END OF SECTION



# Aboveground Storage Tank Facility Plan

(TCEQ - 0575)

Attachment D - Spill and Overfill  
Control

## **Attachment D – Spill and Overfill Control**

The integral double wall fuel tank provides a minimum capacity of not less than 24-hours full running time. The design is capable of preventing accident spilling of fuel and hand pump feeding on emergencies if possible. The proposed tank type is UL-2085, a double wall secondary containment type integral/subbase fuel storage tank. The tank material is a corrosion resistant carbon steel. It is provided with a suitable sized filling opening that will minimize the oil spilling during tank filling operation. The mechanical gauge located on the tank can be viewed locally to prevent any overfill. It also comes with a suitable sized ASME B 36.10, Schedule 40 Black Steel Drainpipe connection with a Carbon Steel, Stainless Ball with Viton seals Spill Sump Drain Valve to drain any spills inside the secondary containment if needed. More details about tank spill prevention controls are included in Specification 26 32 13.13.

A leak detection alarm is provided to send signals to the generator local control panel in the event of spills or leaks. When there is any leakage inside the secondary containment, the alarm will be on to shut off the generator. Operator shall take necessary actions to control the spill. More details about tank spill controls are included in Specification 40 61 96 and Drawing I-4.

# Aboveground Storage Tank Facility Plan

(TCEQ - 0575)

Attachment E - Response Actions  
to Spills

## Attachment E – Response Actions to Spills

The integral fuel tank is capable of preventing accident spilling of fuel and hand pump feeding on emergencies if possible. Since it is a double wall secondary containment type integral/subbase fuel storage tank, any spills shall be contained inside the secondary containment, the fuel will not be exposed to the environment. Once the leak detection alarm is on, the generator will be taken offline. Operator shall check the generator and spill levels before taking any actions. Operator shall follow generator spill instructions and Title 30, Texas Administrative Code Section 327 for proper spill disposal.

If there are any spills to the environment, operator shall reach out to Texas Spill Reporting Hotline at 1-822-832-8224 or the appropriate regional office of the TCEQ during normal office hours. A spill report shall be submitted to the TCEQ, refer to Title 30, Texas Administrative Code Section 327.3. The following actions shall be performed.

### Keep People Safe:

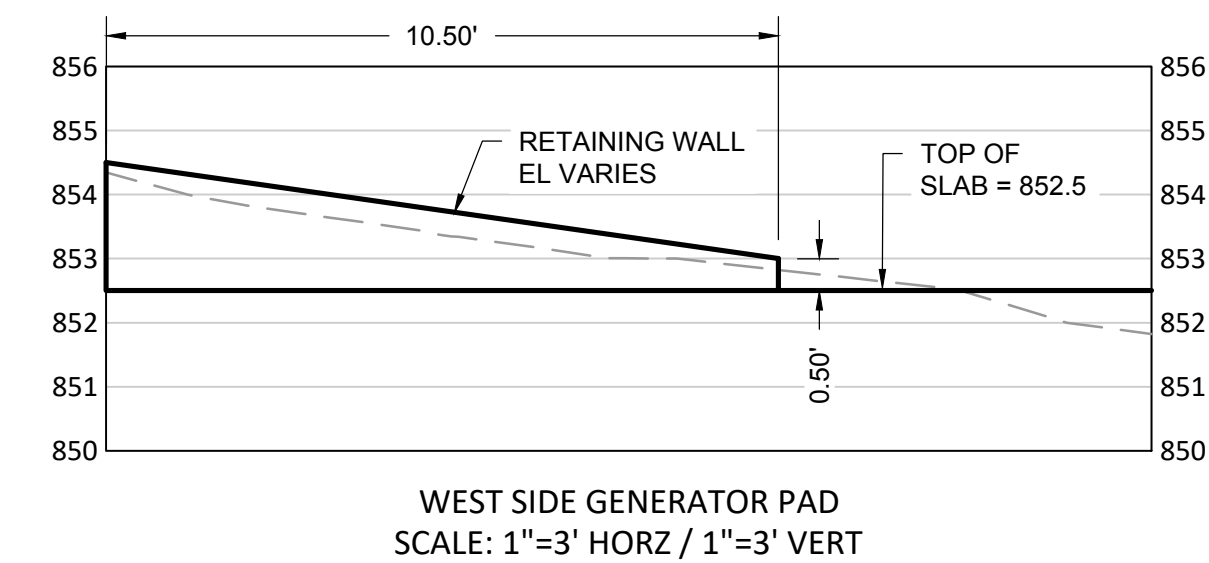
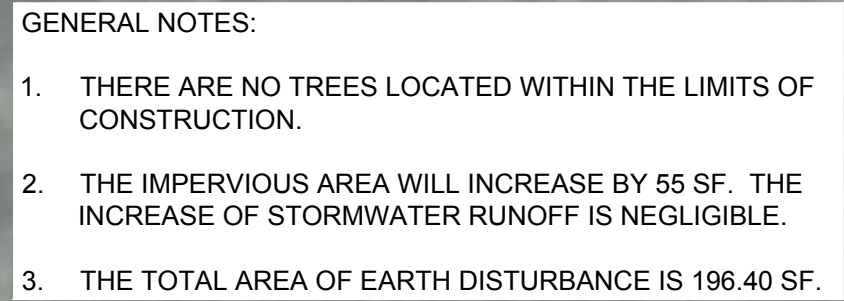
- Avoid direct contact with the spilled material.
- Avoid inhalation of any gases, fumes, vapors, or smoke. All personnel should stay upwind (some gases inhibit the sense of smell or may be dangerous at undetectable concentrations).
- Move and keep people away from the incident scene. Contact the nearest law-enforcement authority for assistance, if necessary.
- Find and, if possible, safely remove all ignition sources.
- Assess the situation with regard to injuries.
- Contact the appropriate authorities and responsible parties and allow them to handle the response.

# Aboveground Storage Tank Facility Plan

(TCEQ - 0575)

Site Plan



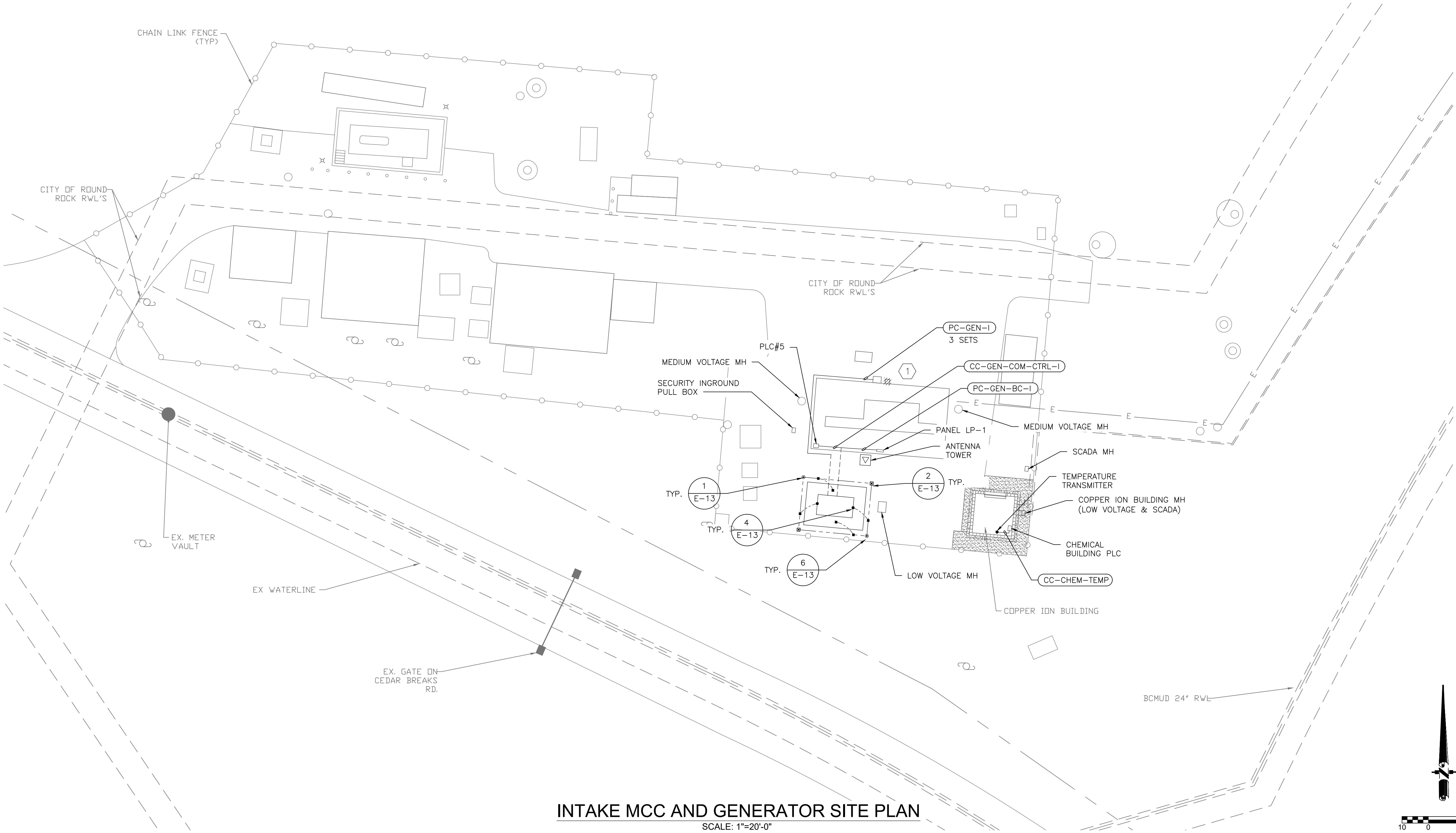


- CONSTRUCTION NOTES:**
1. ALIGN WEST SIDE OF GENERATOR FOUNDATION WITH THE EXIST. BLDG WEST SIDE.
  2. SAWCUT EXISTING PAVEMENT AS SHOWN PRIOR TO REMOVAL.
  3. EXCAVATE HMAC AND ALL BROWN SILTY CLAY AND ANY ORGANIC MATERIAL WITHIN THE STRUCTURE FOOTPRINT AND AT LEAST 4' OUTSIDE THE FOOTPRINT.
  4. SCARIFY THE EXCAVATED, PRE-FILL SUBGRADE AT LEAST 8" AND RECOMPACT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX-114-E. KEEP MOISTURE CONTENT WITHIN OPTIMUM TO +3 PERCENT OF OPTIMUM.
  5. BACKFILL WITH CRUSHED LIMESTONE DERIVATIVE BASE MATERIAL (SELECT FILL) CONFORMING TO THE FOLLOWING:
- |                               |           |
|-------------------------------|-----------|
| RETAINED ON 2-1/2" SCREEN     | 0%        |
| RETAINED ON 7/8" SCREEN       | 5% - 50%  |
| RETAINED ON 3/8" SCREEN       | 25% - 65% |
| RETAINED ON No. 4 MESH        | 35% - 75% |
| RETAINED ON No. 40 MESH SIEVE | 60% - 90% |
- MATERIAL PASSING THE No. 40 SIEVE SHALL MEET THE FOLLOWING PLASTICITY REQUIREMENTS:
- | PASSING NO. 40 SIEVE | MAXIMUM PLASTICITY INDEX | MINIMUM PLASTICITY INDEX |
|----------------------|--------------------------|--------------------------|
| 25% - 40%            | 15                       | 3                        |
| 10% - 25%            | 20                       | 4                        |
6. PLACE FILL MATERIAL IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACT TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX 113-E. MAINTAIN MOISTURE CONTENT WITHIN 2% OF OPTIMUM.
  7. REMOVE HMAC AND EXCAVATED MATERIALS FROM PROJECT SITE AND DISPOSE OFFSITE PER SPECIFICATION SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
  8. AFTER COMPLETION OF THE GENERATOR TESTING, REPAIR REMOVED HMAC. FURNISH AND INSTALL FULL DEPTH 6" TYPE 'D' HMAC PER CITY OF GEORGETOWN STANDARD SPECIFICATION, SECTION SD1 - HOT MIX CONCRETE PAVEMENT.
  9. SLOPE NEW HMAC AWAY FROM NEW CONCRETE FOUNDATION.
  10. RE GRADE DISTURBED AREAS TO PROVIDE POSITIVE STORMWATER DRAINAGE AWAY FROM STRUCTURE AND RESTORE EXISTING VEGETATION AFTER COMPLETION OF ALL CONSTRUCTION WORK.

PASSING No. 40 SIEVE	MAXIMUM PLASTICITY INDEX	MINIMUM PLASTICITY INDEX
25% - 40%	15	3
10% - 25%	20	4



PRINTED: 10/26/2023 11:01 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-5 INTAKE MCC AND GENERATOR SITE PLAN.dwg, SAVED: 9/22/2023 9:04 AM USER: Ryan Banerjee



INTAKE MCC AND GENERATOR SITE PLAN  
SCALE: 1"=20'-0"

- NOTESBY SYMBOL
1. THE EXISTING SITE PLAN IS INCLUDED FOR INFORMATION PURPOSE ONLY. EXISTING PIPING ELEVATIONS WERE OBTAINED FROM RECORD DRAWINGS AND HAVE NOT BEEN FIELD VERIFIED. CONTRACTOR SHALL FIELD VERIFY PRIOR TO COMMENCEMENT OF INSTALLING NEW PIPING. SHOULD ANY POTENTIAL CONFLICT BE IDENTIFIED WITH PROPOSED PIPING INSTALLATION, CONTRACTOR SHALL NOTIFY THE DISTRICT AND ENGINEER. FIELD ADJUSTMENT SHALL BE MADE UPON APPROVAL BY THE ENGINEER AT NO ADDITIONAL COSTS TO THE OWNER. DEMOLISH PORTABLE GENERATOR TERMINATION CABINET. REFERENCE SHEET E-4.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
INTAKE MCC AND GENERATOR SITE PLAN

DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of
	XX XXX
Dwg. No.	E-5
2023-0002-00	

# Temporary Stormwater

(TCEQ - 0602)



# Temporary Stormwater Section

## Texas Commission on Environmental Quality

for Regulated Activities on the Edwards Aquifer Recharge Zone and Relating to 30 TAC §213.5(b)(4)(A), (B), (D)(I) and (G); Effective June 1, 1999

***To ensure that the application is administratively complete, confirm that all fields in the form are complete, verify that all requested information is provided, consistently reference the same site and contact person in all forms in the application, and ensure forms are signed by the appropriate party.***

***Note: Including all the information requested in the form and attachments contributes to more streamlined technical reviews.***

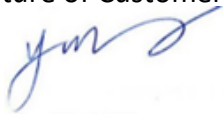
## Signature

To the best of my knowledge, the responses to this form accurately reflect all information requested concerning the proposed regulated activities and methods to protect the Edwards Aquifer. This **Temporary Stormwater Section** is hereby submitted for TCEQ review and executive director approval. The application was prepared by:

Print Name of Customer/Agent: Ardurra

Date: 1/17/2024

Signature of Customer/Agent:



**Regulated Entity Name:** Brushy Creek Municipal Utility District Raw Water Intake Facility

## Project Information

### Potential Sources of Contamination

*Examples: Fuel storage and use, chemical storage and use, use of asphaltic products, construction vehicles tracking onto public roads, and existing solid waste.*

1. Fuels for construction equipment and hazardous substances which will be used during construction:

☐ The following fuels and/or hazardous substances will be stored on the site: \_\_\_\_\_

These fuels and/or hazardous substances will be stored in:

- ☐ Aboveground storage tanks with a cumulative storage capacity of less than 250 gallons will be stored on the site for less than one (1) year.

- ☐ Aboveground storage tanks with a cumulative storage capacity between 250 gallons and 499 gallons will be stored on the site for less than one (1) year.
- ☐ Aboveground storage tanks with a cumulative storage capacity of 500 gallons or more will be stored on the site. An Aboveground Storage Tank Facility Plan application must be submitted to the appropriate regional office of the TCEQ prior to moving the tanks onto the project.
- ☒ Fuels and hazardous substances will not be stored on the site.
- 2. ☐ **Attachment A - Spill Response Actions.** A site specific description of the measures to be taken to contain any spill of hydrocarbons or hazardous substances is attached.
- 3. ☐ Temporary aboveground storage tank systems of 250 gallons or more cumulative storage capacity must be located a minimum horizontal distance of 150 feet from any domestic, industrial, irrigation, or public water supply well, or other sensitive feature.
- 4. ☐ **Attachment B - Potential Sources of Contamination.** A description of any activities or processes which may be a potential source of contamination affecting surface water quality is attached.

### ***Sequence of Construction***

- 5. ☒ **Attachment C - Sequence of Major Activities.** A description of the sequence of major activities which will disturb soils for major portions of the site (grubbing, excavation, grading, utilities, and infrastructure installation) is attached.
  - ☒ For each activity described, an estimate (in acres) of the total area of the site to be disturbed by each activity is given.
  - ☒ For each activity described, include a description of appropriate temporary control measures and the general timing (or sequence) during the construction process that the measures will be implemented.
- 6. ☐ Name the receiving water(s) at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project: \_\_\_\_\_

### ***Temporary Best Management Practices (TBMPs)***

*Erosion control examples: tree protection, interceptor swales, level spreaders, outlet stabilization, blankets or matting, mulch, and sod. Sediment control examples: stabilized construction exit, silt fence, filter dikes, rock berms, buffer strips, sediment traps, and sediment basins. Please refer to the Technical Guidance Manual for guidelines and specifications. All structural BMPs must be shown on the site plan.*

- 7. ☐ **Attachment D – Temporary Best Management Practices and Measures.** TBMPs and measures will prevent pollution of surface water, groundwater, and stormwater. The construction-phase BMPs for erosion and sediment controls have been designed to retain sediment on site to the extent practicable. The following information is attached:  
**Reference to Specification 01 35 43 - Environmental Procedures.**

- ☐ A description of how BMPs and measures will prevent pollution of surface water, groundwater or stormwater that originates upgradient from the site and flows across the site.
  - ☐ A description of how BMPs and measures will prevent pollution of surface water or groundwater that originates on-site or flows off site, including pollution caused by contaminated stormwater runoff from the site.
  - ☐ A description of how BMPs and measures will prevent pollutants from entering surface streams, sensitive features, or the aquifer.
  - ☐ A description of how, to the maximum extent practicable, BMPs and measures will maintain flow to naturally-occurring sensitive features identified in either the geologic assessment, TCEQ inspections, or during excavation, blasting, or construction.
8. ☐ The temporary sealing of a naturally-occurring sensitive feature which accepts recharge to the Edwards Aquifer as a temporary pollution abatement measure during active construction should be avoided.
- ☐ **Attachment E - Request to Temporarily Seal a Feature.** A request to temporarily seal a feature is attached. The request includes justification as to why no reasonable and practicable alternative exists for each feature.
- ☒ There will be no temporary sealing of naturally-occurring sensitive features on the site.
9. ☐ **Attachment F - Structural Practices.** A description of the structural practices that will be used to divert flows away from exposed soils, to store flows, or to otherwise limit runoff discharge of pollutants from exposed areas of the site is attached. Placement of structural practices in floodplains has been avoided. **NA**
10. ☐ **Attachment G - Drainage Area Map.** A drainage area map supporting the following requirements is attached:
- ☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin will be provided.
  - ☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a smaller sediment basin and/or sediment trap(s) will be used.
  - ☐ For areas that will have more than 10 acres within a common drainage area disturbed at one time, a sediment basin or other equivalent controls are not attainable, but other TBMPs and measures will be used in combination to protect down slope and side slope boundaries of the construction area.
  - ☐ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. A smaller sediment basin and/or sediment trap(s) will be used in combination with other erosion and sediment controls within each disturbed drainage area.

- ☒ There are no areas greater than 10 acres within a common drainage area that will be disturbed at one time. Erosion and sediment controls other than sediment basins or sediment traps within each disturbed drainage area will be used.
11. ☐ **Attachment H - Temporary Sediment Pond(s) Plans and Calculations.** Temporary sediment pond or basin construction plans and design calculations for a proposed temporary BMP or measure have been prepared by or under the direct supervision of a Texas Licensed Professional Engineer. All construction plans and design information must be signed, sealed, and dated by the Texas Licensed Professional Engineer. Construction plans for the proposed temporary BMPs and measures are attached.
- ☒ N/A
12. ☐ **Attachment I - Inspection and Maintenance for BMPs.** A plan for the inspection of each temporary BMP(s) and measure(s) and for their timely maintenance, repairs, and, if necessary, retrofit is attached. A description of the documentation procedures, recordkeeping practices, and inspection frequency are included in the plan and are specific to the site and/or BMP. **NA**
13. ☒ All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections by the applicant or the executive director, or other information indicate a control has been used inappropriately, or incorrectly, the applicant must replace or modify the control for site situations.  
**Reference to Specification 01 35 43 - Environmental Procedures.**
14. ☒ If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impacts to water quality (e.g., fugitive sediment in street being washed into surface streams or sensitive features by the next rain).  
**Reference to Specification 31 25 14 - Stabilization Measures for Erosion and Sedimentation Control.**
15. ☒ Sediment must be removed from sediment traps or sedimentation ponds not later than when design capacity has been reduced by 50%. A permanent stake will be provided that can indicate when the sediment occupies 50% of the basin volume.  
**Reference to Specification 31 25 14 - Stabilization Measures for Erosion and Sedimentation Control.**
16. ☒ Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges (e.g., screening outfalls, picked up daily).  
**Reference to Specification 01 74 23 - Final Cleaning.**

## **Soil Stabilization Practices**

*Examples: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, or preservation of mature vegetation. N/A, There is no existing trees or vegetation at the construction site.*

17. ☐ **Attachment J - Schedule of Interim and Permanent Soil Stabilization Practices.** A schedule of the interim and permanent soil stabilization practices for the site is attached.

- 18. ☐ Records must be kept at the site of the dates when major grading activities occur, the dates when construction activities temporarily or permanently cease on a portion of the site, and the dates when stabilization measures are initiated.
- 19. ☐ Stabilization practices must be initiated as soon as practicable where construction activities have temporarily or permanently ceased.

### ***Administrative Information***

- 20. ☒ All structural controls will be inspected and maintained according to the submitted and approved operation and maintenance plan for the project.
- 21. ☒ If any geologic or manmade features, such as caves, faults, sinkholes, etc., are discovered, all regulated activities near the feature will be immediately suspended. The appropriate TCEQ Regional Office shall be immediately notified. Regulated activities must cease and not continue until the TCEQ has reviewed and approved the methods proposed to protect the aquifer from any adverse impacts.
- 22. ☒ Silt fences, diversion berms, and other temporary erosion and sediment controls will be constructed and maintained as appropriate to prevent pollutants from entering sensitive features discovered during construction.

# Temporary Stormwater

(TCEQ - 0602)

Attachment C - Sequence of Major  
Activities





- GENERAL NOTES:
1. THERE ARE NO TREES LOCATED WITHIN THE LIMITS OF CONSTRUCTION.
  2. THE IMPERVIOUS AREA WILL INCREASE BY 55 SF. THE INCREASE OF STORMWATER RUNOFF IS NEGLIGIBLE.
  3. THE TOTAL AREA OF EARTH DISTURBANCE IS 196.40 SF.

CONSTRUCTION NOTES:

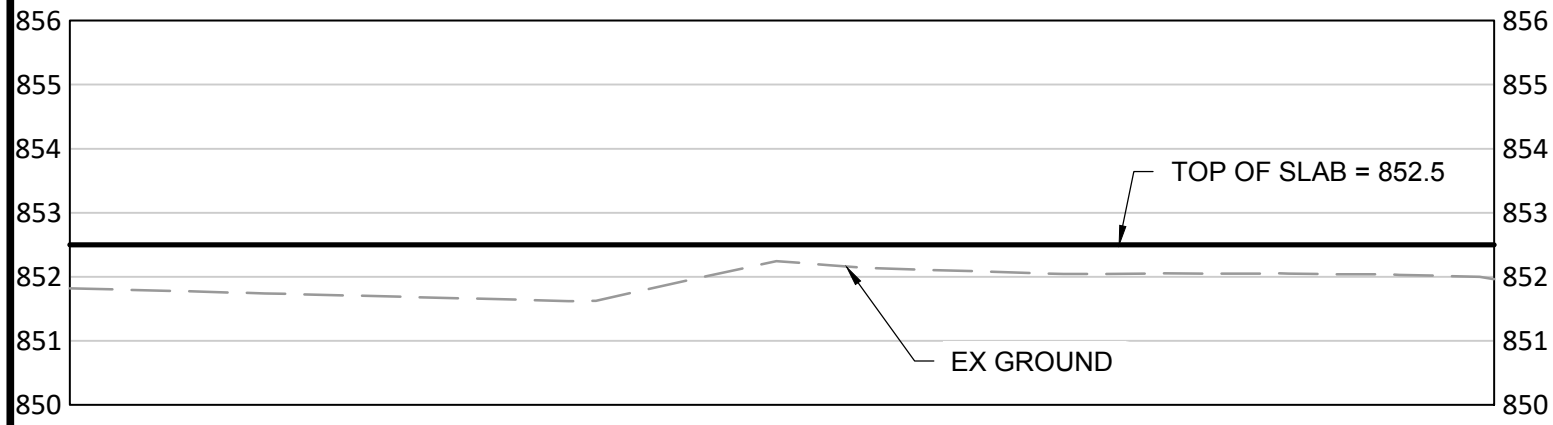
1. ALIGN WEST SIDE OF GENERATOR FOUNDATION WITH THE EXIST. BLDG WEST SIDE.
2. SAWCUT EXISTING PAVEMENT AS SHOWN PRIOR TO REMOVAL.
3. EXCAVATE HMAC AND ALL BROWN SILTY CLAY AND ANY ORGANIC MATERIAL WITHIN THE STRUCTURE FOOTPRINT AND AT LEAST 4' OUTSIDE THE FOOTPRINT.
4. SCARIFY THE EXCAVATED, PRE-FILL SUBGRADE AT LEAST 8" AND RECOMPACT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX-114-E. KEEP MOISTURE CONTENT WITHIN OPTIMUM TO +3 PERCENT OF OPTIMUM.
5. BACKFILL WITH CRUSHED LIMESTONE DERIVATIVE BASE MATERIAL (SELECT FILL) CONFORMING TO THE FOLLOWING:

RETAINED ON 2-1/2" SCREEN	0%
RETAINED ON 7/8" SCREEN	5% - 50%
RETAINED ON 3/8" SCREEN	25% - 65%
RETAINED ON No. 4 MESH	35% - 75%
RETAINED ON No. 40 MESH SIEVE	60% - 90%

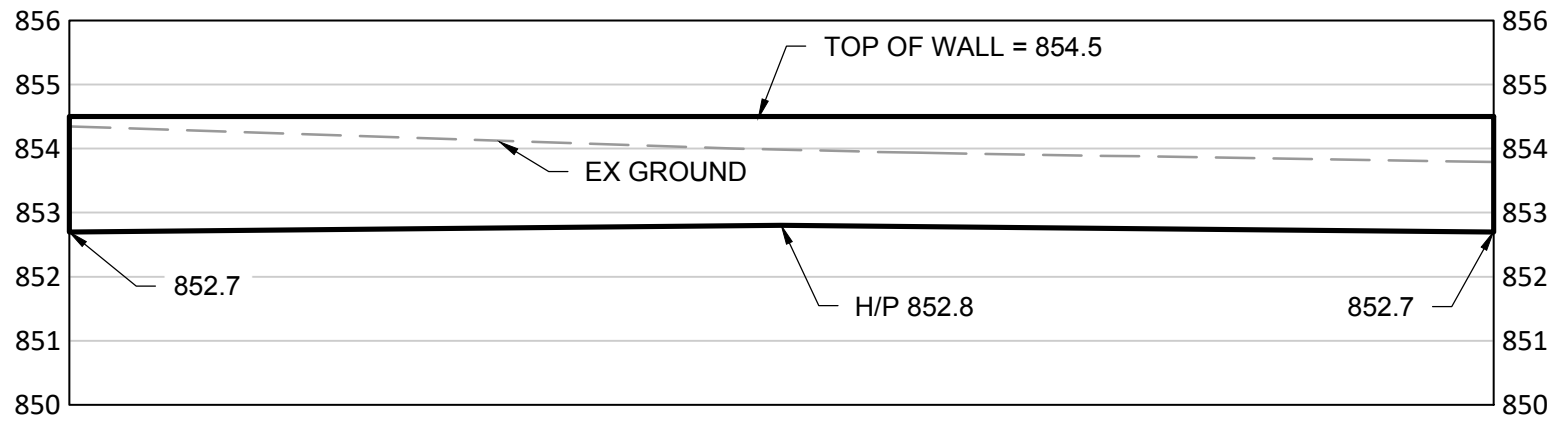
MATERIAL PASSING THE No. 40 SIEVE SHALL MEET THE FOLLOWING PLASTICITY REQUIREMENTS:

PASSING No. 40 SIEVE	MAXIMUM PLASTICITY INDEX	MINIMUM PLASTICITY INDEX
25% - 40%	15	3
10% - 25%	20	4

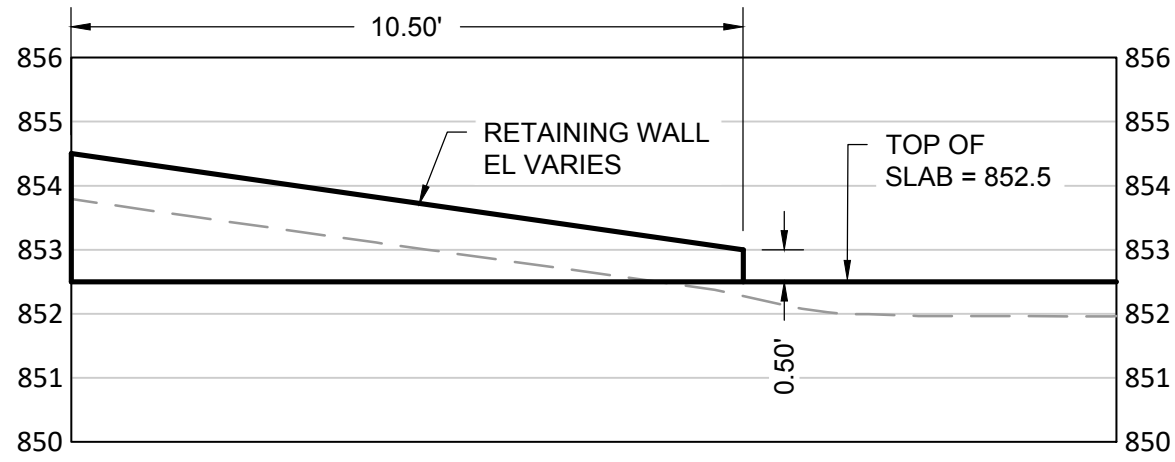
6. PLACE FILL MATERIAL IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACT TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX 113-E. MAINTAIN MOISTURE CONTENT WITHIN 2% OF OPTIMUM.
7. REMOVE HMAC AND EXCAVATED MATERIALS FROM PROJECT SITE AND DISPOSE OFFSITE PER SPECIFICATION SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
8. AFTER COMPLETION OF THE GENERATOR TESTING, REPAIR REMOVED HMAC. FURNISH AND INSTALL FULL DEPTH 6" TYPE "D" HMAC PER CITY OF GEORGETOWN STANDARD SPECIFICATION, SECTION S01 - HOT MIX CONCRETE PAVEMENT.
9. SLOPE NEW HMAC AWAY FROM NEW CONCRETE FOUNDATION.
10. RE-GRADE DISTURBED AREAS TO PROVIDE POSITIVE STORMWATER DRAINAGE AWAY FROM STRUCTURE AND RESTORE EXISTING VEGETATION AFTER COMPLETION OF ALL CONSTRUCTION WORK.



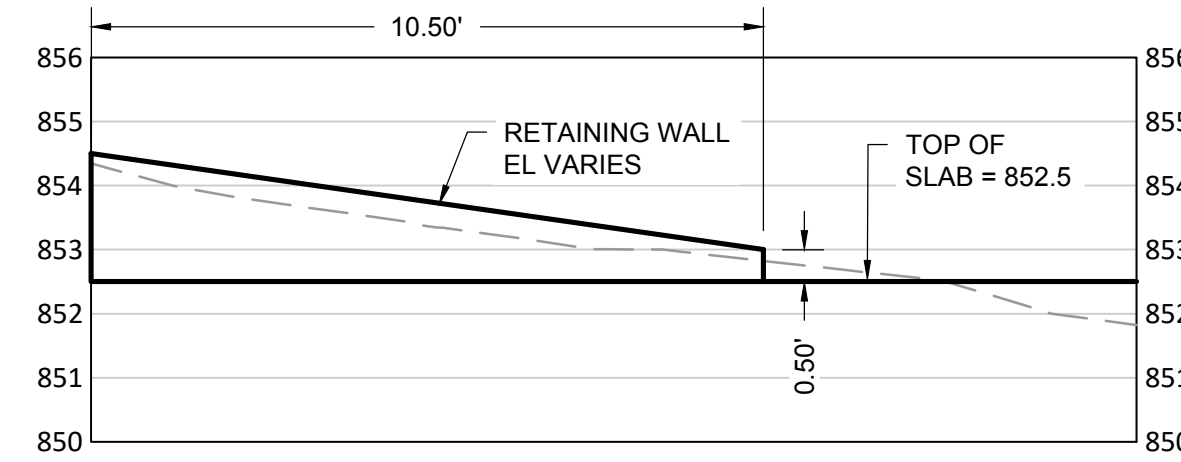
NORTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



SOUTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



EAST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



WEST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
CIVIL  
RAW WATER INTAKE  
SITE & DEMO PLAN - GENERATOR E-5 PAD - INTAKE SITE

VERIFY SCALE  
BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.  
DESIGNED J. LEVITT  
DRAWN J. GIBSON  
CHECKED Y. SUN  
REVIEWED Y. SUN  
Seq. of XXX  
Dwg. No. C-3  
2023-0002-00



# Temporary Stormwater

(TCEQ - 0602)

Attachment D - Temporary BMPs,  
Specification 01 35 43



SECTION 01 35 43  
ENVIRONMENTAL PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, silt fences, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area. Specific requirements for erosion and sedimentation controls are specified in Section 31 25 14.
- D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is Contractor's responsibility to determine the specific construction techniques to meet these guidelines.
- E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency.

1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS

- A. The Owner's Construction Manager (CM) will notify Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectional acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Owner's CM, of any non-compliance with State or local requirements. Contractor shall, after receipt of such notice from the Owner's CM or from the regulatory agency through the Owner's CM, immediately take corrective action. Such notice, when delivered to

Contractor or his/her authorized CM at the site of the work, shall be deemed sufficient for the purpose. If Contractor fails or refuses to comply promptly, Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by Contractor unless it is later determined that Contractor was in compliance.

**1.04 IMPLEMENTATION**

- A. Prior to commencement of the work, meet with Owner to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.
- B. Remove temporary environmental control features, when approved by the Owner's CM, and incorporate permanent control features into the project at the earliest practicable time.

**1.05 PROTECTION OF WATERWAYS**

- A. Contractor shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government prohibiting the pollution of any lake, stream, river, adjacent canal or wetland by the dumping of any refuse, rubbish, dredge material, or debris therein.
- B. Contractors are specifically cautioned that disposal of materials into any waters of the State must conform with the requirements of the TCEQ, and an applicable permit from the U.S. Army Corps of Engineers.
- C. Contractor shall be responsible for providing holding ponds or an approved method which will handle, carry through, or divert around his work all flows, including storm flows and flows created by construction activity, so as to prevent silting of waterways or flooding damage to the property or adjacent properties.
- D. Contractor is responsible for researching the need for a Texas Pollutant Discharge Elimination System (TPDES) permit for the construction site. If one is required, Contractor is responsible for obtaining the permit and for monitoring the site per the permit requirements until final completion, as well as submitting all certification forms to the Owner and reviewing the implementation of the SWPPP in a meeting with the Owner and Engineer before beginning construction.

**1.06 DISPOSAL OF EXCESS EXCAVATION AND OTHER WASTE MATERIALS**

- A. Excess excavated material not required or suitable for backfill and other waste material must be disposed of at sites approved by Owner or hauled off site.
- B. Unacceptable disposal sites, include, but are not limited to, sites within a wetland or critical habitat and sites where disposal will have a detrimental effect on surface water or groundwater quality.
- C. Contractor may make his own arrangements for disposal subject to submission of proof to the Owner's CM that Owner(s) of the proposed site(s) has a valid fill permit issued by the

appropriate governmental agency and submission of a haul route plan including a map of the proposed route(s).

- D. Contractor shall provide watertight conveyance of any liquid, semi-liquid, or saturated solids which tend to bleed or leak during transport. No liquid loss from transported materials will be permitted whether being delivered to the construction site or being hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at the selected disposal site.

#### 1.07 USE OF CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture or any other applicable regulatory agency. Use of all such chemicals and disposal of residues shall be in conformance with the manufacturer's instructions.
- B. Any oil or other hydrocarbon spilled or dumped on Owner's Site during construction must be excavated and completely removed from the site prior to final acceptance. Soil contaminated by Contractor's operations shall become the property of Contractor, who will bear all costs of testing and disposal.
- C. Before Contractor commences work, the following steps shall be completed.
  - 1. Owner will provide a copy of the Chemical List giving the hazardous chemicals to which Contractor, his employees and agents may be exposed to on the project site upon the Contractor's request.
  - 2. Owner will provide copies of all MSDSs to Contractor for the hazardous chemicals which he may be exposed to on the project site upon the Contractor's request.
  - 3. Contractor shall provide MSDSs for all hazardous chemicals he may bring onto the project site that Owner's employees may be exposed to.
  - 4. Contractor shall sign a Contractor Acknowledgement certifying that he has received the information provided by the Owner on hazardous chemicals and maintain the Acknowledgement with the original Contract.

#### 1.08 MEASUREMENT AND PAYMENT

- A. The work specified in this Section shall be considered incidental and payment will be included as part of the appropriate lump sum or unit prices specified in the Bid Form.

#### PART 2 PRODUCTS – NOT USED

#### PART 3 EXECUTION

##### 3.01 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, hay check dams,

mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

### 3.02 PROTECTION OF STREAMS

- A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before being directed into the streams.
- B. Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the TCEQ. Contractor shall submit two copies of approved contingency plans to the Owner's CM.
- D. Water being flushed from structures or pipelines after disinfection, with a chlorine residue of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Owner's CM, prior to discharge.

### 3.03 PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Owner's CM. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.
- C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

- D. Any trees or other landscape feature scarred or damaged by Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Owner's CM will decide what methods of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by Contractor and are beyond saving in the opinion of the Owner's CM, shall be immediately removed and replaced.

- E. The locations of Contractor's storage, and other construction buildings, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the Owner's CM and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the Owner's CM.
- F. If Contractor proposes to construct temporary roads or embankments and excavations for plant and/or work areas, he/she shall submit the following for approval at least ten days prior to scheduled start of such temporary work.
1. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
  2. Details of temporary road construction.
  3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.
  4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of Contractor's approved drawings shall be made only with the written approval of the Owner's CM. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.
- G. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by Engineer. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in these specifications, or as approved by the Owner's CM.

- H. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

### 3.04 PROTECTION OF AIR QUALITY

- A. Burning: The use of burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Dust Control: Contractor will be required to maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.
- C. All unpaved streets, roads, detours, or haul roads used in the construction area shall be given an approved dust-preventive treatment or periodically watered to prevent dust. The use of petroleum products is prohibited. The use of chlorides may be used with the approval of the engineer. Applicable environmental regulations for dust prevention shall be strictly enforced.
- D. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the Owner's CM.
- E. Sprinkling, to be approved by the Owner and Owner's CM, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and Contractor must have sufficient suitable equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Owner's CM.

### 3.05 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

### 3.06 NOISE AND DUST CONTROL

- A. Contractor shall so conduct all his operations that they will cause the least annoyance to the residents in the vicinity of the work, and shall comply with all applicable local ordinances. If contractor work to exceed maximum allowable noise level per the local authority having jurisdiction (AHJ) 's ordinance, contractor shall obtain temporary noise permit through the (AHJ) Services. The compressors, hoists, and other apparatus shall be equipped with such mechanical devices as may be necessary to minimize noise and dust. Compressors shall be equipped with silencers on intake lines. All gasoline or oil operated equipment shall be equipped with silencers or mufflers on intake and exhaust lines. Storage bins and hoppers shall be lined with material that will deaden the sounds. The operation of dumping rock and of carrying rock away in trucks shall be so conducted as to cause a minimum of noise and dust. Vehicles carrying rock, concrete, or other material shall be routed over such streets as will cause the least annoyance to the public and shall not be operated on public streets between the hours of 6 p.m. and 7 a.m. or on Saturdays, Sundays or legal holidays unless approved by Engineer.

3.07 NIGHTTIME WORK

- A. If Contractor is required or desires to execute any work between the hours of 6 p.m. to 7 a.m., he shall notify Owner in writing at least 48 hours before the intended start of such work. Contractor shall acquire any necessary permits associated with night work and comply with all permit conditions and all laws and ordinances relating to night work.

3.08 ENVIRONMENTAL PROTECTION CONDITIONS AND MEASURES

- A. The following environmental protection conditions and measures must be complied as required by U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service (USFWS) in order to ensure that the proposed project construction activities will not have a significant impact on the environment.
  - 1. Refer to the City of Round Rock, or the City of Georgetown Code of Ordinances on sound level limitations: Chapter 14 for the City of Round Rock and Chapter 8 for the City of Georgetown.
  - 2. Adverse impacts on threatened and endangered species within the project area shall be avoided or mitigated in accordance with the federal Migratory Bird Treaty Act (MBTA) per Texas Parks and Wildlife Department (TPWD), in particular between March 1 and August 1, which is the Golden-Cheeked Warbler's nesting season.
  - 3. Construction activities requiring vegetation removal or disturbance shall avoid the peak nesting period of March 1 through August 1 to the extent possible to avoid destruction of individuals, nests, or eggs.
  - 4. If construction activities must be conducted during this time, the Contractor shall survey for nests prior to commencing work. If an occupied migratory bird nest is found, a 50-foot buffer of vegetation shall remain around the nest until the juveniles have fledged or the nest is vacated.
  - 5. Adverse impacts on threatened and endangered species within the project area shall be avoided per Texas Parks and Wildlife Department.
  - 6. Prior to construction, the Contractor shall search for the potential presence of rare, threatened, and endangered species in the vicinity of the construction area. Should a species of potential interest or critical habitat be discovered, project construction will be halted, and the Contractor shall notify the BCMUD and USACE for further instruction for proper handling of the situation. Construction will remain halted until the situation is satisfactorily resolved as directed by the BCMUD and USACE.

END OF SECTION

# Agent Authorization Form

(TCEQ - 0599)



**Agent Authorization Form**  
For Required Signature  
Edwards Aquifer Protection Program  
Relating to 30 TAC Chapter 213  
Effective June 1, 1999

I Amy Giannini  
Print Name  
District Engineer  
Title - Owner/President/Other  
of Brushy Creek Municipal Utility District  
Corporation/Partnership/Entity Name  
have authorized Yue Sun  
Print Name of Agent/Engineer  
of Ardurra Group, Inc.  
Print Name of Firm

to represent and act on the behalf of the above named Corporation, Partnership, or Entity for the purpose of preparing and submitting this plan application to the Texas Commission on Environmental Quality (TCEQ) for the review and approval consideration of regulated activities.

I also understand that:

1. The applicant is responsible for compliance with 30 Texas Administrative Code Chapter 213 and any condition of the TCEQ's approval letter. The TCEQ is authorized to assess administrative penalties of up to \$10,000 per day per violation.
2. For those submitting an application who are not the property owner, but who have the right to control and possess the property, additional authorization is required from the owner.
3. Application fees are due and payable at the time the application is submitted. The application fee must be sent to the TCEQ cashier or to the appropriate regional office. The application will not be considered until the correct fee is received by the commission.
4. A notarized copy of the Agent Authorization Form must be provided for the person preparing the application, and this form must accompany the completed application.
5. No person shall commence any regulated activity on the Edwards Aquifer Recharge Zone, Contributing Zone or Transition Zone until the appropriate application for the activity has been filed with and approved by the Executive Director.

SIGNATURE PAGE:

*Amy*  
Applicant's Signature

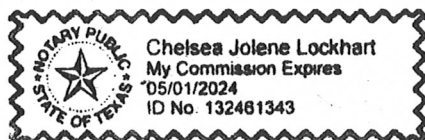
12/12/2023  
Date

THE STATE OF Texas §

County of Williamson §

BEFORE ME, the undersigned authority, on this day personally appeared Yue Sun known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that (s)he executed same for the purpose and consideration therein expressed.

GIVEN under my hand and seal of office on this 12 day of December 2023



*Chelsea Lockhart*  
NOTARY PUBLIC

Chelsea Lockhart  
Typed or Printed Name of Notary

MY COMMISSION EXPIRES: 5/01/24

# Application Fee Form

(TCEQ - 0574)

# Application Fee Form

## Texas Commission on Environmental Quality

Name of Proposed Regulated Entity: Raw Water Intake Facility

Regulated Entity Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628

Name of Customer: 1

Contact Person: Amy Giannini

Phone: 512-255-7871 x 237

Customer Reference Number (if issued):CN \_\_\_\_\_

Regulated Entity Reference Number (if issued):RN \_\_\_\_\_

### Austin Regional Office (3373)

☐ Hays

☐ Travis

☒ Williamson

### San Antonio Regional Office (3362)

☐ Bexar

☐ Medina

☐ Uvalde

☐ Comal

☐ Kinney

Application fees must be paid by check, certified check, or money order, payable to the **Texas Commission on Environmental Quality**. Your canceled check will serve as your receipt. **This form must be submitted with your fee payment.** This payment is being submitted to:

☒ Austin Regional Office

☐ San Antonio Regional Office

☐ Mailed to: TCEQ - Cashier

☐ Overnight Delivery to: TCEQ - Cashier

Revenues Section

Mail Code 214

P.O. Box 13088

Austin, TX 78711-3088

12100 Park 35 Circle

Building A, 3rd Floor

Austin, TX 78753

(512)239-0357

### Site Location (Check All That Apply):

☒ Recharge Zone

☐ Contributing Zone

☐ Transition Zone

<i>Type of Plan</i>	<i>Size</i>	<i>Fee Due</i>
Water Pollution Abatement Plan, Contributing Zone Plan: One Single Family Residential Dwelling	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Multiple Single Family Residential and Parks	Acres	\$
Water Pollution Abatement Plan, Contributing Zone Plan: Non-residential	Acres	\$
Sewage Collection System	L.F.	\$
Lift Stations without sewer lines	Acres	\$
Underground or Aboveground Storage Tank Facility	1 Tanks	\$ 650
Piping System(s)(only)	Each	\$
Exception	Each	\$
Extension of Time	Each	\$

Signature: 

Date: 12/15/2023

# Application Fee Schedule

Texas Commission on Environmental Quality

Edwards Aquifer Protection Program 30 TAC Chapter 213 (effective 05/01/2008)

## ***Water Pollution Abatement Plans and Modifications***

### ***Contributing Zone Plans and Modifications***

<b><i>Project</i></b>	<b><i>Project Area in Acres</i></b>	<b><i>Fee</i></b>
One Single Family Residential Dwelling	< 5	\$650
Multiple Single Family Residential and Parks	< 5	\$1,500
	5 < 10	\$3,000
	10 < 40	\$4,000
	40 < 100	\$6,500
	100 < 500	\$8,000
	≥ 500	\$10,000
Non-residential (Commercial, industrial, institutional, multi-family residential, schools, and other sites where regulated activities will occur)	< 1	\$3,000
	1 < 5	\$4,000
	5 < 10	\$5,000
	10 < 40	\$6,500
	40 < 100	\$8,000
	≥ 100	\$10,000

### ***Organized Sewage Collection Systems and Modifications***

<b><i>Project</i></b>	<b><i>Cost per Linear Foot</i></b>	<b><i>Minimum Fee- Maximum Fee</i></b>
Sewage Collection Systems	\$0.50	\$650 - \$6,500

### ***Underground and Aboveground Storage Tank System Facility Plans and Modifications***

<b><i>Project</i></b>	<b><i>Cost per Tank or Piping System</i></b>	<b><i>Minimum Fee- Maximum Fee</i></b>
Underground and Aboveground Storage Tank Facility	\$650	\$650 - \$6,500

### ***Exception Requests***

<b><i>Project</i></b>	<b><i>Fee</i></b>
Exception Request	\$500

### ***Extension of Time Requests***

<b><i>Project</i></b>	<b><i>Fee</i></b>
Extension of Time Request	\$150

# Core Data Form

(TCEQ - 10400)



# TCEQ Core Data Form

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

## SECTION I: General Information

<b>1. Reason for Submission</b> (If other is checked please describe in space provided.)		
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)	<input checked="" type="checkbox"/> Other	TCEQ required this form for the Above Ground Storage Tank Facility Plan Application
<b>2. Customer Reference Number</b> (if issued)	<b>3. Regulated Entity Reference Number</b> (if issued)	
CN 600646574	RN 104348768	

[Follow this link to search for CN or RN numbers in Central Registry\\*\\*](#)

## SECTION II: Customer Information

<b>4. General Customer Information</b>		<b>5. Effective Date for Customer Information Updates</b> (mm/dd/yyyy)			
<input type="checkbox"/> New Customer <input type="checkbox"/> Update to Customer Information <input type="checkbox"/> Change in Regulated Entity Ownership					
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)					
<i>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</i>					
<b>6. Customer Legal Name</b> (If an individual, print last name first: eg: Doe, John)				<i>If new Customer, enter previous Customer below:</i>	
<b>7. TX SOS/CPA Filing Number</b>		<b>8. TX State Tax ID</b> (11 digits)		<b>9. Federal Tax ID</b> (9 digits)	<b>10. DUNS Number</b> (if applicable)
<b>11. Type of Customer:</b>		<input type="checkbox"/> Corporation		<input type="checkbox"/> Individual	Partnership: <input type="checkbox"/> General <input type="checkbox"/> Limited
Government: <input type="checkbox"/> City <input type="checkbox"/> County <input type="checkbox"/> Federal <input type="checkbox"/> Local <input type="checkbox"/> State <input type="checkbox"/> Other		<input type="checkbox"/> Sole Proprietorship		<input type="checkbox"/> Other:	
<b>12. Number of Employees</b>				<b>13. Independently Owned and Operated?</b>	
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher				<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>14. Customer Role</b> (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following					
<input type="checkbox"/> Owner <input type="checkbox"/> Operator <input type="checkbox"/> Owner & Operator <input type="checkbox"/> Other:					
<input type="checkbox"/> Occupational Licensee <input type="checkbox"/> Responsible Party <input type="checkbox"/> VCP/BSA Applicant					
<b>15. Mailing Address:</b>					
City		State		ZIP	ZIP + 4
<b>16. Country Mailing Information</b> (if outside USA)				<b>17. E-Mail Address</b> (if applicable)	
<b>18. Telephone Number</b>		<b>19. Extension or Code</b>		<b>20. Fax Number</b> (if applicable)	

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### SECTION III: Regulated Entity Information

<b>21. General Regulated Entity Information</b> <i>(If 'New Regulated Entity' is selected, a new permit application is also required.)</i>							
<input type="checkbox"/> New Regulated Entity <input type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information							
<i>The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).</i>							
<b>22. Regulated Entity Name</b> <i>(Enter name of the site where the regulated action is taking place.)</i>							
<b>23. Street Address of the Regulated Entity:</b>  <i>(No PO Boxes)</i>							
	City		State		ZIP		ZIP + 4
<b>24. County</b>							

If no Street Address is provided, fields 25-28 are required.

<b>25. Description to Physical Location:</b>								
<b>26. Nearest City</b>					<b>State</b>	<b>Nearest ZIP Code</b>		
<i>Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).</i>								
<b>27. Latitude (N) In Decimal:</b>					<b>28. Longitude (W) In Decimal:</b>			
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds			
<b>29. Primary SIC Code</b> (4 digits)	<b>30. Secondary SIC Code</b> (4 digits)		<b>31. Primary NAICS Code</b> (5 or 6 digits)		<b>32. Secondary NAICS Code</b> (5 or 6 digits)			
<b>33. What is the Primary Business of this entity?</b> <i>(Do not repeat the SIC or NAICS description.)</i>								
<b>34. Mailing Address:</b>								
	City		State		ZIP		ZIP + 4	
<b>35. E-Mail Address:</b>								
<b>36. Telephone Number</b>		<b>37. Extension or Code</b>			<b>38. Fax Number</b> <i>(if applicable)</i>			
(   )   -					(   )   -			




<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Emissions Inventory Air	<input type="checkbox"/> Industrial Hazardous Waste
<input type="checkbox"/> Municipal Solid Waste	<input type="checkbox"/> New Source Review Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS
<input type="checkbox"/> Sludge	<input type="checkbox"/> Storm Water	<input type="checkbox"/> Title V Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Wastewater	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

## **SECTION IV: Preparer Information**

<b>40. Name:</b>	Yue Sun			<b>41. Title:</b>	Group Leader
<b>42. Telephone Number</b>	<b>43. Ext./Code</b>	<b>44. Fax Number</b>	<b>45. E-Mail Address</b>		
( 713 ) 208-9463		(   ) -	ysun@ardurra.com		

## **SECTION V: Authorized Signature**

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

<b>Company:</b>	Ardurra Group, Inc		<b>Job Title:</b>	Group Leader	
<b>Name (In Print):</b>	YUE SUN			<b>Phone:</b>	( 713 ) 208- 9463
<b>Signature:</b>				<b>Date:</b>	12/18/2023

# Brushy Creek Municipal Utility District

## Winterization and Electrical Improvements



October 31, 2023



Prepared By:



A handwritten signature in blue ink, appearing to read "Yue Sun".

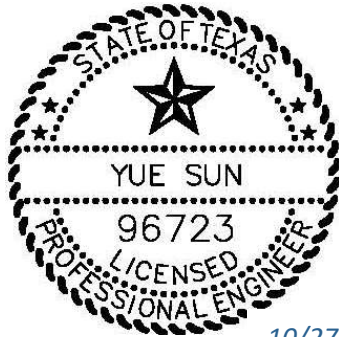
*October 31, 2023*

7500 Rialto Boulevard, Bldg. 1 Ste 240  
Austin, Texas 78735  
TBPE Firm Registration No. F-10053

# Technical Specifications for the

## Brushy Creek Municipal Utility District, TX Winterization and Electrical Improvements

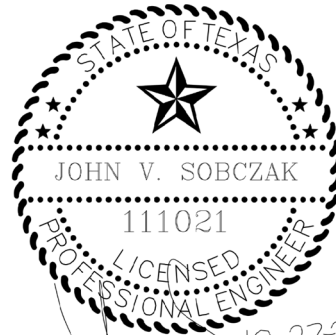
DIVISION 1, DIVISION 2,  
SPECIFICATION 40 05 53 AND 40 42 13



10/27/2023

Yue Sun  
Texas PE No. 96723

DIVISION 3



John Sobczak  
Texas PE No. 111021

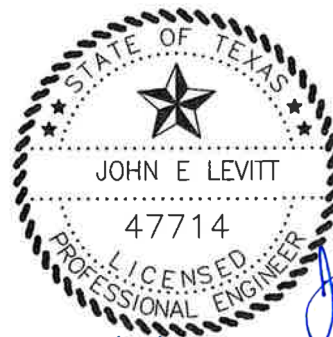
DIVISION 26, SPECIFICATION 40 41 13.13



10/27/2023

James E Landgraf  
Texas PE No. 75428

DIVISION 31



10/27/2023

John E Levitt  
Texas PE No. 47714

Technical Specifications for the

Brushy Creek Municipal Utility District, TX  
Winterization and Electrical Improvements

DIVISION 40 (EXCEPT SPECIFICATIONS  
40 42 13 AND 40 41 13.13)



Sahar Saffarshamshirgar  
Texas PE No. 125740

SPECIFICATION 40 42 13



Ricardo Azcarate  
Texas PE No. 81863

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**ADVERTISEMENT FOR BIDS**  
**BRUSHY CREEK MUNICIPAL UTILITY DISTRICT**  
**ROUND ROCK, TEXAS**  
**WINTERIZATION AND ELECTRICAL IMPROVEMENTS**

**General Notice**

Brushy Creek Municipal Utility District is requesting Bids for the construction of the following Project:

**WINTERIZATION AND ELECTRICAL IMPROVEMENTS**

Bids for the construction of the Project will be received at the Brushy Creek Municipal Utility District located at the office of the Brushy Creek Municipal Utility District, 16318 Great Oaks Drive, Round Rock, Texas 78681, until **11:00 AM** local time on **xxxx**, 2024. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

**Raw Water Intake Site:**

Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628

Proposed Improvements:

- Installation of Backup Power Generator at Raw Water Intake Facility (by ARPA funds).
- MCC Improvements at the raw water intake facility: Replacement of Medium Voltage Reduced Voltage Starters and Protective Relays.

**Water Treatment Plant:**

Location: 2300 Great Oaks Drive, Round Rock, TX 78681.

Proposed Improvements:

- Install pipe insulation and heat tracing at the Membrane Feed Pump Station.
- Install pipe insulation and heat tracing at the Recycle Pump Station.

**Well Sites:**

Location: Atumn Ln, Round Rock, TX 78681 (30.525982, -97.706815).

Proposed improvements:

- Install pipe insulation and heat tracing at Well Nos.3, 5 and 6.
- Installation of one backup power generator to serve Well site Nos. 3 and 5.
- Installation of one backup power generator to serve Well site No. 6 as an alternate bid item.

Bids shall be on a lump sum basis as indicated in the BID form.

**Obtaining the Bidding Documents**

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

**<https://www.civcastusa.com>**

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports,

and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

### **Pre-bid Conference**

A pre-bid conference for the Project will be held on [day, date] at [time] at [name of venue] [street address of venue] [city, state, zip code]. Attendance at the pre-bid conference is encouraged but not required.

### **Instructions to Bidders.**

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

The Brushy Creek Municipal Utility District, Williamson County, Texas, reserves the right to reject any or all bids, or to waive any informalities, or to make an award to other than the low bidder. It further reserves the right to limit the amount of the award and eliminate a portion of the work or add additional work as required to keep the total contract amount with the funds budgeted; to award any part or combination of parts of the project it deems necessary; and any other rights established under the laws of the State of Texas.

Attention of the bidders is particularly directed to the requirements of the conditions of employment to be observed and minimum Wage Rates to be paid under the Contract.

The Brushy Creek Municipal Utility District does not discriminate on the basis of handicapped status in admission or access to, or treatment or employment in, its programs and activities.

Bid security shall be furnished in accordance with the Instructions to Bidders.

### **This Advertisement is issued by:**

Owner: **Brushy Creek Municipal Utility District**

By: **Nora Dinsmore**

Title: **Procurement Specialist**

Date: **[Date of initial publication of advertisement]**

# INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

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## **ARTICLE 1—DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

## **ARTICLE 2—BIDDING DOCUMENTS**

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

## **ARTICLE 3—QUALIFICATIONS OF BIDDERS**

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five (5) days of Owner's request, Bidder must submit the following information:
- A. Completed EJCDC C-451, Qualifications Statement.
- 3.02 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.



- B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
  - C. Bidder's state or other contractor license number, if applicable.
  - D. Subcontractor and Supplier qualification information.
  - E. Other required information regarding qualifications.
- 3.03 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.04 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

#### **ARTICLE 4—PRE-BID CONFERENCE**

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

##### **5.01 *Site and Other Areas***

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

##### **5.02 *Existing Site Conditions***

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

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

- c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
  - d. Technical Data contained in such reports and drawings.
- 2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.
- C. A Site visit is scheduled for [designate, date, time and location]. Maps to the Site will be made available upon request.
- D. Bidders visiting the Site are required to arrange their own transportation to the Site.
- E. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: Amy Giannini, [A.Giannini@bcmud.org](mailto:A.Giannini@bcmud.org) or 512-225-7871 x 237. Bidder must conduct the required Site visit during normal working hours.
- F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- G. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

- H. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- I. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

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

5.06 *Other Work at the Site*

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

## **ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS**

6.01 *Express Representations and Certifications in C-410 Bid Form, C-520 Agreement*

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

## **ARTICLE 7—INTERPRETATIONS AND ADDENDA**

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer via CIVCAST.
- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract

Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

#### **ARTICLE 8—BID SECURITY**

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

#### **ARTICLE 9—CONTRACT TIMES**

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

#### **ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS**

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute or materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or

substitute unless written request for approval has been submitted by Bidder and has been received by Engineer within 10 days of the issuance of the Advertisement for Bids or invitation to Bidders. Each such request must comply with the requirements of Paragraphs 7.05 and 7.06 of the General Conditions, and the review of the request will be governed by the principles in those paragraphs. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all registered Bidders. Bidders cannot rely upon approvals made in any other manner.

- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

#### **ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS**

- 11.01 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- A. See below.

<b>Subcontractor</b>	<b>Work to be Performed</b>
	Piping Insulation
	Electrical
	Concrete
<b>Suppliers</b>	<b>Equipment or Material</b>
	Generators

- 11.02 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.03 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable

to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

## **ARTICLE 12—PREPARATION OF BID**

- 12.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
  - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder’s name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder’s authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.



- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

### **ARTICLE 13—BASIS OF BID**

#### **13.01 *Lump Sum***

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

#### **13.02 *Base Bid with Alternates***

- A. Bidders must submit a Bid on a lump sum basis for the base Bid and include a separate price for each alternate described in the Bidding Documents and as provided for in the Bid Form. The price for each alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.

#### **13.03 *Allowances***

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

### **ARTICLE 14—SUBMITTAL OF BID**

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

### **ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID**

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted

prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

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

#### **ARTICLE 16—OPENING OF BIDS**

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

#### **ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE**

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

#### **ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT**

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award shall be to the responsible Bidder, in the Brushy Creek board's judgment, that will be most advantageous to the district and result in the best and most economical completion of the Work.
- 18.05 *Evaluation of Bids*
  - A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
  - B. If Owner awards the alternates as part of the contract for the Work, such award shall be in the Brushy Creek board's judgment, that will be most advantageous to the district and result in the best and most economical completion of the Work. After determination of the Successful Bidder based on this comparative process and on the responsiveness,

responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

#### **ARTICLE 19—BONDS AND INSURANCE**

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

#### **ARTICLE 20—SIGNING OF AGREEMENT**

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

#### **ARTICLE 21—SALES AND USE TAXES**

- 21.01 Owner is exempt from Texas state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

#### **ARTICLE 22—CONTRACTS TO BE ASSIGNED**

- 22.01 When the Contractor will be required to accept assignment of a procurement contract, previously entered into the Owner ( as " Buyer" )with a manufacturer ( as " Seller") for the direct purchase of goods and special services, insert at this location in these Instructions to Bidders for Construction Contract language regarding the assignment. For model language, refer to EJCDC® P-200, Instructions to Bidders for Procurement Contract.
- 22.02 For additional information on assigning a procurement contract, refer to EJCDC® P-001, Commentary on the 2018 EJCDC Procurement Documents (2018).

## **ARTICLE 23—WAGE RATE REQUIREMENTS**

23.01 The prevailing wage rates of Texas apply to this contract as do any requirements of Texas associated with the use of these State Prevailing wages.

# BID FORM FOR CONSTRUCTION CONTRACT

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

## ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:

**Brushy Creek Municipal Utility District**

**16318 Great Oaks Drive**

**Round Rock, Texas 78681**

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

## ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. List of Proposed Subcontractors;
- C. List of Proposed Suppliers;
- D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
- E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
- F. Required Bidder Qualification Statement with supporting data as shown in Document C-451; and
- G. Completed Non-Collusion Bidding Certification.

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

3.01 *Lump Sum Bids*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any Unit Prices indicated in Paragraph 3.02:
  - 1. Lump Sum Price (Base Bid and Alternates)

<b>TABLE 1 - BASE BID PRICES</b>				
Bid Item No.	Quantity	Unit	Bid Item Description	Bid Amount
<b>Part A. Water Treatment Plant Winterization Improvements (ARPA Funds Code 5.10 Drinking Water: Treatment)</b>				
A1	1	LS	Mobilization and demobilization, Bonds and Insurance ( not to exceed 5% of the Total Bid Amount)	\$
A2	1	LS	Provide and install a complete SWPPP system as shown on plans and described in specifications.	\$
A3	1	LS	Install pipe insulation and heat tracing at the WTP Membrane Feed Pump Station, and associated electrical improvements, as shown on the Drawings and specified herein.	\$
A4	1	LS	Install pipe insulation and heat tracing at the WTP Recycle Pump Station, and associated electrical improvements, as shown on the Drawings and specified herein.	\$
<b>Part B. Raw Water Intake and Well Site Winterization Improvements (ARPA Funds Code 5.13 Drinking Water: Source)</b>				
B1	1	LS	Mobilization and demobilization, Bonds and Insurance ( not to exceed 5% of the Total Bid Amount)	\$
B2	1	LS	Provide and install a complete SWPPP system as shown on plans and described in specifications.	\$
B3	1	LS	Install pipe insulation and heat tracing at Well Nos. 3, 5 and 6, and associated electrical improvements, as shown on the Drawings and specified herein.	\$
B4	1	LS	Furnish and Install one(1) Diesel Electrical Generator at Raw Water Intake Facility and associated concrete pads, electrical, instrumentation and control improvements, as shown on the Drawings and specified herein.	\$
B5	1	LS	Furnish and Install one(1) Diesel Electrical Generator at Well Nos. 3 & 5, and associated concrete pads, electrical, instrumentation and control improvements, as shown on the Drawings and specified herein.	\$
B6	1	LS	Miscellaneous site civil work as shown on the Drawings and specified herein.	\$
<b>PART C. Raw Water Intake Electrical Improvements (Non-ARPA funds)</b>				
C1	1	LS	Raw Water Intake Electrical & MCC Rehabilitation and upgrades as shown on the Drawings and specified herein.	\$
<b>TOTAL BASE BID PRICES (PART A THROUGH PART C)</b>				\$



<b>TABLE 2 – ADDITIVE ALTERNATE BID PRICES</b>				
<b>Part D. Well Site Winterization Improvements (ARPA Funds Code 5.13 Drinking Water: Source)</b>				
D1	1	LS	Furnish and Install one(1) Diesel Electrical Generator at Well No.6, and associated concrete pads, electrical, instrumentation and control improvements, as shown on the Drawings and specified herein.	\$
<b>TOTAL ADDITIVE ALTERNATE BID PRICES (PART D)</b>				<b>\$</b>

<b>TABLE 3 – DEDUCTIVE ALTERNATE BID PRICES</b>				
<b>Part E. Water Treatment Plant Winterization Improvements (ARPA Funds Code 5.10 Drinking Water: Treatment)</b>				
E1	1	LS	Reuse existing spare conduit at Membrane Pump Station and Recycle Pump Station.	\$
<b>Part F. Raw Water Intake and Well Site Winterization Improvements (ARPA Funds Code 5.13 Drinking Water: Source)</b>				
F1	1	LS	Reuse existing spare conduit at Well No.3 and Well No.5	\$
<b>TOTAL DEDUCTIVE ALTERNATIVE BID PRICES (PART E THROUGH PART F)</b>				<b>\$</b>

#### **ARTICLE 4—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA**

##### **4.01 Bid Acceptance Period**

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

##### **4.02 Instructions to Bidders**

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

##### **4.03 Receipt of Addenda**

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

<b>Addendum Number</b>	<b>Addendum Date</b>

#### **ARTICLE 5—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS**

##### **5.01 Bidder’s Representations**

- A. In submitting this Bid, Bidder represents the following:
  - 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### 5.02 *Bidder's Certifications*

##### A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

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

BIDDER hereby submits this Bid as set forth above:

Bidder:

\_\_\_\_\_  
*(typed or printed name of organization)*

By:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Date:

\_\_\_\_\_  
*(typed or printed)*

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

Attest:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Date:

\_\_\_\_\_  
*(typed or printed)*

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_

Bidder's Contact:

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Phone:

Email:

Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

\_\_\_\_\_

## BID BOND (PENAL SUM FORM)

<b>Bidder</b> Name: _____ Address <i>(principal place of business)</i> : _____	<b>Surety</b> Name: _____ Address <i>(principal place of business)</i> : _____
<b>Owner</b> Name: Brushy Creek Municipal Utility District Address <i>(principal place of business)</i> : 16318 Great Oaks Drive Round Rock, Texas 78681	<b>Bid</b> Project <i>(name and location)</i> : <b>Winterization and Electrical Improvements</b>  Bid Due Date: <span style="background-color: yellow;">[Enter date bid is due]</span>
<b>Bond</b> Penal Sum: _____ Date of Bond: _____	
Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.	
Bidder	Surety
_____ <i>(Full formal name of Bidder)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature) (Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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



# QUALIFICATION STATEMENT

**THIS INFORMATION SUPPLIED IN THIS DOCUMENT IS CONFIDENTIAL  
TO THE EXTENT PERMITTED BY LAW AND REGULATIONS.**

## ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation		
<input type="checkbox"/> Limited Liability Company <input type="checkbox"/> Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venturer.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Pending			

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	

Address:			
Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		
Authorized to sign contracts: <input type="checkbox"/> Yes <input type="checkbox"/> No		Limit of Authority:	\$	
Name:		Title:		

## ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

## ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
<input type="checkbox"/> Disadvantaged Business Enterprise		
<input type="checkbox"/> Minority Business Enterprise		
<input type="checkbox"/> Woman-Owned Business Enterprise		
<input type="checkbox"/> Small Business Enterprise		
<input type="checkbox"/> Disabled Business Enterprise		
<input type="checkbox"/> Veteran-Owned Business Enterprise		
<input type="checkbox"/> Service-Disabled Veteran-Owned Business		
<input type="checkbox"/> HUBZone Business (Historically Underutilized) Business		
<input type="checkbox"/> Other		
<input type="checkbox"/> None		

## ARTICLE 4—SAFETY

- 4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

- 4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

## ARTICLE 5—FINANCIAL

- 5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business's most recent financial statement:		<input type="checkbox"/> Attached	
Date of Business's most recent audited financial statement:		<input type="checkbox"/> Attached	
Financial indicators from the most recent financial statement			
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor's Quick Ratio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

## ARTICLE 6—SURETY INFORMATION

- 6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:		
Surety is a corporation organized and existing under the laws of the state of:		

Is surety authorized to provide surety bonds in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?			
<input type="checkbox"/> Yes <input type="checkbox"/> No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

## ARTICLE 7—INSURANCE

- 7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider		Type of Policy (Coverage Provided)	
Are providers licensed or authorized to issue policies in the Project location?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Does provider have an A.M. Best Rating of A-VII or better?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

## ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Been released from a bid in the past 5 years? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Defaulted on a project or failed to complete any contract awarded to it? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Been a party to any currently pending litigation or arbitration? <input type="checkbox"/> Yes <input type="checkbox"/> No				
Provide full details in a separate attachment if the response to any of these questions is Yes.				

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

## ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business's safety performance if required by Paragraph 4.02.
- D. Financial statements as required by Paragraph 5.01.
- E. Attachments providing additional information as required by Paragraph 8.02.
- F. Schedule A (Current Projects) as required by Paragraph 8.03.

- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business:

\_\_\_\_\_  
*(typed or printed name of organization)*

By:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Date:

\_\_\_\_\_  
*(date signed)*

*(If Business is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Designated Representative:

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone:

\_\_\_\_\_  
\_\_\_\_\_

Email:



**Schedule A—Current Projects**

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

**Schedule B—Previous Experience with Similar Projects**

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

**Schedule B—Previous Experience with Similar Projects**

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

**Schedule C—Key Individuals**

<b>Project Manager</b>			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
<b>Project Superintendent</b>			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

<b>Safety Manager</b>			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
<b>Quality Control Manager</b>			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

## NOTICE OF AWARD

Date of Issuance:

Owner: Brushy Creek Municipal Utility District

Owner's Project No.:

Engineer: Ardurra Group, Inc.

Engineer's Project No.: 2023-0002-00

Project: Winterization and Electrical Improvements

Contract Name:

Bidder:

Bidder's Address:

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

### Winterization and Electrical Improvements Project

The Contract Price of the awarded Contract is \$[Contract Price].

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or will be transmitted electronically.

☐ Drawings will be delivered separately from the other Contract Documents.

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

1. Deliver to Owner **three (3)** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security performance and payment bonds and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.

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

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

Owner: **Brushy Creek Municipal Utility District**

By (signature):

Name (printed):

Title:

Copy: Engineer

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

This Agreement is by and between **Brushy Creek Municipal Utility District** ("Owner") and **[name of contracting entity]** ("Contractor").

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

Owner and Contractor hereby agree as follows:

## ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

### Raw Water Intake Site Improvements:

- Installation of Backup Power Generator at Raw Water Intake Facility (by ARPA funds).
- MCC Improvements at the raw water intake facility.

### WTP Improvements (by ARPA Funds):

- Install pipe insulation and heat tracing at the Membrane Feed Pump Station.
- Install pipe insulation and heat tracing at the Recycle Pump Station.

### Well Sites Improvements (by ARPA Funds):

- Install pipe insulation and heat tracing at Well Nos. 3, 5 and 6.
- Installation of one backup power generators to serve Well Nos. 3 & 5.
- Installation of one backup power generators to serve Well No. 6 as an alternate bid item.

## ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

### Raw Water Intake Site:

Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628

Proposed Improvements:

- Installation of Backup Power Generator at Raw Water Intake Facility (by ARPA funds).
- MCC Improvements at the raw water intake facility.

### Water Treatment Plant:

Location: 2300 Great Oaks Drive, Round Rock, TX 78681.

Proposed Improvements:

- Install pipe insulation and heat tracing at the Membrane Feed Pump Station.
- Install pipe insulation and heat tracing at the Recycle Pump Station.

### Well Sites:

Location: Atumn Ln, Round Rock, TX 78681 (30.525982, -97.706815).



Proposed improvements:

- Install pipe insulation and heat tracing at Well Nos.3, 5 and 6.
- Installation of one backup power generator to serve Well site Nos. 3 and 5.
- Installation of one backup power generator to serve Well site No. 6.

### ARTICLE 3—ENGINEER

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

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

### ARTICLE 4—CONTRACT TIMES

#### 4.01 *Time is of the Essence*

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

#### 4.02 *Contract Times: Days*

- A. The Work will be substantially complete within **690** days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within **720** days after the date when the Contract Times commence to run.

#### 4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion:* Contractor shall pay Owner **\$1000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
  2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **\$1000** for each day that expires after such time until the Work is completed and ready for final payment.
  3. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.

## ARTICLE 5—CONTRACT PRICE

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

A. For all Work other than Unit Price Work, a lump sum of **\$(number)**.

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

B. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item). See Contractor's Bid – Attached.

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

C. Total of Lump Sum Amount and Unit Price Work (subject to final Unit Price adjustment) **\$(number)**.

D. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

## ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. 90 percent of the value of the Work completed (with the balance being retainage).

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

- b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
  - B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 200 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.
- 6.03 *Final Payment*
  - A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.
- 6.04 *Consent of Surety*
  - A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.
- 6.05 *Interest*
  - A. All amounts not paid when due will bear interest at the rate of [number] percent per annum.

## **ARTICLE 7—CONTRACT DOCUMENTS**

- 7.01 *Contents*
  - A. The Contract Documents consist of all of the following:
    - 1. This Agreement.
    - 2. Bonds:
      - a. Performance bond (together with power of attorney).
      - b. Payment bond (together with power of attorney).
    - 3. General Conditions.
    - 4. Supplementary Conditions.
    - 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
    - 6. Drawings as Conformed for Construction.
    - 7. Addenda (numbers [number] to [number], inclusive).
    - 8. Exhibits to this Agreement (enumerated as follows):
      - a. Contractor's Bid
    - 9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
      - a. Notice to Proceed.
      - b. Work Change Directives.
      - c. Change Orders.

- d. Field Orders.
  - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

## **ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS**

### **8.01 *Contractor's Representations***

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

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

#### 8.02 *Contractor's Certifications*

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

#### 8.03 *Standard General Conditions*

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

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

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

Owner:

Contractor:

\_\_\_\_\_  
(typed or printed name of organization)

By: \_\_\_\_\_  
(individual's signature)

Date: \_\_\_\_\_  
(date signed)

Name: \_\_\_\_\_  
(typed or printed)

Title: \_\_\_\_\_  
(typed or printed)

Attest: \_\_\_\_\_  
(individual's signature)

Title: \_\_\_\_\_  
(typed or printed)

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_

Designated Representative:

Name: \_\_\_\_\_  
(typed or printed)

Title: \_\_\_\_\_  
(typed or printed)

Address:

\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

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

\_\_\_\_\_  
(typed or printed name of organization)

By: \_\_\_\_\_  
(individual's signature)

Date: \_\_\_\_\_  
(date signed)

Name: \_\_\_\_\_  
(typed or printed)

Title: \_\_\_\_\_  
(typed or printed)

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

Attest: \_\_\_\_\_  
(individual's signature)

Title: \_\_\_\_\_  
(typed or printed)

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_

Designated Representative:

Name: \_\_\_\_\_  
(typed or printed)

Title: \_\_\_\_\_  
(typed or printed)

Address:

\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

License No.: \_\_\_\_\_  
(where applicable)

State: \_\_\_\_\_

## NOTICE TO PROCEED

Owner: Brushy Creek Municipal Utility District **Owner's Project No.:** \_\_\_\_\_  
Engineer: Ardurra Group, Inc. Engineer's Project No.: 2023-0002-00  
Contractor: \_\_\_\_\_ Contractor's Project No.: \_\_\_\_\_  
Project: Winterization and Electrical Improvements Project  
Contract Name: \_\_\_\_\_  
Effective Date of Contract: \_\_\_\_\_

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on **[date Contract Times are to start]** pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

The date by which Substantial Completion must be achieved is **[date for Substantial Completion, from Agreement]**, and the date by which readiness for final payment must be achieved is **[date for readiness, from Agreement]**.

Before starting any Work at the Site, Contractor must comply with the following:

**[Note any access limitations, security procedures, or other restrictions]**

Owner: Brushy Creek Municipal Utility District  
By *(signature)*: \_\_\_\_\_  
Name *(printed)*: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date Issued: \_\_\_\_\_  
Copy: Engineer



## PERFORMANCE BOND

<b>Contractor</b> Name: _____ Address <i>(principal place of business)</i> : _____  	<b>Surety</b> Name: _____ Address <i>(principal place of business)</i> : _____  
<b>Owner</b> Name:     Brushy Creek Municipal Utility District Mailing address <i>(principal place of business)</i> :  16318 Great Oaks Drive Round Rock, Texas 78681	<b>Contract</b> Description <i>(name and location)</i> : <u>Raw Water Intake Site Improvement</u> Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628 <u>Water Treatment Plant Improvement</u> Location: 2300 Great Oaks Drive, Round Rock, TX 78681. <u>Well Sites Improvement</u> Location: Atumn Ln, Round Rock, TX 78681 (30.525982, - 97.706815). Contract Price: _____ Effective Date of Contract: _____
<b>Bond</b> Bond Amount: _____ Date of Bond: _____ <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____	By: _____
<i>(Signature)</i>	<i>(Signature)(Attach Power of Attorney)</i>
Name: _____	Name: _____
<i>(Printed or typed)</i>	<i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____	Attest: _____
<i>(Signature)</i>	<i>(Signature)</i>
Name: _____	Name: _____
<i>(Printed or typed)</i>	<i>(Printed or typed)</i>
Title: _____	Title: _____
Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.	

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

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

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

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
  - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
  - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
  - 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
  - 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows:

# WARRANTY BOND

<b>Contractor</b> Name: _____ Address (principal place of business): _____	<b>Surety</b> Name: _____ Address (principal place of business): _____
<b>Owner</b> Name: Brushy Creek Municipal Utility District Address (principal place of business): 16318 Great Oaks Drive Round Rock, Texas 78681	<b>Construction Contract</b> Description (name and location): <u>Raw Water Intake Site Improvement</u> Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628 <u>Water Treatment Plant Improvement</u> Location: 2300 Great Oaks Drive, Round Rock, TX 78681. <u>Well Sites Improvement</u> Location: Atumn Ln, Round Rock, TX 78681 (30.525982, - 97.706815). Contract Price: _____ Effective Date of Contract: _____ Contract's Date of Substantial Completion: _____
<b>Bond</b> Bond Amount: _____ Date of Bond: _____ Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 9	
Bond Period: Commencing 364 days after Substantial Completion of the Work under the Construction Contract, and continuing until two years after such Substantial Completion.	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth herein, do each cause this Warranty Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature) (Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract's Correction Period Obligations. The Construction Contract is incorporated herein by reference.
2. If the Contractor performs the Correction Period Obligations, the Surety and the Contractor shall have no obligation under this Warranty Bond.
3. If Owner gives written notice to Contractor and Surety during the Bond Period of Contractor's obligation under the Correction Period Obligations, and Contractor does not fulfill such obligation, then Surety shall be responsible for fulfillment of such Correction Period Obligations. Surety shall either fulfill the Correction Period Obligations itself, through its agents or contractors, or, in the alternative, Surety may waive the right to fulfill the Correction Period Obligations itself, and reimburse the Owner for all resulting costs incurred by Owner in performing Contractor's Correction Period Obligations, including but not limited to correction, removal, replacement, and repair costs.
4. The Surety's liability is limited to the amount of this Warranty Bond. Renewal or continuation of the Warranty Bond will not modify such amount, unless expressly agreed to by Surety in writing.
5. The Surety shall have no liability under this Warranty Bond for obligations of the Contractor that are unrelated to the Construction Contract. No right of action will accrue on this Warranty Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
6. Any proceeding, legal or equitable, under this Warranty Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and must be instituted within two years after the Surety refuses or fails to perform its obligations under this Warranty Bond.
7. Written notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown in this Warranty Bond.
8. Definitions
  - 8.1. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page of this Warranty Bond, including all Contract Documents and changes made to the agreement and the Contract Documents.
  - 8.2. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
  - 8.3. *Correction Period Obligations*—The duties, responsibilities, commitments, and obligations of the Contractor with respect to correction or replacement of defective Work, as set forth in the Construction Contract's Correction Period clause, EJCDC® C-700, Standard General Conditions of the Construction Contract (2018), Paragraph 15.08, as duly modified.
  - 8.4. *Substantial Completion*—As defined in the Construction Contract.
  - 8.5. *Work*—As defined in the Construction Contract.
9. Modifications to this Bond are as follows:

## PAYMENT BOND

<b>Contractor</b> Name: Address <i>(principal place of business)</i> :	<b>Surety</b> Name: Address <i>(principal place of business)</i> :
<b>Owner</b> Name: Brushy Creek Municipal Utility District Mailing address <i>(principal place of business)</i> : 16318 Great Oaks Drive Round Rock, Texas 78681	<b>Contract</b> Description <i>(name and location)</i> : <u>Raw Water Intake Site Improvement</u> Location: 2040 Cedar Breaks Rd, Georgetown, TX 78628 <u>Water Treatment Plant Improvement</u> Location: 2300 Great Oaks Drive, Round Rock, TX 78681. <u>Well Sites Improvement</u> Location: Atumn Ln, Round Rock, TX 78681 (30.525982, - 97.706815). Contract Price: Effective Date of Contract:
<b>Bond</b> Bond Amount: Date of Bond: <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <div style="text-align: center;"><i>(Signature)</i></div>	By: _____ <div style="text-align: center;"><i>(Signature)(Attach Power of Attorney)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>	Attest: _____ <div style="text-align: center;"><i>(Signature)</i></div>
Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>	Name: _____ <div style="text-align: center;"><i>(Printed or typed)</i></div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	



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

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

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
  - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
  - 16.1.7. The total amount of previous payments received by the Claimant; and
  - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows:

## CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner: Brushy Creek Municipal Utility District  
Engineer: Ardurra Group, Inc.  
Contractor:  
Project: Winterization and Electrical Improvements  
Contract Name:

Owner's Project No.:  
Engineer's Project No.: 2023-0002-00  
Contractor's Project No.:

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion: \_\_\_\_\_

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

The following documents are attached to and made a part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By (signature): \_\_\_\_\_

Name (printed): \_\_\_\_\_

Title: \_\_\_\_\_

# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

## ARTICLE 1—DEFINITIONS AND TERMINOLOGY

### 1.01 *Defined Terms*

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

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

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

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

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

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

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

## 1.02 Terminology

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

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

## **ARTICLE 2—PRELIMINARY MATTERS**

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

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

### **2.02 *Copies of Documents***

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

### **2.03 *Before Starting Construction***

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



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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

2.05 *Acceptance of Schedules*

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

2.06 *Electronic Transmittals*

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

## ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

### 3.01 *Intent*

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

### 3.02 *Reference Standards*

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

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

### 3.03 *Reporting and Resolving Discrepancies*

#### A. *Reporting Discrepancies*

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

#### B. *Resolving Discrepancies*

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

### 3.04 *Requirements of the Contract Documents*

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

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

### 3.05 *Reuse of Documents*

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

## **ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK**

### 4.01 *Commencement of Contract Times; Notice to Proceed*

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

### 4.02 *Starting the Work*

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

### 4.03 *Reference Points*

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

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

#### 4.04 *Progress Schedule*

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

#### 4.05 *Delays in Contractor's Progress*

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

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

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

### **5.01 *Availability of Lands***

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

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

## 5.02 *Use of Site and Other Areas*

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

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

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

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

### 5.03 *Subsurface and Physical Conditions*

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

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

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

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

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

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



#### 5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

#### 5.05 *Underground Facilities*

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

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
  4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
  5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
  2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
  3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
  4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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

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

#### 5.06 *Hazardous Environmental Conditions at Site*

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

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

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

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

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

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

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

## **ARTICLE 6—BONDS AND INSURANCE**

### **6.01 *Performance, Payment, and Other Bonds***

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

Regulations, and must be issued and signed by a surety named in “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual’s authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

#### 6.02 *Insurance—General Provisions*

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

Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.

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



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

6.03 *Contractor's Insurance*

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

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

6.04 *Builder's Risk and Other Property Insurance*

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

6.05 *Property Losses; Subrogation*

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

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

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

6.06 *Receipt and Application of Property Insurance Proceeds*

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

**ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES**

7.01 *Contractor's Means and Methods of Construction*

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

7.02 *Supervision and Superintendence*

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

7.03 *Labor; Working Hours*

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

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

#### 7.04 *Services, Materials, and Equipment*

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

#### 7.05 *"Or Equals"*

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

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

#### 7.06 Substitutes

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

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

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

7.07 *Concerning Subcontractors and Suppliers*

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



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

7.08 *Patent Fees and Royalties*

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

#### 7.09 *Permits*

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

#### 7.10 *Taxes*

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

#### 7.11 *Laws and Regulations*

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

#### 7.12 *Record Documents*

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

### 7.13 *Safety and Protection*

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

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

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

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

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

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

*D. Resubmittal Procedures for Shop Drawings and Samples*

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

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

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

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

**7.17 Contractor's General Warranty and Guarantee**

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

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

**7.18 Indemnification**

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

**7.19 Delegation of Professional Design Services**

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



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

## **ARTICLE 8—OTHER WORK AT THE SITE**

### **8.01 *Other Work***

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

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

#### 8.02 *Coordination*

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

#### 8.03 *Legal Relationships*

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

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

## **ARTICLE 9—OWNER'S RESPONSIBILITIES**

### **9.01    *Communications to Contractor***

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

### **9.02    *Replacement of Engineer***

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

### **9.03    *Furnish Data***

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

### **9.04    *Pay When Due***

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

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

## **ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION**

### **10.01 *Owner's Representative***

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

### **10.02 *Visits to Site***

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

### **10.03 *Resident Project Representative***

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

### **10.04 *Engineer's Authority***

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

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

**10.05 *Determinations for Unit Price Work***

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

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

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

**10.07 *Limitations on Engineer's Authority and Responsibilities***

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

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

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

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

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

**10.08 *Compliance with Safety Program***

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

## ARTICLE 11—CHANGES TO THE CONTRACT

### 11.01 *Amending and Supplementing the Contract*

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

### 11.02 *Change Orders*

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

### 11.03 *Work Change Directives*

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

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

#### 11.04 *Field Orders*

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

#### 11.05 *Owner-Authorized Changes in the Work*

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

#### 11.06 *Unauthorized Changes in the Work*

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

#### 11.07 *Change of Contract Price*

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



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

#### 11.08 *Change of Contract Times*

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

#### 11.09 *Change Proposals*

- A. *Purpose and Content:* Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.
- B. *Change Proposal Procedures*
  - 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
  - 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
    - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
    - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

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

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

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

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

#### 11.10 *Notification to Surety*

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

### ARTICLE 12—CLAIMS

#### 12.01 *Claims*

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

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

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

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

### **13.01 *Cost of the Work***

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

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

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

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

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
  - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
  - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
  - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
  - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
  - 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
  - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
  - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  - 6. Expenses incurred in preparing and advancing Claims.
  - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
  - 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
    - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
    - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
      - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
      - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
  - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

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

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

### 13.02 Allowances

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

### 13.03 Unit Price Work

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



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

E. *Adjustments in Unit Price*

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

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

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

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

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

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

#### 14.03 *Defective Work*

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

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

#### 14.04 *Acceptance of Defective Work*

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

#### 14.05 *Uncovering Work*

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

#### 14.06 *Owner May Stop the Work*

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

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

**14.07 Owner May Correct Defective Work**

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

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

**15.01 Progress Payments**

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

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

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

*C. Review of Applications*

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

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

**D. *Payment Becomes Due***

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

**E. *Reductions in Payment by Owner***

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

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

#### 15.02 *Contractor's Warranty of Title*

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

#### 15.03 *Substantial Completion*

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

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

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

#### 15.04 *Partial Use or Occupancy*

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



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

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

#### 15.05 *Final Inspection*

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

#### 15.06 *Final Payment*

##### A. *Application for Payment*

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

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

#### 15.07 *Waiver of Claims*

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

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

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

#### 15.08 *Correction Period*

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

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

## **ARTICLE 16—SUSPENSION OF WORK AND TERMINATION**

### **16.01 *Owner May Suspend Work***

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

### **16.02 *Owner May Terminate for Cause***

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

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

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

#### 16.03 *Owner May Terminate for Convenience*

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

#### 16.04 *Contractor May Stop Work or Terminate*

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

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

## **ARTICLE 17—FINAL RESOLUTION OF DISPUTES**

### **17.01 *Methods and Procedures***

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

## **ARTICLE 18—MISCELLANEOUS**

### **18.01 *Giving Notice***

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

### **18.02 *Computation of Times***

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

18.03 *Cumulative Remedies*

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

18.04 *Limitation of Damages*

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

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

# SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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

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

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

## **ARTICLE 1—DEFINITIONS AND TERMINOLOGY**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 2—PRELIMINARY MATTERS**

### **2.01   *Delivery of Bonds and Evidence of Insurance***

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

### **2.02   *Copies of Documents***

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

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

### **2.06   *Electronic Transmittals***

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

- B. *Electronic Documents Protocol:* The parties shall conform to the following provisions in Paragraphs 2.06.B and 2.06.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.
  - 1. *Basic Requirements*

- a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.
- b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.
- c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.
- d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.
- e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.
- f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of the General Conditions.

## 2. *System Infrastructure for Electronic Document Exchange*

- a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.
  - 1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 32 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.
  - 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

- b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology (“IT”) for maintaining operations of its System Infrastructure during the Project, including coordination with the party’s individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.
- c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.
- d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.
- e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.
- f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.
- g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.
- h. The Owner will operate a Project information management system (also referred to in this EDP as “Project Website”) for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications,

submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:

- 1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;
- 2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;
- 3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and
- 4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.

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

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

**ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE**

**ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK**

**4.05 *Delays in Contractor's Progress***

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

5. *Weather-Related Delays*
  - a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.

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

### **5.03    *Subsurface and Physical Conditions***

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

- E.    The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:        None.

### **5.06    *Hazardous Environmental Conditions***

SC-5.06    Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A.    No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B.    Not Used.

## **ARTICLE 6—BONDS AND INSURANCE**

### **6.01    *Performance, Payment, and Other Bonds***

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

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

### **6.02    *Insurance—General Provisions***

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

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

### **6.03    *Contractor's Insurance***

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

- D.    *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following:
- E.    *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap

employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

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

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
  2. damages insured by reasonably available personal injury liability coverage, and
  3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
    - a. Such insurance must be maintained for three years after final payment.
    - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
  2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
  4. Underground, explosion, and collapse coverage.
  5. Personal injury coverage.
  6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
  7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 “Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured” or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
  2. Any exclusion for water intrusion or water damage.
  3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
  4. Any exclusion of coverage relating to earth subsidence or movement.
  5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
  6. Any limitation or exclusion based on the nature of Contractor’s work.
  7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- I. *Commercial General Liability—Minimum Policy Limits*

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

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

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

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

<b>Excess or Umbrella Liability</b>	<b>Policy limits of not less than:</b>
Each Occurrence	\$5,000,000
General Aggregate	\$5,000,000

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$5,000,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.
- M. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

<b>Contractor's Pollution Liability</b>	<b>Policy limits of not less than:</b>
Each Occurrence/Claim	\$
General Aggregate	\$

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



duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

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

**6.04**     *Builder's Risk and Other Property Insurance*

SC-6.04     Delete Paragraph 6.04.A and insert the following in its place:

- A.     Owner shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.

**ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES**

**7.03**     *Labor; Working Hours*

SC-7.03     Add the following new subparagraphs immediately after Paragraph 7.03.C:

1.     Regular working hours will be 7:00 AM to 4:00 PM Monday through Friday.
2.     Owner's legal holidays are the same as Federal and State Holidays.

**7.10**     *Taxes*

SC-7.10     Add a new paragraph immediately after Paragraph 7.10.A:

- B.     Owner is exempt from payment of sales and compensating use taxes of the State of Texas and of cities and counties thereof on all materials to be incorporated into the Work.
1.     Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
  2.     Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

## ARTICLE 8—OTHER WORK AT THE SITE

- 8.01 The City of Georgetown South Lake Water Treatment Plant Project is within the common work area at the Raw Water Intake Site. Contractor is PLW Waterwork. Contact Joao Lopes Farias, area manager, at 346-372-0393 or email :jlopes@plwus.com.

## ARTICLE 9—OWNER’S RESPONSIBILITIES

## ARTICLE 10—ENGINEER’S STATUS DURING CONSTRUCTION

### 10.03 *Resident Project Representative*

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
  - 1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor’s safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
  - 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR’s own personal safety while at the Site.
  - 3. *Liaison*
    - a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
    - b. Assist Engineer in serving as Owner’s liaison with Contractor when Contractor’s operations affect Owner’s on-Site operations.
    - c. Assist in obtaining from Owner additional details or information, when required for Contractor’s proper execution of the Work.
  - 4. *Review of Work; Defective Work*
    - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
    - b. Observe whether any Work in place appears to be defective.
    - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
  - 5. *Inspections and Tests*

- a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
  - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
- 6. *Payment Requests:* Review Applications for Payment with Contractor.
- 7. *Completion*
  - a. Participate in Engineer's visits regarding Substantial Completion.
  - b. Assist in the preparation of a punch list of items to be completed or corrected.
  - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
  - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
  - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
  - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
  - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
  - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
  - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
  - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
  - 7. Authorize Owner to occupy the Project in whole or in part.

## **ARTICLE 11—CHANGES TO THE CONTRACT**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 12—CLAIMS**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK**

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

No suggested Supplementary Conditions in this Article.

## **ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD**

### **15.01 *Progress Payments***

SC-15.01 Add the following new Paragraph 15.01.F:

- F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

### **15.03 *Substantial Completion***

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

## **ARTICLE 16—SUSPENSION OF WORK AND TERMINATION**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES**

### **17.03 *Attorneys' Fees***

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

## **ARTICLE 18—MISCELLANEOUS**

## WORK CHANGE DIRECTIVE NO.:

Owner:

Owner's Project No.:

Engineer:

Engineer's Project

Contractor:

No.:2023-0002-00

Project:

Contractor's Project No.:

Contract Name:

Date Issued:

Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments:

Purpose for the Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

### Notes to User—Check one or both of the following

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: \$ \_\_\_\_\_ [increase] [decrease] [not yet estimated].

Contract Time: \_\_\_\_\_ days [increase] [decrease] [not yet estimated].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

Recommended by Engineer

Authorized by Owner

By:

\_\_\_\_\_

\_\_\_\_\_

Title:

\_\_\_\_\_

\_\_\_\_\_

Date:

\_\_\_\_\_

\_\_\_\_\_

## CHANGE ORDER NO.:

Owner: Brushy Creek Municipal Utility District **Owner's Project No.:**  
Engineer's Project No.:  
Engineer: Ardurra Group, Inc. 2023-0002-00  
Contractor: Contractor's Project No.:  
Project: Winterization and Electrical Improvements Project  
Contract Name:  
Date Issued: Effective Date of Change Order:  
The Contract is modified as follows upon execution of this Change Order:

Description:

**[Description of the change]**

Attachments:

**[List documents related to the change]**

Change in Contract Price	Change in Contract Times [State Contract Times as either a specific date or a number of days]
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
<b>[Increase] [Decrease]</b> from previously approved Change Orders No. 1 to No. <b>[Number of previous Change Order]</b> : \$ _____	<b>[Increase] [Decrease]</b> from previously approved Change Orders No.1 to No. <b>[Number of previous Change Order]</b> : Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
<b>[Increase] [Decrease]</b> this Change Order: \$ _____	<b>[Increase] [Decrease]</b> this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

Recommended by Engineer (if required)

Accepted by Contractor

By: \_\_\_\_\_

\_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

\_\_\_\_\_

Authorized by Owner

Approved by Funding Agency (if applicable)

By: \_\_\_\_\_

\_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

\_\_\_\_\_

## FIELD ORDER NO.:

Owner: Brushy Creek Municipal Utility District **Owner's Project No.:**  
Engineer: Ardurra Group, Inc. Engineer's Project No.: 2023-0002-00  
Contractor: Contractor's Project No.:  
Project: Winterization and Electrical Improvements Project  
Contract Name:  
Date Issued: Effective Date of Field Order:

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

### Reference:

Specification Section(s):

Drawing(s) / Details (s):

### Description:

**[Description of the change to the Work]**

### Attachments:

**[List documents supporting change]**

### Issued by Engineer

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



SECTION 01 11 00  
SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION OF WORK

- A. Raw Water Intake Facility is located at 2040 Cedar Breaks Rd, Georgetown, TX 78628
- B. The Well Site is located at Atumn Ln, Round Rock, TX 78681 (30.525982, -97.706815).
- C. Water Treatment Plant is located at 2300 Great Oaks Drive, Round Rock, TX 78681.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 SCOPE OF WORK

- A. Work of the contract is for winterization and electrical improvements at Brushy Creek Municipal Utility District (BCMUD). Generally, the work consists of the following:
  - 1. Mobilization, bonds, and insurance by the Contractor to initiate project start-up, as specified in Contract Documents.
  - 2. Storm water pollution prevention plan and storm water control measures during construction as specified in Contract Document.
  - 3. Winterization and electrical improvements as shown on the Drawings and specified herein.

Raw Water Intake Site Improvements:

- a. Installation of Backup Power Generator at Raw Water Intake Facility (by ARPA funds).
- b. MCC Improvements at the raw water intake facility.

WTP Improvements (by ARPA Funds):

- a. Install pipe insulation and heat tracing at the Membrane Feed Pump Station.
- b. Install pipe insulation and heat tracing at the Recycle Pump Station.

Well Sites Improvements (by ARPA Funds):

- a. Install pipe insulation and heat tracing at Well Nos. 3, 5 and 6.
- b. Installation of one backup power generators to serve Well Nos. 3 & 5.
- c. Installation of one backup power generators to serve Well No. 6 as an alternate bid item.

- B. Extra Unit Price Items, Additive Alternate Bid Prices, and Deductive Alternate Bid Prices are included in Document Proposal for use if extra work is encountered.

1.04 WORK SEQUENCE

- A. Furnish all labor, materials, equipment and incidentals required and construct the modification and improvements at the BCMUD in its entirety as shown on the Drawings and specified herein.
- B. The Contractor is required to determine his own method of construction and detailed work sequence, within the general terms of the Contract, and the specific requirements of Section 01 33 05, so long as the restraints are observed and the final project completion dates are met.
- C. The Contractor shall serve as an overall coordinator among all Sub-contractors.
- D. The maximum allowable time the facility may be shut-down is four (4) hours. Should the Contractor's means and methods require a shut-down duration of more than four hours, the Contractor shall provide temporary bypass pumping at no additional cost to the Owner.

1.05 CONTRACTOR'S USE OF PREMISES

- A. Coordinate use of premises with Owner, considering work by other contractors.
- B. Assume full responsibility for security of all materials and equipment stored on the site.
- C. If directed by the Owner, move any stored items which interfere with operations of Owner or other contractors.
- D. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.06 OWNER OCCUPANCY

- A. The Owner will occupy the entire project site during the entire period of construction for the conduct of normal operation.
- B. Cooperate with the Owner to minimize conflict, and to facilitate the Owner's operations. Coordinate Contractor's activities with Engineer.
- C. Schedule work to accommodate this requirement.
- D. If Owner occupies any or all parts of the premises, this action does not signify substantial completion or any limits on the Contractor's liability or contractual responsibility of premises.
- E. A single Substantial Completion date will be established for the entire project. The Owner will not be providing partial Substantial Completion.

1.07 GEOTECHNICAL INVESTIGATIONS

- A. In the design and preparation of Contract documents for this Project, the District and Design Consultant have used information in the following geotechnical reports for the investigation and analysis of soils and subsurface conditions at the Project site.

1. Report No. 0122-049, prepared by the firm of Balcones Geotechnical, LLC, entitled Brushy Creek Municipal Utility District Winterization and Electrical Improvements for Brushy Creek Municipal Utility District, Texas dated March 27<sup>th</sup>, 2023, consisting of 19 pages.
  2. Report No. 09-25819, prepared by the firm of HOLT Engineering, Inc., entitled Subsurface Investigation and Foundation Recommendations for Chemical Storage Building for City of Round Rock Raw Water Intake Cedar Breaks Park Road, Georgetown, Texas dated October 3<sup>rd</sup>, 2019, consisting of 21 pages.
- B. An electronic copy of the geotechnical investigation report is included as separate attachments to the Bid Documents.
- C. Neither the District nor Design Consultant is responsible for accuracy or completeness of any information or data.
- D. Contractor shall take full responsibility for interpretation and use of information contained in above listed reports for its bidding and construction purposes.
- E. Contractor may perform additional soil investigations as he/she deems appropriate.

1.08 PERMITS

- A. Raw Water Intake Site: Contractor is responsible for obtaining all building permits required for this project including Building, Electrical, Plumbing, Mechanical, ROW Excavation, etc., and building permit fee. Contractor shall prepare building review plans and forms and submit plans and forms to the Building Permit for review and approval. Contractor shall coordinate and schedule any building inspection or approval as required by the Owner. For any developments within the City of Georgetown, fire department review is included in this permitting process. Contact: 512-930-2550, 300-1 Industrial Ave. Georgetown, TX 78626.
- B. Water Treatment Plant: Contractor is responsible for obtaining all building permits required for this project including Building, Electrical, Plumbing, Mechanical, ROW Excavation, etc., and building permit fee. Contractor shall prepare building review plans and forms and submit plans and forms to the Building Permit for review and approval. Contractor shall coordinate and schedule any building inspection or approval as required by the Owner. City of Round Rock Sam Bass Fire Department also requires plan review for fire protection. Contact: 512-255-0100, 16248 Great Oaks Dr, Round Rock, TX 78681.
- C. Well Site: Contractor is responsible for obtaining all building permits required for this project including Building, Electrical, Plumbing, Mechanical, ROW Excavation, etc., and building permit fee. Contractor shall prepare building review plans and forms and submit plans and forms to the Building Permit for review and approval. Contractor shall coordinate and schedule any building inspection or approval as required by the Owner. City of Round Rock Sam Bass Fire Department also requires plan review for fire protection. Contact: 512-255-0100, 16248 Great Oaks Dr, Round Rock, TX 78681.
- D. Contractor shall obtain all required Storm Water Pollution Prevention Permit from Texas Commission on Environmental Quality and other applicable state and federal review agencies.

1.09 GENERAL CONSTRUCTION NOTES

- A. Contractor shall be responsible for providing required security to protect his own property, equipment, and work in progress in accordance with the Contract Documents.
- B. The Contractor is responsible for verifying the location(s) of all underground utility lines shown on the drawings before beginning construction.
- C. The information contained within the project Drawings with regards to the existing facilities was taken from the original construction plans with the original work shown light and proposed work shown dark. Original work shown light is for the Contractor's information only. Its accuracy is not guaranteed and its use in no way relieves the Contractor or others of any responsibility for loss due to inaccuracies.
- D. Contractor shall be responsible for adequately protecting existing structures, utilities, trees, shrubs, and other adjoining facilities and repair or replace due to damage caused by Contractor.
- E. Contractor shall field verify all dimensions and conditions before commencing work. All landscaping features shall be field verified. It shall be the Contractor's responsibility to report any discrepancies to the engineer in a timely manner. Contractor shall include all field verified information on the project record drawings.
- F. Interruption of water flows of any kind and plant, facility, or process shutdowns are not permitted without prior written approval of the Owner. Submit for approval construction plans which detail schedule, techniques, and method to be used for interruptions of water flow and shut downs. Flow interruptions and shut downs should be scheduled for low flow periods for as short a duration as practical. Shut down of pumping and processing facilities are not allowed during peak flow conditions. Make provisions for accommodating peak flow if necessary. The District's designated Plant Superintendent shall be notified when any interruptions or shut downs are to be made.
- G. Any existing plant process piping or utilities in conflict with proposed construction, whether explicitly identified on the Drawings or not, shall be temporarily relocated as required so as to provide continuous service by the plant and/or by the utility (no separate pay). After construction, piping and/or utility shall be returned to original location (no separate pay), unless notification is provided in writing that relocated piping or utility can remain in modified location (or abandoned as appropriate) and clear identification of new location (or abandonment as appropriate) is noted on the As-Built Drawings.
- H. Contractor to keep access road to existing plants open at all times, unless specific permission is granted by the Owner for the purposes of safety or completion of construction activities. Contractor staging area used for Contractor's personnel, parking, material, and storage. Stockpile, material fabrication and related construction uses will not be allowed to interfere with normal plant operation. Contractor to provide temporary all-weather access roads as needed to maintain access to all plant facilities throughout the duration of the project.
- I. The Contractor to give notice to all authorized inspectors, superintendents or persons in charge of private and public utilities affected by his operations prior to commencement of work.

- J. Obtain all required construction permits prior to commencement of work. See Summary of Work 01 11 00.
- K. The finished grade elevations shown are intended to provide drainage away from treatment plant facilities. Minor changes may be necessary to provide adequate drainage.
- L. Maintain drainage of site during all phases of construction. Do not block drainage from adjacent areas or add flow to adjacent areas.
- M. These Drawings, prepared by Ardurra Group Inc. (Ardurra), do not extend to or include designs or systems pertaining to the safety of the construction Contractor or its employees or agents. Ardurra's registered professional engineer(s) that have sealed these bid documents does not extend to any such safety systems that may now or hereafter be incorporated in these Drawings. The construction Contractor shall prepare or obtain the appropriate safety systems, including the drawings and specifications required by the House Bills 662 and 665 enacted by the Texas Legislature in the 70th Legislature - Regular Session.
- N. The Contractor shall contact the following, a minimum of 48 hours prior to beginning construction:  
  
Texas One Call            (800) 545-6005
- O. Contractor shall not operate any existing valves, plant appurtenances or plant equipment. Provide sufficient lead time for Plant Operator where it becomes necessary to actuate or de-actuate valves, plant appurtenances, or plant equipment.
- P. Designated District Plant Superintendent to be notified 48 hours in advance of any existing process equipment or pump "shutdown."
- Q. All the buried fittings (valves, bends, wyes, plugs, tees, fire hydrants, etc.) shall be installed with joint restraining system to withstand the test pressures listed in the Contract Documents. Contractor responsible for calculating restraint length requirements and providing required restraint piping as necessary. Concrete thrust blocks may be used only for special conditions when approved or directed by the engineer.
- R. Contractor shall comply with all Federal, State, and local laws and regulations of utility companies concerning safety and health practices.
- S. Contractor shall provide hydro-mulch in all areas disturbed as a result of construction operations that are not covered by structures or pavement.
- T. Piping drawings indicate invert elevations for gravity flow lines. Slope pipe uniformly between elevations shown. No valleys or peaks permitted in gravity flow lines. For other piping, refer to detail sheets for pipe elevations at each structure. Yard piping drawings do not indicate vertical bends and transitions. When necessary, make vertical transitions or furnish and install vertical bends at no extra cost. Do not exceed manufacturer's recommendations for curvature of lines and/or deflection of pipe joints. All vertical transitions and bends to be documented on required "red line drawings."

- U. Yard piping locations shown are approximate. Field verify locations of existing pipe. Arrange new piping as necessary to avoid interference and provide clearance noted. All changes in piping shown, to be documented on required "As-Built drawings."
- V. Maintain minimum clearance of 3 feet from edge of structures to closest edge of pipeline adjacent and parallel to edge of structure unless otherwise noted on plans.
- W. The Contractor to provide tape, fittings, plugs, and other devices for use in filling, flushing, testing, etc. (no separate pay).
- X. Overhead lines exist along and adjacent to the project boundary. Contractor to locate them prior to beginning any construction and comply with special restrictions. Texas Law, Session 752, Health and code governing any activities which may cause people or objects to approach live overhead high-voltage lines shall be strictly adhered to. Contractor and owners are legally responsible for safety of construction workers under this law. This law carries both criminal and civil liability.
- Y. The Contractor shall abide by all Oncor Electric and Pedernales Electrical Coop restrictions including all recommended safety precautions. The Contractor shall not operate any equipment or have any persons within 10 feet (vertical and horizontal) of any electrical power lines.
- Z. Provide sheeting, shoring, and bracing of excavations where required to properly and safely complete the work as shown. Construct sheeting, shoring, and bracing to prevent the excavation from extending beyond specified or indicated limits and to protect adjacent structures or improvements. The sheeting, shoring, and bracing that is used to protect workmen and the public shall comply to OSHA, State of Texas, federal regulations, deemed as applicable and concerning trenching, tunneling, or other excavations. Unless specifically noted elsewhere in the Drawings or Specifications, all hardware provided for piping, including nuts, bolts, supports, straps, etc. shall be Type 316 SS.
- AA. Contractor shall coordinate construction activities in the common work area with the City of Georgetown South Lake WTP project. Contractor – PLW Waterworks. Contact João Lopes Farias, Area Manager, at 346-372-0393 or email: [jlopes@plwus.com](mailto:jlopes@plwus.com).

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 14 19  
USE OF SITE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes general use of the site including properties inside and outside of rights-of-way, work affecting road, ramps, streets and driveways and notification to adjacent occupants.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 RIGHTS-OF-WAY

- A. Confine access and operations and storage areas to rights-of-way provided by Owner as stipulated in General Conditions of Agreement; trespassing on abutting lands or other lands in the area is not allowed.
- B. Contractor may make arrangements, at Contractor's cost, for temporary use of private properties, in which case Contractor and Contractor's surety shall indemnify and hold harmless the Owner against claims or demands arising from such use of properties outside of rights-of-way. Any use of private property shall have a written agreement between the contractor and the property owner. Notify the Owner in writing of any agreements and provide written agreement with the landowner to the Owner. The Use of said site shall comply with all Owner ordinances and restrictions.
- C. Restrict total length which materials may be distributed along the route of the construction at any one time to 1,000 linear feet unless otherwise approved by Engineer.

1.04 PROPERTIES OUTSIDE OF RIGHTS-OF-WAY

- A. Altering the condition of properties adjacent to and along rights-of-way will not be permitted unless authorized by the Owner's Representative, Owner and property owner.
- B. Ways, means, methods, techniques, sequences, or procedures which will result in damage to properties or improvements in the vicinity outside of rights-of-way will not be permitted.
- C. Any damage to properties outside of rights-of-ways shall be repaired or replaced to the satisfaction of the Owner's Representative, Owner and property owner at no cost to the Owner or property owner.

1.05 USE OF SITE

- A. Obtain approvals of governing authorities prior to impeding or closing public roads or streets. Do not close more than two consecutive intersections at one time unless approved by the Owner.

- B. Notify the Owner's Representative, Responsible Jurisdiction and the Owner a minimum of 72 hours prior to closing a street or a street crossing. Permits for street closures are required in advance and are the responsibility of the Contractor.
- C. Maintain access for emergency vehicles including access to fire hydrants.
- D. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.
- E. Locate and protect private lawn sprinkler systems which may exist on rights-of-ways within the site. Repair or replace damaged systems to condition equal to or better than that existing at start of Work.
- F. Perform daily cleanup of dirt outside the construction zone, and debris, scrap materials, and other disposable items. Keep streets, driveways, and sidewalks clean of dirt, debris and scrap materials. Do not leave buildings, roads, streets or other construction areas unclean overnight.
- G. Contractor shall assume full responsibility for security of all his and his subcontractors' materials and equipment stored on the site and any and all remote sites.
- H. If directed by the Owner, move any stored items which interfere with normal operations of the Owner.

1.06 PUBLIC, TEMPORARY, AND CONSTRUCTION ROADS AND RAMPS

- A. Construct and maintain temporary detours, ramps, and roads to provide for normal public traffic flow when use of public roads or streets is closed by necessities of the Work.
- B. Provide mats or other means to prevent overloading or damage to existing roadways from tracked equipment or exceptionally large or heavy trucks or equipment.
- C. Construct and maintain access roads and parking areas as specified in Section 01 50 00 - Temporary Facilities and Controls.

1.07 EXCAVATION IN STREETS AND DRIVEWAYS

- A. Avoid hindering or needlessly inconveniencing public travel on a street or any intersecting alley or street for more than two blocks at any one time, except by permission of the Owner's Representative.
- B. Obtain the Owner's Representative and Owner's approval when the nature of the Work requires closing of any portion or an entire street. Permits required for street closure are the Contractor's responsibility. Avoid unnecessary inconvenience to abutting property owners.
- C. Remove surplus materials and debris and open each block for public use as work in that block is complete.
- D. Acceptance of any portion of the Work will not be based on return of street to public use.



- E. Avoid obstructing driveways or entrances to private property.
- F. Provide temporary crossing or complete the excavation and backfill in one continuous operation to minimize the duration of obstruction when excavation is required across drives or entrances. Closure of driveways overnight shall not be allowed unless approved by the Owner.
- G. Provide barricades and signs in accordance with Section VI of the State of Texas Manual on Uniform Traffic Control Devices latest edition.

1.08 SURFACE RESTORATION

- A. Restore site to condition existing before construction to satisfaction of the Owner and Engineer.
- B. Repair paved area per the requirements of the plans and specifications.
- C. Repair turf areas which become damaged per the requirements of the plans and specifications.

PART 2: PRODUCTS – NOT USED

PART 3: EXECUTION – NOT USED

END OF SECTION

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SECTION 01 20 22  
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for measurement and payment plus conditions for nonconformance assessment and nonpayment for rejected products.

1.02 AUTHORITY

- A. Measurement methods delineated in Specification sections are intended to complement the criteria of this section. In the event of conflict, the requirements of the Specification section shall govern.
- B. Measurements and quantities submitted by the Contractor will be verified by the Owner's Construction Manager.
- C. Contractor shall provide necessary equipment, workers, and survey personnel as required by Owner's Construction Manager to verify quantities.

1.03 UNIT QUANTITIES SPECIFIED

- A. Quantity and measurement estimates stated in the Agreement are for contract purposes only. Quantities and measurements supplied or placed in the Work and verified by Owner's Construction Manager shall determine payment as stated in the General Conditions.
- B. If the actual Work requires greater or lesser quantities than those quantities indicated in the Bid Form, provide the required quantities at the unit prices contracted, except as otherwise stated in the General Conditions.

1.04 MEASUREMENT OF QUANTITIES

- A. Measurement by Weight: Measured by unit of weight as submitted on certified load tickets.
- B. Measurement by Volume:
  - 1. Stockpiles: Measured by cubic dimension using mean length, width, and height or thickness.
  - 2. Excavation and Embankment Materials: Measured by cubic dimension using cross-sections measured every 100-feet unless otherwise specified by the owner.
- C. Measurement by Area: Measured by square dimension using mean length and width or radius.
- D. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- E. Stipulated Price Measurement: By unit designated in the agreement.

- F. Other: Items measured by weight, volume, area, or lineal means or combination, as appropriate, as a completed item or unit of the Work.

1.05 PAYMENT

- A. Payment Includes: Full compensation for all required supervision, labor, products, tools, equipment, plant, transportation, services, and incidentals; and erection, application or installation of an item of the Work; and Contractor's overhead and profit.
- B. The total lump sum bid proposal in the Bid Form shall cover all Work required by the Contract Documents. The lump sum bid shall include all costs in connection with the proper and successful completion of the Work, including but not limited to: furnishing all materials, equipment, supplies, and appurtenances; providing all construction equipment and tools; and performing all necessary labor and supervision to fully complete the Work. All Work not specifically set forth in the Bid Form shall be considered subsidiary obligations of Contractor and all costs in connection therewith shall be included in the price bid.
- C. Total compensation for required Unit Price Work shall be included in Unit Price bid in Bid schedule. Claims for payment as Unit Price Work, but not specifically covered in the list of unit prices contained in Bid Schedule, will not be accepted.
- D. Partial payments will be made for materials and equipment stored on site but not installed, in accordance with the General Conditions. The amount paid for stored materials shall be for amount actually paid by Contractor and include any discounts received for early payment. In order to receive approval for partial payment of any materials and equipment stored on site, the Contractor must submit copies of the original invoice with the Application for Payment for all materials and equipment, to be approved for payment. Payment for all stored on site items shall be subject to the retainage described in the General Conditions.
- E. No partial payments will be made for materials and equipment NOT stored on site.
- F. Progress payments will be based on the Owner's Construction Manager's observations and evaluations of quantities incorporated in the Work multiplied by the unit price.
- G. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities determined by Owner & Owner's Construction Manager multiplied by the unit price for Work which is incorporated in or made necessary by the Work.

1.06 NONCONFORMANCE ASSESSMENT

- A. Remove and replace the Work, or portions of the Work, not conforming to the Contract Documents.
- B. If, in the opinion of Owner & Owner's Construction Manager, it is not practical to remove and replace the Work, the Owner & Owner's Construction Manager will direct one of the following remedies:
  - 1. The nonconforming Work will remain as is, but the unit price will be adjusted to a lower price at the discretion of Owner & Owner's Construction Manager.

2. The nonconforming Work will be modified as authorized by the Owner & Owner's Construction Manager, and the unit price will be adjusted to a lower price at the discretion of Owner & Owner's Construction Manager, if the modified work is deemed to be less suitable than originally specified.
- C. Specification sections may modify these options or may identify a specific formula or percentage price reduction.
- D. The Owner's Construction Manager shall make a recommendation to the District on the assessment of nonconformance and adjustment of payment based on the nonconformance if such condition of nonconformance is not specifically resolved within the contract documents. The Owner will have final approval of the assessment and adjustment of payment."

1.07 NONPAYMENT FOR REJECTED PRODUCTS

- A. Payment will not be made for any of the following:
  1. Products wasted or disposed of in a manner that is not acceptable to Owner's Construction Manager.
  2. Products determined as nonconforming before or after placement.
  3. Products not completely unloaded from transporting vehicle.
  4. Products placed beyond the lines and levels of the required Work.
  5. Products remaining on hand after completion of the Work, unless specified otherwise.
  6. Loading, hauling, and disposing of rejected products.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01 25 00  
SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish and install products specified, under options and conditions for substitutions stated in this Section.
- B. Whenever a product, material or item of equipment is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, followed by the phrase "or equal," the specific item mentioned shall be the basis upon which bids are to be prepared, and shall be understood as establishing the type, function, dimension, appearance and quality desired. Other manufacturer's or vendor's products not named will be considered as substitutions, provided the required information is submitted in the manner set forth in this section and provided the substitution will not require substantial revision to the Contract Documents. When the phrase "or equal" is not included, no substitutions will be considered.

1.02 RELATED WORK

- A. Substitutions during the Bidding Period are included in Section 01 25 00.
- B. Bid Form is included in Section 01 41 16.10.
- C. Delivery Storage and Handling is included in Section 01 66 00.

1.03 SELECTION OPTIONS

- A. Preapproved Products: Construction products of certain manufacturers or suppliers are designated in the Specifications as "preapproved." Products of other manufacturers or suppliers will not be acceptable for this Project and will not be considered under the submittal process for approving alternate products.
- B. Approved Products: Construction products or processes of certain manufacturers or suppliers designated in the Specifications followed by the words "or approved equal." Approval of alternate products or processes not listed in the Specifications may be obtained through provisions in the Special Conditions, and by following the submittal procedures specified in Section 01 33 00 - Submittals. The procedure for approval of alternate products is not applicable to preapproved products.
- C. Product Compatibility: To the maximum extent possible, provide products that are of the same type or function from a single manufacturer, make, or source. Where more than one choice is available as a Contractor's option, select a product which is compatible with other products already selected, specified, or in use by the Owner.

1.04 SUBMITTAL OF LIST OF PROPOSED SUBSTITUTIONS

- A. Bidders shall submit their list of proposed substitutions and the proposed monetary changes associated therewith to the Owner on the standard form provided together with their bids.

1.05 CONTRACTOR'S OPTIONS

- A. For Products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For Products specified by naming several products or manufacturers, select any one of products and manufacturers named which complies with Specifications.
- C. For products specified by naming one or more products or manufacturers and stating "or equal," submit a request as for substitutions, for any product or manufacturer which is not specifically named.
- D. For Products specified by naming only one product and manufacturer, there is no option and no substitution will be allowed.

1.06 SUBSTITUTIONS

- A. In order for substitutions to be considered, the Contractor shall submit, within 30 days of issuance of Notice of Award, complete data as set forth herein to permit complete analysis of all proposed substitutions noted on the substitutions list. No substitution shall be considered unless the Contractor provides the required data in accordance with the requirements of this Section within the 30 day period.
- B. Submit separate requests for each substitution. Support each request with:
  - 1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature; identify:
      - 1) Product description.
      - 2) Reference standards.
      - 3) Performance and test data.
      - 4) Operation and maintenance data.
    - c. Samples, as applicable.
    - d. Name and address of similar projects on which product has been used, and date of each installation.
  - 2. Itemized comparison of the proposed substitution with product specified; List significant variations. Substitution shall not change design intent and shall perform equal to that specified.
  - 3. Data relating to impact on construction schedule occasioned by the proposed substitution.
  - 4. Any effect of substitution on separate contracts.
  - 5. List of changes required in other work or products.
  - 6. Accurate cost data comparing proposed substitution with product specified.
    - a. Amount of any net change to Contract Sum.



7. Designation of required license fees or royalties.
  8. Designation of availability of maintenance services, sources of replacement materials.
  - C. Substitutions will not be considered for acceptance when:
    1. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor.
    2. They are requested directly by a subcontractor or supplier.
    3. Acceptance will require substantial revision of Contract Documents.
  - D. Requests for substitutions submitted after Notice of Award will not be considered unless evidence is submitted to the Engineer that all of the following circumstances exist:
    1. The specified product is unavailable for reasons beyond the control of the Contractor. Such reasons shall consist of strikes, bankruptcy, discontinuance of manufacturer, or acts of God.
    2. The Contractor placed, or attempted to place, orders for the specified products within 10 days after Notice of Award.
    3. Request for substitution is made in writing to the Engineer within 10 days of the date on which the Contractor ascertains that he cannot obtain the item specified.
    4. Complete data as set forth herein to permit complete analysis of the proposed substitution is submitted with the request.
  - E. The Engineer's decision regarding evaluation of substitutions shall be considered final and binding. Requests for time extensions and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed. All approved substitutions will be incorporated into the Agreement by Change Order.
  - F. Approved alternate products will be subject to the same review process as the specified product would have been for shop drawings, product data, and samples.
  - G. The Owner desires to have the products and processes as specified in the contract. The consideration and approval of the alternative product or process is at the sole discretion of the owner.
  - H. The Owner retains the right to accept any product or process deemed advantageous to the Owner, and similarly, to reject any product or process deemed not beneficial to the Owner.
- 1.07 CONTRACTOR'S REPRESENTATION
- A. Contractor shall furnish information that the Engineer deems necessary to judge equivalency of the alternate product.

- B. Contractor shall pay for laboratory testing, as well as any other review or examination costs, needed to establish the equivalency between products in order to obtain information upon which the Engineer can base a decision.
- C. If the Engineer determines that an alternate product is not equal to that named in the Specifications, the Contractor shall furnish one of the specified products.
- D. In making formal request for substitution, Contractor represents that:
  - 1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
  - 2. He will provide same warranties or bonds for substitution as for product specified.
  - 3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.
  - 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
  - 5. Cost data is complete and includes related costs under his Contract and Engineer's costs for redesign or revision of Contract Documents, but not:
    - a. Costs under separate contracts.

1.08 ENGINEER DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
- B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 29 00  
PROGRESS PAYMENT PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit Applications for Payment to the Owner in accordance with the schedule established by Conditions of the Contract and Agreement between Owner and Contractor.
- B. The accepted Schedule of Values, Section 01 29 73, shall be used as the basis for the Contractor's Application for Payment.

1.02 RELATED WORK

- A. Agreement between Owner and Contractor is included in EJCDC C-520.
- B. Standard General Conditions of the Construction Contract are included in EJCDC C-700.
- C. Supplementary Conditions are included in EJCDC C-800.
- D. Schedule of Values are included in Section 01 29 73.
- E. Contract Closeout is included in Section 01 70 00.
- F. Project Record Documents are included in Section 01 78 39.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01 33 00, applications typed on the AIA Document G-702 or equivalent.
- B. Provide itemized data on continuation sheet:
  - 1. Format, schedules, line items and values: Those of the Schedule of Values accepted by the Owner and Engineer.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
  - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
  - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
  - 3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.
2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored:
  - a. Round off values to nearest dollar, or as specified for Schedule of Values.
3. List each Change Order executed prior to date of submission, at the end of the continuation sheets:
  - a. List by Change Order Number and description, as for an original component item of work.
4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the Owner or the Engineer requires substantiating data, submit suitable information, with a cover letter identifying:
  1. Project.
  2. Application number and date.
  3. Detailed list of enclosures.
  4. For stored products:
    - a. Item number and identification as shown on application.
    - b. Description of specific material.
- B. Submit one copy of data and cover letter for each copy of application.
- C. As a prerequisite for payment, submit a "Surety Acknowledgement of Payment Request" letter showing amount of progress payment which the Contractor is requesting.
- D. Maintain an updated set of drawings to be used as record drawings in accordance with Section 01 78 39. As a prerequisite for monthly progress payments, exhibit the updated record drawings for review by the Owner and the Engineer.
- E. Submit an updated schedule for each copy of application.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01 70 00 - Contract Closeout.

- C. Submit all Project Record Documents in accordance with Section 01 78 39.

1.07 SUBMITTAL PROCEDURE

- A. Submit Applications for Payment to the Owner at the times stipulated in the Agreement.
- B. Number: Five copies of each Application, pdf only.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 29 73  
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit a Schedule of Values allocated to the various portions of the work, within 21 days after the effective date of the Agreement.
- B. Upon request of the Engineer, support the values with data which will substantiate their correctness.
- C. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 RELATED REQUIREMENTS

- A. Standard General Conditions of the Construction Contract are included in Section 00 72 00 .
- B. Application for Payment is included in Section 01 29 00.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2-in by 11-in or 8-1/2-in by 14-in white paper furnished by the Owner; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:
  - 1. Title of Project and location.
  - 2. Engineer and Project number.
  - 3. Name and Address of Contractor.
  - 4. Contract designation.
  - 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction. Schedule shall be subdivided as necessary by specification section and work area.
- C. Identify each line item with the number and title of the respective Specification Section.
- D. For each major line item list sub-values of major products or operations under the item.
- E. For the various portions of the work:
  - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the Engineer.
    - b. The total installed value.
  - F. The sum of all values listed in the schedule shall equal the total Contract Sum.
  - G. Each item shall also include the percent of the total Contract Amount.
- 1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES
- A. Submit a sub-schedule of unit costs and quantities for:
    1. Products on which progress payments will be requested for stored products.
  - B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
  - C. The unit quantity for bulk materials shall include an allowance for normal waste.
  - D. The unit values for the materials shall be broken down into:
    1. Cost of the material, delivered and unloaded at the site, with taxes paid.
    2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
    3. Paid invoices shall be provided with the second payment request in which the material appears or no payment shall be allowed and/or may be deleted from the request.
  - E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



SECTION 01 31 19  
PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Engineer shall schedule and administer a pre-construction meeting, periodic progress meetings and specially called meetings throughout progress of the work.
- B. Representatives of Contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. Contractor and other required parties shall attend meetings to ensure that work is expedited consistent with Contract Documents and construction schedules.
- D. Meetings, in addition to those specified in this Section, may be held when requested by the Owner, or Contractor.

1.02 RELATED REQUIREMENTS

- A. Instructions to Bidders are included in Section 01 21 13.
- B. Submittals are included in Section 01 33 00.
- C. Project Record Documents are included in Section 01 78 39.
- D. Operating and Maintenance Data is included in Section 01 78 39.

1.03 PRE-CONSTRUCTION MEETING

- A. A preconstruction conference shall be held as soon as possible after Award of Contract and before work is started. The conference will be held at a location selected by the Owner. The conference shall be attended by:
  - 1. Contractor's Office Representative/Project Manager.
  - 2. Contractor's General Superintendent.
  - 3. Any subcontractors' or suppliers' representatives whom the Contractor may desire to invite or the Engineer may request.
  - 4. Engineer's Representatives.
  - 5. Owner's Representatives.
  - 6. Such other individual that the Engineer or Owner may invite.
- B. Suggested Agenda
  - 1. Distribution and discussion of:

- a. List of major subcontractors and suppliers.
    - b. Projected Construction Schedules.
  2. Critical work sequencing.
  3. Major equipment deliveries and priorities.
  4. Project Coordination.
    - a. Designation of responsible personnel.
  5. Procedures and processing of:
    - a. Field decisions.
    - b. Proposal requests.
    - c. Submittals.
    - d. Change Orders.
    - e. Applications for Payment.
  6. Adequacy of distribution of Contract Documents.
  7. Procedures for maintaining Record Documents.
  8. Use of premises:
    - a. Office, work and storage areas.
    - b. Owner's requirements.
  9. Construction constraints
    - a. Scheduling constraints and after-hour/weekend work request procedures
    - b. Facility shut-down constraints and request procedures
    - c. Facility access requirements for operators, maintenance staff, deliveries, and dumpster trucks
    - d. Availability of water and power
  10. Construction facilities, controls and construction aids.
  11. Temporary utilities.
  12. Storm Water Pollution Prevention Plan
  13. Construction traffic plan
  14. Housekeeping procedures and site maintenance.
  15. Liquidated damages.
- C. The Engineer will preside at the conference, prepare the minutes of the meeting and distribute copies of same to all participants who so request by fully completing the attendance form to be circulated at the beginning of the conference.

1.04 PROJECT PROGRESS AND COORDINATION MEETINGS

- A. Hold monthly project progress and coordination meetings. The meeting shall be scheduled and chaired by the Engineer. The Engineer may request representation (at each meeting) by every entity currently involved in coordination, planning or performance of the work; including invitations to the Owner, Contractor, Resident Engineer, Superintendent, separate contractors, subcontractors, suppliers, manufacturers, fabricators, governing authorities, insurers and similar responsible entities having an interest or expertise in the coordination.
- B. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, change orders and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule, on time, or behind time in relation with the updated progress schedule. Determine how behind-time work will be expedited and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work. Conduct meetings in a manner which will resolve coordination problems. Engineer shall record results of meetings and distribute copies to everyone in attendance, and to others affected by the decisions or actions resulting from each meeting.
- C. Immediately following each progress meeting where revisions to the Progress Schedule/ Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule concurrently with report of each meeting, unless extensive revisions require a longer revision period, but in any case, reissue within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.
- D. Preliminary Agenda include items as appropriate.
  - 1. Review of minutes of previous meeting
  - 2. Review of work progress since previous meeting
  - 3. Review field observations, problems, and conflicts
  - 4. Identify problems which impede construction schedule
  - 5. Review of off-site fabrication, delivery schedules
  - 6. Corrective measures and procedures to regain projected schedule
  - 7. Revisions to construction schedule
  - 8. Progress, schedule, during succeeding work period
  - 9. Coordination of schedules and projected progress
  - 10. Review submittal schedules

11. Maintenance of quality and work standards
  12. Pending changes and substitutions
  13. Review of Request For Information and Request for Proposal Status
  14. Review proposed changes for:
    - a. Effect on construction schedule and on completion date
    - b. Effect on work by others
  15. Review Record Documents
  16. Review monthly pay request
- E. Contractor shall be prepared to discuss all agenda items.
- F. Contractor shall provide a current submittal log at each progress meeting in accordance with Section 01 33 00 – Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 32 33  
CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Photographic requirements for construction photographs and submittals.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 SUBMITTALS

- A. Construction Photographs shall be made and submitted according to the provisions of all sections of these specifications.
- B. All photographs shall be taken digitally and submitted on a flash drive with Project Name, Contractor and Date Photographs were taken.
- C. Prepare 2 copies of the flash drive of each view in digital format and submit 1 directly to the Owner's Representative:
  - 1. Preconstruction Photographs. Submit prior to start of construction operations and first Application for Payment.
  - 2. On-going Construction Photographs. Submit with each Application for Payment at the times established for submittal of Applications for Payment.
  - 3. Post Construction Photographs. Submit after Date of Substantial Completion and prior to final payment.

PART 2 PRODUCTS

2.01 PRECONSTRUCTION PHOTOGRAPHS

- A. Prior to the commencement of any construction, take digital color photographs of the entire project site and adjacent properties. Photographs shall be 5 megapixel quality minimum.
- B. Provide photographs recorded on a flash drive and a photo log shall be submitted with the flash-drive's providing the required details.
- C. The photographs shall show:
  - 1. Date photographs were taken
  - 2. Location of the photograph, house number and street name.
    - a. This information may be shown on a chalkboard in the photograph or by a label on the photo log.

- D. Photographs should show the condition of the following:
  - 1. Existing structures
  - 2. Existing utilities
  - 3. Adjacent streets and properties.
  - 4. Adjacent utilities.
- E. Surface features (yard lights, fences, manholes, valve boxes, sprinkler heads, mail boxes, etc.)
- F. Trees, shrubs and grass.
- G. Any other items the contractor, Owner, and/or Owner's Construction Manager requests or requires.
- H. Areas of damaged improvements that the Contractor desires to document preconstruction.
- I. Aerial photographs of the project site, taken from at least 4 vantage points, prior to construction.

#### 2.02 ON-GOING CONSTRUCTION PHOTOGRAPHS

- A. During construction, contractor shall provide monthly construction progress photographs with a minimum of 4 vantage points to best show status of construction and progress, with the same quality and labeling requirements as 2.01 of this section. Provide photographs on flash drive to the Engineer.
- B. Take monthly progress photographs at regular intervals to coincide with cutoff dates associated with each Application for Payment.

#### 2.03 POST CONSTRUCTION PHOTOGRAPHS

- A. On completion of construction, provide photographs of any public or private property which has been repaired or restored and any damage which is the subject of complaints. Damaged areas that cannot be documented by photographs preconstruction will be the Contractor's responsibility for repair.
- B. Submit in same quantity and format as the preconstruction photographs.

#### PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 33 05  
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

- A. No work shall be done between 6:00 P.M. and 7:00 A.M. nor on Saturdays or Sundays or legal holidays without the written permission of the Owner. However, emergency work may be done without prior permission. Emergency work shall include work to mitigate or prevent conditions that may pose an immediate threat to the health and well-being of workers under the supervision of the Contractor or Owner or the general population, including maintenance of operations of the treatment process, as well as work to mitigate or prevent conditions that may cause damage to existing facilities or work in-progress. Efforts shall be made at the earliest convenience to notify the Owner and Engineer or such work deemed to be emergency work and documentation shall be provided in writing.
- B. If night work is required, the Contractor should coordinate with the Owner for permission. Such permission, however, may be revoked at any time by the Owner if the Contractor fails to maintain adequate lighting equipment, and supervision for the proper prosecution and control of the work at night, or if the off-site effects of night construction are deemed by the Owner to be unacceptable.
- C. Due to the potential health hazards, and requirements of the State of Texas and the U.S. Environmental Protection Agency, water treatment facilities must be maintained in operation throughout the construction period. It is required that the degree of treatment during construction be equal to or exceed the efficiency required by the Plant's discharge permits.
- D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, heating, ventilating, air conditioning, lighting, temporary structures, and such other items required to maintain the treatment plant operations. All details of temporary piping and temporary construction are not indicated in the plans or these Specifications. However, this does not relieve the Contractor of the responsibility to insure the construction will not interrupt proper water treatment.
- E. Several areas of construction under this contract must be coordinated with the Plant Operating Personnel and accomplished in a logical order to maintain the process flow through the plant and to allow construction to be completed within the time allowed by Contract Documents. Coordinate the activities with the other contractors, if any, to allow orderly and timely completion of all the work.
- F. When access through construction areas must be disrupted, provide alternate acceptable access for the plant operators.
- G. Coordinate the activities in the interface or common areas with the plant operators. Submit to the Engineer a description and schedule as to how the common areas will be utilized, recognizing the required coordination with the plant operators.

- H. Various interconnections within the plant will depend on the closure of various valves and/or gates. Only Plant Operation Personnel may close or open existing facilities (i.e. valves, gates, lift stations, hydrants, etc.).
- I. Various interconnections within the plant may require temporary partial power shutdown. Make every effort necessary to minimize the shutdown time and coordinate with the Plant Operating Personnel and/or utility authorities prior to attempting any such power shutdown. Furthermore, provide any corrective measure or temporary facilities necessary to perform the work at no additional cost to the Owner and without interrupting the plant operation.
- J. When the work requires an existing facility to be taken out of operation, temporarily or permanently, notify the Engineer and Owner at least 14 calendar days in advance.
- K. Where water is required in large quantity for preoperational testing or other use, plant process water may be used, upon coordination with Owner. If the plant water (washdown hydrants, etc.) is not sufficient to be used for testing the water retaining structures, it is the Contractor's responsibility to coordinate the acquisition of water.
- L. During Start-Up Testing, make available the manpower, equipment and manufacturer's representatives required to make any necessary adjustments and training.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this section. Include payment in the lump sum base bid.

1.03 PROGRESS OF THE WORK

- A. The Work shall be started within 15 days following the effective date of the Agreement, the work shall be executed with such progress as may be required to prevent any delay to the general completion of the project. The work shall be executed at such times and in or on such parts of the project, and with such personnel, materials, and equipment to assure completion of the work in the time established by the Agreement.
- B. If the Contractor for his convenience and at his own expense, should desire to carry on his work at night or outside regular hours, he shall submit written notice to the Engineer and he shall allow ample time for satisfactory arrangements to be made for inspecting the work in progress. The Contractor shall pay the expenses for extra inspection required for work outside regular hours at the current hourly rates at the time of construction. The Contractor shall illuminate the different parts of the project as required to comply with all applicable Federal and State regulations.

1.04 CONSTRUCTION SCHEDULE

- A. In lieu of the progress schedules specified in the General Conditions, the Contractor shall, within ten (10) days after the effective date of the Agreement, provide and submit to the Engineer for approval, the Schedule for the first 60 days of activities. Within 45 days after the effective date of the Agreement the Contractor shall provide and submit to the Engineer the schedule he plans to maintain in order to successfully construct the entire project within the time allotted. The completed schedule shall be approved before additional monthly payments



are made. This Schedule shall include a Critical Path Network and a computer-generated printout. The Schedule shall account for all the work of the Contractor and his Subcontractors and suppliers. In addition to all reasonably important construction activities, the Schedule shall provide for the proper sequence of construction the various key milestones and various crafts, purchasing time, submittal approval, material delivery, equipment fabrication, and similar time consuming factors.

- B. The Schedule shall include as a minimum, the earliest starting and finish dates, and latest starting and finish dates, and the total float for each task or item. The Contractor shall update (monitor) and rerun the schedule at least monthly and shall submit to the Engineer both the network and computer print-out, both in duplicate, at the same time the pay estimate is prepared. The schedule shall contain all of the items of the Periodic Estimate and Pay Schedule.
- C. While the Contractor bears full responsibility for scheduling the Work to insure its successful prosecution and completion within the time specified in accordance with all provisions of these Specifications, the Contractor is specifically required to complete fully or complete such stages of work to enable his Subcontractors and suppliers to complete their work within the respective time specified.
- D. The monthly schedule update (monitoring) shall include the following items:
  - 1. Network
    - a. Activities that are completed or in process are to be identified on the Network by contrasting heavy lines, colors, fill patterns, etc. Each activity worked on should be proportional to the percentage of progress achieved to date, as shown in the Periodic Estimate and Pay Schedule.
    - b. Restraints imposed by material deliveries, precedent activity durations or schedule adjustments, are to be appropriately represented on the monthly update of the Network.
  - 2. Computer Print-out
    - a. The percentage progress status of each activity shall be shown on the computer print-out. The percentage progress status will be used to support the Contractor's periodic pay estimate.
    - b. Actual start and completion dates are to be included in the computer printout.
    - c. All activities started and in progress should be flagged in the computer printout.
- E. Supplemental to the Critical Path Schedule, the Contractor shall provide a detailed work schedule, projected at least a month in advance. The implementation of the work schedule and the coordination required will constitute the basic agenda of the coordination and planning meetings.
- F. If the Engineer determines that operations are falling behind schedule at any time during the construction period, the Owner may require the Contractor to add to his plant, equipment and/or construction forces, including increases in working hours, in such quantities as are required to bring operations back on schedule. Upon receipt of written communication from the Owner requiring such addition, the Contractor shall furnish same at no additional cost to the Owner.

1.05 PARTIAL OWNER OCCUPANCY

- A. The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the Owner's occupancy prior to Pre-Final Inspection of the entire work.

1.06 PLANT CAPACITY CONSTRAINTS

- A. The Contractor shall work with the District Operations staff and the CM to maintain the required capacity at the project sites at all times.
- B. It is understood that shutdowns of existing pipelines, process units and operations, of short and controlled durations, may be necessary to complete construction. However, Contractor shall work with the Owner to schedule work that may impact plant operations in such a manner that plant production will meet the capacity constraints established in this Paragraph. The Contractor's project schedule will be structured to maintain capacity requirements. In the event that construction activity begins to impact capacity constraints in a manner unforeseen by the Contractor, the Contractor shall immediately take all steps necessary to remove the impact on capacity caused by construction and restore specified plant capacity .
- C. The Contractor shall provide the Owner and CM a request for shutdown at a minimum 14 calendar days prior to the scheduled shutdown. The Owner reserves the right to grant, delay, or deny such shutdown request depending upon required production capacity at the time. In addition, the Contractor's overall construction schedule shall clearly highlight the anticipated scheduled shutdown dates and duration.
- D. The time of shutdown will be decided by the Owner.
- E. Contractor shall not be entitled to additional payment for shutdown work scheduled during night-time, Sundays or holidays to meet plant operating requirements.

1.07 GENERAL PROJECT CONSTRAINTS

- A. Before commencing work on any of the existing structures or equipment, the Contractor shall notify the CM, in writing, at least 14 calendar days in advance of the date he proposes to commence such work.
- B. The Contractor shall provide at his own cost all necessary temporary facilities for access to, and for protection of, all existing structures. The treatment plant personnel must have ready access at all times to the existing structures. The Contractor is responsible for all damage to existing structures, equipment, and facilities caused by his construction operations, and must repair all such damage when and as directed by the CM.
- C. All existing pump stations must remain fully operational during construction, except as specifically approved by the Owner.
- D. Utility Outages and Shutdown: Provide notification to the Owner a minimum of 14 calendar days in advance of required utility shutdown. Coordinate all work as required.
- E. The Contractor is required to protect all equipment, buildings, structures, piping, electrical cables, tanks, underground utilities, and all associated appurtenances during construction.

- F. The Contractor is responsible for all temporary supports and bracing for all structural elements including, but not limited to, pumps, piping, walls, and foundations. All proposed temporary bracing and supports must be submitted by the Contractor for approval by the Owner and must be prepared by a Registered Professional Engineer retained by the Contractor. It is the Contractor's responsibility to insure the safety and functionality of the piping and associated appurtenances in the intermediate conditions of sequencing between these said temporary phase conclusions. Furthermore, should the Contractor feel that any supports or bracing illustrated or depicted within these construction documents present a potential problem in terms of safety or interference with operations, it is the Contractor's responsibility to immediately document these concerns and immediately present this said documentation to the Owner's attention.
- G. Contractor shall maintain existing onsite Plant access roads and parking spaces, to the greatest degree possible, over the course of the Project. When the progression of work disrupts onsite Plant access roads, Contractor shall establish and maintain temporary access roads as required to complete the Project and/or provide alternate access for Owner's Plant personnel. Contractor's establishment of temporary access roads shall be sufficient to provide a similar level of service, fulfill the Owner's need and shall not disrupt Plant operations, fire truck access, or create any safety hazards.

1.08 WORK COORDINATION

- A. Refer to Section 01 31 19 – Project Meetings
- B. Coordination with Work provided by Others
  - 1. All costs associated with coordination of work and other contracts shall be included in the base bid unit price.
- C. The Contractor shall make every effort to group work in similar areas or work that will affect similar operation together.
- D. Contractor shall keep the CM informed of all work activities, including daily notification of all crews performing work and the locations thereof.
- E. The Contractor is required to protect all equipment, buildings, structures, piping, electrical cables, tanks, underground utilities, and all associated appurtenances during construction.
- F. Contractor shall provide temporary trailer facilities for use by the Engineer and Construction Management Team for the duration of the project through Construction Closeout Activities. Contractor will be responsible for all utility connections and services.

1.09 WORK SEQUENCE

- A. All work to be done under this Contract shall be done with minimum inconvenience to the existing wastewater treatment facilities. The Contractor shall coordinate his work with the Owner such that the facilities are maintained to the maximum extent possible.
- B. Construct Work in stages to accommodate the Owner's use of the premises during the construction period; coordinate the Construction schedule and operations with the Owner's Representative.

- C. Contractor shall develop the construction schedule to accommodate all construction sequence requirements identified in this Section.

1.10 CONSTRUCTION AREAS

- A. Contractor shall limit his use of the construction areas for Work and for storage, to allow for:
  - 1. Work by other contractors, if any.
  - 2. Owner use.
  - 3. This section and other sections of these specifications, for existing construction operations and coordination of the work.
- B. Coordinate use of work site under direction of Engineer.
- C. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.
- D. Move any stored Products under Contractor's control which interfere with operations of the Owner or separate contractor.
- E. Obtain and pay for the use of additional storage or work areas needed for operations.
- F. Construction Operations on Plant Property.
  - 1. The Contractor shall conduct his plant access, hauling, parking and storage operations as specified and within the construction site plans. Any staging/storage areas are tentative and subject to change until Contractor issues a Notice to Proceed.

1.11 ADDITIONAL PROVISIONS

- A. Before commencing work on any of the existing structures or equipment or any planned work associated with any shutdown of the plant or portions of the plant, the Contractor shall notify the Engineer, in writing, at least 14 calendar days in advance of the date he proposes to commence such work.
- B. The Contractor shall provide at his own cost all necessary temporary facilities for access to, and for protection of, all existing structures. The treatment plant personnel must have ready access at all times to the existing structures. The Contractor is responsible for all damage to existing structures, equipment, and facilities caused by his construction operations, and must repair all such damage when and as ordered by the Engineer.

1.12 OWNER OCCUPANCY

- A. Owner shall have full access to and use of all existing utilities during the entire period of construction for the conduct of his normal operations. Cooperate with Owner's Representative in all construction operations to minimize conflict, and to facilitate Owner usage.

- B. Contractor shall at all times conduct his operations as to insure the least inconvenience to the general public and plant operating/maintenance personnel.

1.13 PARTIAL OWNER OCCUPANCY

- A. The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the Owner's occupancy prior to Pre-Final Inspection of the entire work.

1.14 MINIMUM CONDITIONS FOR SUBSTANTIAL COMPLETION

- A. In addition to requirements outlined in document EJCDC C-700 – General Conditions, for Contractor to be substantially complete with the Work and call for inspection by Owner Engineer to confirm, the following minimum conditions must be met or completed:
  - 1. All new structures and buildings fully constructed and complete with all utilities connected, tested, in service and operational.
  - 2. All equipment installed, tested, and functional in all modes of operation as defined in Divisions 26 and 40 and manufacturer certificates of installation have been provided where required.
  - 3. All yard piping, site electrical and all other site work installed, tested, and complete and accepted by Owner.
  - 4. All programming, control narratives and system startup procedures and equipment interaction fully demonstrated.
  - 5. Final O&M manuals have been delivered to the Owner in hard copy and electronic format. Electronic manuals shall be provided in a format acceptable to the Engineer and Owner.
  - 6. Completion of requirements outlined in individual equipment Specification Sections.
  - 7. Completion of installations of all required safety structures and equipment, including, but not limited to, guard rails, warning signs, pipe and equipment painting, labeling, and tagging. All safety related systems and equipment shall be installed, accepted by manufacturer's representative and approved for use.
  - 8. All training completed using Draft O&M Manuals.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01 35 00  
SPECIAL PROVISIONS

PART 1 GENERAL

1.01 GENERAL OBLIGATIONS OF THE CONTRACTOR

- A. General obligations of the Contractor shall be as set forth in the Contract Documents Unless special payment is specifically provided in the payment paragraphs of the specifications, all incidental work and expense in connection with the completion of work under the contract will be considered a subsidiary obligation of the Contractor, and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

1.02 SITE INVESTIGATION

- A. The Contractor shall satisfy himself as to the conditions existing within the project area, the type of equipment required to perform the work, the character, quality and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Contract Documents. Any failure of the Contractor to acquaint himself with the available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.03 COORDINATION WITH OWNER AGENCIES

- A. The Contractor shall supply applicable Jurisdictions, the Owner Police Department, Fire Department, and the Public Works Department with the following information as applicable for each major construction activity:
  - 1. Immediate notification of any gas or water main breaks.
- B. The Contractor will be required to reimburse the Owner for the actual cost of the services of Public Works Department Personnel required by him during other than regular working hours.

1.04 SHIPMENT AND DELIVERY OF EQUIPMENT

- A. Equipment shall not be shipped until approved by the Owner's CM. The intent of this requirement is to reduce site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to anticipated installation without written authorization from the Owner's CM.
- B. During shipment and delivery, the following procedures shall apply:
  - 1. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay between time of shipment and installation, including any prolonged period at the site.

2. Factory assembled parts and components shall not be disassembled for shipment unless permission is received in writing from the Owner's CM.
3. Finished surfaces of all exposed parts shall be properly protected against adverse conditions that may prevail from time of shipment until ready for operation.
4. All finished surfaces of all exposed flanges shall be protected by wooden blank flanges, stoutly built, and securely bolted.
5. Finished iron and steel surfaces not painted shall be protected against rust and corrosion.
6. After hydrostatic or other tests, all entrapped water shall be drained, and care taken to prevent the entrance of water during shipment, storage, and handling.
7. Each box or package shall be legibly marked to show its net weight and contents.
8. At the time of shipment, the shipping list, original bill of lading, shipping memorandum, and invoice shall be mailed in triplicate to the Owner's CM. Each shipping list shall give the description and net weight of each item, and gross weight of the shipment. Shipment will not be accepted until the list has been received.
9. Demurrage, or other charges resulting from failure to furnish these items shall be absorbed by the Contractor.
10. The Contractor shall make suitable provision for the handling and delivery of all equipment and material at the site.

1.05 SPECIAL PRECAUTIONS

- A. The Contractor shall conduct his operations in a manner to safe-guard against hazards up until the time the work is complete. Safe-guards shall include ventilation system equipment, gas detection equipment, respiratory equipment, and other equipment as appropriate for the application.

1.06 WEATHER PROTECTION

- A. In the event of inclement weather, the Contractor shall protect the Work and materials from damage or injury from the weather. If, in the opinion of the Owner's CM, any portion of the Work or materials has been damaged by reason of failure on the part of the Contractor to so protect the Work, such Work and materials shall be removed and replaced with new materials and Work to the satisfaction of the Owner's CM.

1.07 INSTALLATION OF EQUIPMENT

- A. Special care shall be taken to ensure proper alignment of all equipment with particular reference to the pumps and electric drives. The units shall be carefully aligned on their foundations by qualified millwrights after their sole plates have been shimmed to true alignment at the anchor bolts. The anchor bolts shall be set in place and the nuts tightened against the shims. After the foundation alignments have been approved by the Engineer, the bedplates or wing feet of the equipment shall be securely bolted in place. The alignment of equipment shall be further



checked after securing to the foundations, and after conformation of all alignments, the sole plates shall be finally grouted in place. The Contractor shall be responsible for the exact alignment of equipment with associated piping, and under no circumstances, will "pipe springing" be allowed.

- B. All wedges, shims, filling pieces, keys, packing, grout, or other materials necessary to properly align, level, and secure apparatus in place shall be furnished by the Contractor. All parts intended to be plumb or level must be proven exactly so. Perform all grinding necessary to bring parts to proper bearing after erection.

#### 1.08 SLEEVES AND OPENINGS

- A. Provide all openings, channels, chases, etc., in new construction and furnish and install anchor bolts and other items to be embedded in concrete, as required to complete the work under this Contract. Perform all cutting, coring and rough and finish patching required in existing construction for the work of all trades as provided in Section 01 73 29.
- B. Subcontractors shall furnish all sleeves, inserts, hangers, anchor bolts, etc., required for the execution of their work. It shall be their responsibility before the work of the General Contractor is begun to furnish him with the above items and with templates, drawings or written information covering chases, openings, etc., which they require and to follow up the work of the General Contractor as it progresses, making sure that their drawings and written instructions are carried out. Failing to do this, they shall be responsible for the cost of any corrective measures which may be required to provide necessary openings, etc. If the General Contractor fails to carry out the directions given him, covering details and locations of openings, etc., he shall be responsible for any cutting and refinishing required to make the necessary corrections. In no case shall beams, lintels, or other structural members be cut without the approval of the Engineer.

#### 1.09 GREASE, OIL AND FUEL

- A. All grease, oil and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment.

#### 1.10 TOOLS

- A. Any special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation and maintenance of any equipment shall be furnished with the respective equipment.
- B. Tools shall be furnished in heavy steel toolboxes complete with lock and duplicate keys.

#### 1.11 POWER SUPPLY

- A. Unless otherwise specified, all motors 1/2 HP and larger shall be designed for a power supply of 460 Volts, 3 Phase, 60 Hz, and all motors 1/3 HP and smaller shall be designed for a power supply of 120 Volts, single phase, 60 Hz.

1.12 NOISE LIMITATIONS

- A. All equipment to be furnished under this Contract, unless specified otherwise in the technical specifications, shall be designed to ensure that the sound pressure level does not exceed the sound limits as regulated by ordinance of local jurisdiction, over a frequency range of 37.8 to 9600 cycles per second at a distance of 3-ft from any portion of the equipment, under any load condition, when tested using standard equipment and methods. Noise levels shall include the noise from the motor. Mufflers or external baffles shall not be acceptable for the purpose of reducing noise. Data on noise levels shall be included with the shop drawing submittal.
- B. Contractor shall comply with the City of Georgetown requirements as applicable when performing work at the Raw Water Intake site. Code of Ordinance, Title 8, Chapter 8.16 – Noise Control.
- C. Contractor shall comply with the City of Round Rock requirements as applicable when performing work at the Well sites. Code of Ordinance, Chapter 14 0 Environment, Article VIII – Noise.
- D. Contractor shall comply with the Williamson County requirements as applicable when performing work at the WTP. Williamson County Zoning Ordinance regarding Sound Standard, Articles 11, 16 and 23.

1.13 SPARE PARTS

- A. Where spare parts are specified in the technical sections, furnish all spare parts recommended by the manufacturer or system supplier for one year of service. In addition, furnish all spare parts itemized in each Section.
- B. Collect and store all spare parts in an area to be designated by the Engineer. Furnish the Engineer with an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivery cost.
- C. Spare parts shall be packed in cartons, properly labeled with indelible markings with complete descriptive information including manufacturer, part number, part name and equipment for which the part is to be used and shall be properly treated for one year of storage.

1.14 MAINTENANCE DATA SHEETS

- A. Contractor shall prepare maintenance data sheets for each piece of equipment furnished and provide with the O&M materials. Data sheets shall be completed by the Contractor in Microsoft Excel format.

END OF SECTION

SECTION 01 35 43  
ENVIRONMENTAL PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, silt fences, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All erosion control measures shall be in place in an area prior to any construction activity in that area. Specific requirements for erosion and sedimentation controls are specified in Section 31 25 14.
- D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is Contractor's responsibility to determine the specific construction techniques to meet these guidelines.
- E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency.

1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS

- A. The Owner's Construction Manager (CM) will notify Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Owner's CM, of any non-compliance with State or local requirements. Contractor shall, after receipt of such notice from the Owner's CM or from the regulatory agency through the Owner's CM, immediately take corrective action. Such notice, when delivered to

Contractor or his/her authorized CM at the site of the work, shall be deemed sufficient for the purpose. If Contractor fails or refuses to comply promptly, Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by Contractor unless it is later determined that Contractor was in compliance.

**1.04 IMPLEMENTATION**

- A. Prior to commencement of the work, meet with Owner to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.
- B. Remove temporary environmental control features, when approved by the Owner's CM, and incorporate permanent control features into the project at the earliest practicable time.

**1.05 PROTECTION OF WATERWAYS**

- A. Contractor shall observe the rules and regulations of the State of Texas and agencies of the U.S. Government prohibiting the pollution of any lake, stream, river, adjacent canal or wetland by the dumping of any refuse, rubbish, dredge material, or debris therein.
- B. Contractors are specifically cautioned that disposal of materials into any waters of the State must conform with the requirements of the TCEQ, and an applicable permit from the U.S. Army Corps of Engineers.
- C. Contractor shall be responsible for providing holding ponds or an approved method which will handle, carry through, or divert around his work all flows, including storm flows and flows created by construction activity, so as to prevent silting of waterways or flooding damage to the property or adjacent properties.
- D. Contractor is responsible for researching the need for a Texas Pollutant Discharge Elimination System (TPDES) permit for the construction site. If one is required, Contractor is responsible for obtaining the permit and for monitoring the site per the permit requirements until final completion, as well as submitting all certification forms to the Owner and reviewing the implementation of the SWPPP in a meeting with the Owner and Engineer before beginning construction.

**1.06 DISPOSAL OF EXCESS EXCAVATION AND OTHER WASTE MATERIALS**

- A. Excess excavated material not required or suitable for backfill and other waste material must be disposed of at sites approved by Owner or hauled off site.
- B. Unacceptable disposal sites, include, but are not limited to, sites within a wetland or critical habitat and sites where disposal will have a detrimental effect on surface water or groundwater quality.
- C. Contractor may make his own arrangements for disposal subject to submission of proof to the Owner's CM that Owner(s) of the proposed site(s) has a valid fill permit issued by the

appropriate governmental agency and submission of a haul route plan including a map of the proposed route(s).

- D. Contractor shall provide watertight conveyance of any liquid, semi-liquid, or saturated solids which tend to bleed or leak during transport. No liquid loss from transported materials will be permitted whether being delivered to the construction site or being hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at the selected disposal site.

#### 1.07 USE OF CHEMICALS

- A. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture or any other applicable regulatory agency. Use of all such chemicals and disposal of residues shall be in conformance with the manufacturer's instructions.
- B. Any oil or other hydrocarbon spilled or dumped on Owner's Site during construction must be excavated and completely removed from the site prior to final acceptance. Soil contaminated by Contractor's operations shall become the property of Contractor, who will bear all costs of testing and disposal.
- C. Before Contractor commences work, the following steps shall be completed.
  - 1. Owner will provide a copy of the Chemical List giving the hazardous chemicals to which Contractor, his employees and agents may be exposed to on the project site upon the Contractor's request.
  - 2. Owner will provide copies of all MSDSs to Contractor for the hazardous chemicals which he may be exposed to on the project site upon the Contractor's request.
  - 3. Contractor shall provide MSDSs for all hazardous chemicals he may bring onto the project site that Owner's employees may be exposed to.
  - 4. Contractor shall sign a Contractor Acknowledgement certifying that he has received the information provided by the Owner on hazardous chemicals and maintain the Acknowledgement with the original Contract.

#### 1.08 MEASUREMENT AND PAYMENT

- A. The work specified in this Section shall be considered incidental and payment will be included as part of the appropriate lump sum or unit prices specified in the Bid Form.

#### PART 2 PRODUCTS – NOT USED

#### PART 3 EXECUTION

##### 3.01 EROSION CONTROL

- A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, hay check dams,

mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

### 3.02 PROTECTION OF STREAMS

- A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream from pollution by debris, sediment or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such waters will be diverted through a settling basin or filter before being directed into the streams.
- B. Contractor shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the TCEQ. Contractor shall submit two copies of approved contingency plans to the Owner's CM.
- D. Water being flushed from structures or pipelines after disinfection, with a chlorine residue of 2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Owner's CM, prior to discharge.

### 3.03 PROTECTION OF LAND RESOURCES

- A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Owner's CM. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.
- C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

- D. Any trees or other landscape feature scarred or damaged by Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Owner's CM will decide what methods of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

All scars made on trees by equipment, construction operations, or by the removal of limbs larger than 1-inch in diameter shall be coated as soon as possible with an approved tree wound dressing. All trimming or pruning shall be performed in an approved manner by experienced workmen with saws or pruning shears. Tree trimming with axes will not be permitted.

Climbing ropes shall be used where necessary for safety. Trees that are to remain, either within or outside established clearing limits, that are subsequently damaged by Contractor and are beyond saving in the opinion of the Owner's CM, shall be immediately removed and replaced.

- E. The locations of Contractor's storage, and other construction buildings, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as shown on the Drawings and shall require written approval of the Owner's CM and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the Owner's CM.
- F. If Contractor proposes to construct temporary roads or embankments and excavations for plant and/or work areas, he/she shall submit the following for approval at least ten days prior to scheduled start of such temporary work.
1. A layout of all temporary roads, excavations and embankments to be constructed within the work area.
  2. Details of temporary road construction.
  3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.
  4. A landscaping drawing showing the proposed restoration of the area. Removal of any trees and shrubs outside the limits of existing clearing area shall be indicated. The drawing shall also indicate location of required guard posts or barriers required to control vehicular traffic passing close to trees and shrubs to be maintained undamaged. The drawing shall provide for the obliteration of construction scars as such and shall provide for a natural appearing final condition of the area. Modification of Contractor's approved drawings shall be made only with the written approval of the Owner's CM. No unauthorized road construction, excavation or embankment construction including disposal areas will be permitted.
- G. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by Engineer. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as described in these specifications, or as approved by the Owner's CM.

- H. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.04 PROTECTION OF AIR QUALITY

- A. Burning: The use of burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Dust Control: Contractor will be required to maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.
- C. All unpaved streets, roads, detours, or haul roads used in the construction area shall be given an approved dust-preventive treatment or periodically watered to prevent dust. The use of petroleum products is prohibited. The use of chlorides may be used with the approval of the engineer. Applicable environmental regulations for dust prevention shall be strictly enforced.
- D. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the Owner's CM.
- E. Sprinkling, to be approved by the Owner and Owner's CM, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and Contractor must have sufficient suitable equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Owner's CM.

3.05 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this Contract, maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.06 NOISE AND DUST CONTROL

- A. Contractor shall so conduct all his operations that they will cause the least annoyance to the residents in the vicinity of the work, and shall comply with all applicable local ordinances. If contractor work to exceed maximum allowable noise level per the local authority having jurisdiction (AHJ) 's ordinance, contractor shall obtain temporary noise permit through the (AHJ) Services. The compressors, hoists, and other apparatus shall be equipped with such mechanical devices as may be necessary to minimize noise and dust. Compressors shall be equipped with silencers on intake lines. All gasoline or oil operated equipment shall be equipped with silencers or mufflers on intake and exhaust lines. Storage bins and hoppers shall be lined with material that will deaden the sounds. The operation of dumping rock and of carrying rock away in trucks shall be so conducted as to cause a minimum of noise and dust. Vehicles carrying rock, concrete, or other material shall be routed over such streets as will cause the least annoyance to the public and shall not be operated on public streets between the hours of 6 p.m. and 7 a.m. or on Saturdays, Sundays or legal holidays unless approved by Engineer.



3.07 NIGHTTIME WORK

- A. If Contractor is required or desires to execute any work between the hours of 6 p.m. to 7 a.m., he shall notify Owner in writing at least 48 hours before the intended start of such work. Contractor shall acquire any necessary permits associated with night work and comply with all permit conditions and all laws and ordinances relating to night work.

3.08 ENVIRONMENTAL PROTECTION CONDITIONS AND MEASURES

- A. The following environmental protection conditions and measures must be complied as required by U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Service (USFWS) in order to ensure that the proposed project construction activities will not have a significant impact on the environment.
  - 1. Refer to the City of Round Rock, or the City of Georgetown Code of Ordinances on sound level limitations: Chapter 14 for the City of Round Rock and Chapter 8 for the City of Georgetown.
  - 2. Adverse impacts on threatened and endangered species within the project area shall be avoided or mitigated in accordance with the federal Migratory Bird Treaty Act (MBTA) per Texas Parks and Wildlife Department (TPWD), in particular between March 1 and August 1, which is the Golden-Cheeked Warbler's nesting season.
  - 3. Construction activities requiring vegetation removal or disturbance shall avoid the peak nesting period of March 1 through August 1 to the extent possible to avoid destruction of individuals, nests, or eggs.
  - 4. If construction activities must be conducted during this time, the Contractor shall survey for nests prior to commencing work. If an occupied migratory bird nest is found, a 50-foot buffer of vegetation shall remain around the nest until the juveniles have fledged or the nest is vacated.
  - 5. Adverse impacts on threatened and endangered species within the project area shall be avoided per Texas Parks and Wildlife Department.
  - 6. Prior to construction, the Contractor shall search for the potential presence of rare, threatened, and endangered species in the vicinity of the construction area. Should a species of potential interest or critical habitat be discovered, project construction will be halted, and the Contractor shall notify the BCMUD and USACE for further instruction for proper handling of the situation. Construction will remain halted until the situation is satisfactorily resolved as directed by the BCMUD and USACE.

END OF SECTION

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SECTION 01 41 00  
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Documentation to be prepared and signed by Contractor before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR 150000 issued March 5, 2018 (the Construction General Permit) or latest revision.
- B. Implementation, maintenance inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the Drawings or specified elsewhere in the Contract.
- C. Review implementation of the Storm Water Pollution Prevention Plan (SW3P or SWPPP) in a meeting with Project Manager prior to start of construction.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 DEFINITIONS

- A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavating.
- B. Large Construction Activity: Project that:
  - 1. disturbs five acres or more, or
  - 2. disturbs less than five acres but is part of a larger common plan of development that will disturb five acres or more of land.
- C. Small Construction Activity: Project that:
  - 1. disturbs one or more acres but less than five acres, or
  - 2. disturbs less than one acre but is part of a larger common plan of development that will ultimately disturb one or more acres but less than five acres.
- D. TPDES Operator:
  - 1. Provide the name and contact information for the designated TPDES operator.

2. The TPDES operator is the person or persons who have day-to-day operational control of the construction activities which are necessary to ensure compliance with the SW3P for the site or other Construction General Permit conditions.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SW3P)

- A. Prepare a SW3P following Part III of the Construction General Permit, if required.
- B. Update or revise the SW3P as needed during the construction following Part III, Section E of the Construction General Permit.
- C. Submit the SW3P and any updates or revisions to Owner's Representative for review and address comments prior to commencing, or continuing, construction activities.

3.02 NOTICE OF INTENT FOR LARGE CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date TCEQ Form 20022 (03/06/2018) "Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR 150000)", **Attachment 1** of this section.
- B. Transmit the signed Contractor's copy of TCEQ Form 20022 (03/06/2018), along with a \$325.00 check or required fee, made out to Texas Commission on Environmental Quality, and the completed Payment Submittal Form to the Owner's Representative.
- C. Owner's Representative will complete a separate TCEQ Form 20022 (03/06/2018) for City's Notice of Intent, and will submit both Notices, along with checks for application fees, to the TCEQ.
- D. Submission of the Notice of Intent form by both the Contractor to TCEQ is required a minimum of two days before Commencement of Construction Activities.
- E. Fill out, sign, and date the "Construction Site Notice", **Attachment 2A** to TPDES General Permit TXR 150000, "Construction Site Notice", **Attachment 2A** of this section.
- F. Transmit the signed Construction Site Notice to at least seven days prior to Commencement of Construction Activity.

3.03 CONSTRUCTION SITE NOTICE FOR SMALL CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date the "Construction Site Notice", **Attachment 2B** to TPDES General Permit TXR 150000, "Construction Site Notice", **Attachment 2B** of this section.
- B. Transmit the signed Construction Site Notice to Owner's Representative at least seven days prior to Commencement of Construction Activity.

**3.04 CERTIFICATION REQUIREMENTS**

- A. Fill out TPDES Operator's Information form, **Attachment 3** of this section, including Contractor's name, address, and telephone number, and the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures. Use multiple copies as required to document full information.
- B. Contractor and Subcontractors shall sign and date the Contractor's / Subcontractor's Certification for TPDES Permitting, **Attachment 4** of this section. Include this certification with other Project certification forms.
- C. Submit properly completed certification forms to Owner's Representative for review before beginning construction operations.
- D. Conduct inspections in accordance with TCEQ requirements. Ensure persons or firms responsible for maintenance and inspection of erosion and sediment control measures read, fill out, sign, and date the Erosion Control Contractor's Certification for Inspection and Maintenance. Use the EPA NPDES Construction Inspection Form, **Attachment 5** of this section to record maintenance inspections and repairs.

**3.05 RETENTION OF RECORDS**

- A. Keep a copy of this document and the SW3P in a readily accessible location at the construction site from the Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR 150000). Contractors with day-to-day operational control over SW3P implementation shall have a copy of the SW3P available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SW3P. Upon submission of the NOT, submit all required forms and a copy of the SW3P with all revisions to the Owner's Representative.

**3.06 REQUIRED NOTICES**

- A. Post the following notices from effective date of the SW3P until date of final site stabilization as defined in the Construction General Permit:
  - 1. Post the TPDES permit number for Large Construction Activity, or a signed TCEQ Construction Site Notice for Small Construction Activity. Signed copies of the Contractor's NOI must also be posted.
  - 2. Post notices near the main entrance of the construction site in a prominent place for public viewing. Post name and telephone number of Contractor's local contact person, brief project description and location of the SW3P.
    - a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with Engineer to conform to requirements of the Construction General Permit.
    - b. If Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.

3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction exit area.
4. Post a notice of waste disposal procedures in a readily visible location on site.

3.07 ON-SITE WASTE MATERIAL STORAGE

- A. On-site waste material storage shall be self-contained and shall satisfy appropriate local, state, and federal rules and regulations.
- B. Prepare list of waste material to be stored on-site. Update list as necessary to include up-to-date information. Keep a copy of updated list with the SW3P.
- C. Prepare description of controls to reduce Pollutants generated from on-site storage. Include storage practices necessary to minimize exposure of materials to storm water, and spill prevention and response measures consistent with industrial program best management practices. Keep a copy of the description with the SW3Ps.

3.08 NOTICE OF TERMINATION

- A. Submit a NOT, **Attachment 6** of this section, to Engineer within 30 days after:
  1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or
  2. Another operator has assumed control over all areas of the site that have not been stabilized; and
  3. All silt fences and other temporary erosion controls have either been removed, scheduled to be removed as defined in the SW3P, or transferred to a new operator in the new operator has sought permit coverage.
- B. Contractor will complete NOT and submit Contractor and City's notices to the TCEQ and MS4 entities.

END OF SECTION

**ATTACHMENT 1**

**PLACE HOLDER**

**ATTACHMENT 2A**

**PLACE HOLDER**



**ATTACHMENT 2B**

**PLACE HOLDER**

**ATTACHMENT 3**

**PLACE HOLDER**

**ATTACHMENT 4**

**PLACE HOLDER**

**ATTACHMENT 5**

**PLACE HOLDER**

**ATTACHMENT 6**

**PLACE HOLDER**



# Notice of Intent (NOI) for an Authorization for Stormwater Discharges Associated with Construction Activity under TPDES General Permit TXR150000

## IMPORTANT INFORMATION

Please read and use the General Information and Instructions prior to filling out each question in the NOI form.

Use the NOI Checklist to ensure all required information is completed correctly.

**Incomplete applications delay approval or result in automatic denial.**

Once processed your permit authorization can be viewed by entering the following link into your internet browser: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm) or you can contact TCEQ Stormwater Processing Center at 512-239-3700.

## ePERMITS

**Effective September 1, 2018, this paper form must be submitted to TCEQ with a completed electronic reporting waiver form (TCEQ-20754).**

To submit an NOI electronically, enter the following web address into your internet browser and follow the instructions: <https://www3.tceq.texas.gov/steers/index.cfm>

## APPLICATION FEE AND PAYMENT

The application fee for submitting a paper NOI is \$325. The application fee for electronic submittal of a NOI through the TCEQ ePermits system (STEERS) is \$225.

Payment of the application fee can be submitted by mail or through the TCEQ ePay system. The payment and the NOI must be mailed to separate addresses. To access the TCEQ ePay system enter the following web address into your internet browser: <http://www.tceq.texas.gov/epay>.

Provide your payment information for verification of payment:

- If payment was mailed to TCEQ, provide the following:
  - Check/Money Order Number:
  - Name printed on Check:
- If payment was made via ePay, provide the following:
  - Voucher Number:
  - A copy of the payment voucher is attached to this paper NOI form.

**RENEWAL** (This portion of the NOI is not applicable after June 3, 2018)

Is this NOI for a renewal of an existing authorization? ☐ Yes ☐ No

If Yes, provide the authorization number here: TXR15

NOTE: If an authorization number is not provided, a new number will be assigned.

**SECTION 1. OPERATOR (APPLICANT)**

a) If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity? CN

(Refer to Section 1.a) of the Instructions)

b) What is the Legal Name of the entity (applicant) applying for this permit? (The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)

c) What is the contact information for the Operator (Responsible Authority)?

Prefix (Mr. Ms. Miss):

First and Last Name:

Suffix:

Title:

Credentials:

Phone Number:

Fax Number:

E-mail:

Mailing Address:

City, State, and Zip Code:

Mailing Information if outside USA:

Territory:

Country Code:

Postal Code:

d) Indicate the type of customer:

☐ Individual

☐ Limited Partnership

☐ General Partnership

☐ Trust

☐ Sole Proprietorship (D.B.A.)

☐ Corporation

☐ Estate

☐ Federal Government

☐ County Government

☐ State Government

☐ City Government

☐ Other Government

☐ Other:

e) Is the applicant an independent operator? ☐ Yes

☐ No

(If a governmental entity, a subsidiary, or part of a larger corporation, check No.)

f) Number of Employees. Select the range applicable to your company.

☐ 0-20

☐ 251-500

☐ 21-100

☐ 501 or higher

☐ 101-250

g) Customer Business Tax and Filing Numbers: (**Required** for Corporations and Limited Partnerships. **Not Required** for Individuals, Government, or Sole Proprietors.)

State Franchise Tax ID Number:

Federal Tax ID:

Texas Secretary of State Charter (filing) Number:

DUNS Number (if known):

## SECTION 2. APPLICATION CONTACT

Is the application contact the same as the applicant identified above?

☐ Yes, go to Section 3

☐ No, complete this section

Prefix (Mr. Ms. Miss):

First and Last Name:  Suffix:

Title:  Credential:

Organization Name:

Phone Number:  Fax Number:

E-mail:

Mailing Address:

Internal Routing (Mail Code, Etc.):

City, State, and Zip Code:

Mailing information if outside USA:

Territory:

Country Code:  Postal Code:

## SECTION 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

a) If this is an existing permitted site, what is the Regulated Entity Number (RN) issued to this site? RN

(Refer to Section 3.a) of the Instructions)



b) Name of project or site (the name known by the community where it's located):

c) In your own words, briefly describe the type of construction occurring at the regulated site (residential, industrial, commercial, or other):

d) County or Counties (if located in more than one):

e) Latitude: Longitude:

f) Site Address/Location

If the site has a physical address such as 12100 Park 35 Circle, Austin, TX 78753, complete *Section A*.

If the site does not have a physical address, provide a location description in *Section B*.  
Example: located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1.

*Section A:*

Street Number and Name:

City, State, and Zip Code:

*Section B:*

Location Description:

City (or city nearest to) where the site is located:

Zip Code where the site is located:

#### SECTION 4. GENERAL CHARACTERISTICS

a) Is the project or site located on Indian Country Lands?

☐ Yes, do not submit this form. You must obtain authorization through EPA Region 6.

☐ No

b) Is your construction activity associated with a facility that, when completed, would be associated with the exploration, development, or production of oil or gas or geothermal resources?

☐ Yes. Note: The construction stormwater runoff may be under jurisdiction of the Railroad Commission of Texas and may need to obtain authorization through EPA Region 6.

☐ No

c) What is the Primary Standard Industrial Classification (SIC) Code that best describes the construction activity being conducted at the site?

d) What is the Secondary SIC Code(s), if applicable?

e) What is the total number of acres to be disturbed?

f) Is the project part of a larger common plan of development or sale?

☐ Yes

☐ No. The total number of acres disturbed, provided in e) above, must be 5 or more.  
If the total number of acres disturbed is less than 5, do not submit this form. See the requirements in the general permit for small construction sites.

g) What is the estimated start date of the project?

h) What is the estimated end date of the project?

i) Will concrete truck washout be performed at the site? ☐ Yes ☐ No

j) What is the name of the first water body(ies) to receive the stormwater runoff or potential runoff from the site?

k) What is the segment number(s) of the classified water body(ies) that the discharge will eventually reach?

l) Is the discharge into a Municipal Separate Storm Sewer System (MS4)?

☐ Yes ☐ No

If Yes, provide the name of the MS4 operator:

Note: The general permit requires you to send a copy of this NOI form to the MS4 operator.

m) Is the discharge or potential discharge from the site within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer, as defined in 30 TAC Chapter 213?

☐ Yes, complete the certification below.

☐ No, go to Section 5

I certify that the copy of the TCEQ-approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) that is included or referenced in the Stormwater Pollution Prevention Plan will be implemented. ☐ Yes

## SECTION 5. NOI CERTIFICATION

a) I certify that I have obtained a copy and understand the terms and conditions of the Construction General Permit (TXR150000). ☐ Yes

b) I certify that the full legal name of the entity applying for this permit has been provided and is legally authorized to do business in Texas. ☐ Yes

c) I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed. ☐ Yes

d) I certify that a Stormwater Pollution Prevention Plan has been developed, will be implemented prior to construction and to the best of my knowledge and belief is compliant with any applicable local sediment and erosion control plans, as required in the Construction General Permit (TXR150000). ☐ Yes

Note: For multiple operators who prepare a shared SWP3, the confirmation of an operator may be limited to its obligations under the SWP3, provided all obligations are confirmed by at least one operator.

## SECTION 6. APPLICANT CERTIFICATION SIGNATURE

Operator Signatory Name:

Operator Signatory Title:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature (use blue ink): \_\_\_\_\_ Date: \_\_\_\_\_

# NOTICE OF INTENT CHECKLIST (TXR150000)

Did you complete everything? Use this checklist to be sure!

Are you ready to mail your form to TCEQ? Go to the General Information Section of the Instructions for mailing addresses.

Confirm each item (or applicable item) in this form is complete. This checklist is for use by the applicant to ensure a complete application is being submitted. **Missing information may result in denial of coverage under the general permit.** (See NOI process description in the General Information and Instructions.)

## APPLICATION FEE

If paying by check:

- ☐ Check was mailed **separately** to the TCEQs Cashier's Office. (See Instructions for Cashier's address and Application address.)
- ☐ Check number and name on check is provided in this application.

If using ePay:

- ☐ The voucher number is provided in this application and a copy of the voucher is attached.

## RENEWAL

- ☐ If this application is for renewal of an existing authorization, the authorization number is provided.

## OPERATOR INFORMATION

- ☐ Customer Number (CN) issued by TCEQ Central Registry
- ☐ Legal name as filed to do business in Texas. (Call TX SOS 512-463-5555 to verify.)
- ☐ Name and title of responsible authority signing the application.
- ☐ Phone number and e-mail address
- ☐ Mailing address is complete & verifiable with USPS. [www.usps.com](http://www.usps.com)
- ☐ Type of operator (entity type). Is applicant an independent operator?
- ☐ Number of employees.
- ☐ For corporations or limited partnerships – Tax ID and SOS filing numbers.
- ☐ Application contact and address is complete & verifiable with USPS. <http://www.usps.com>

## REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

- ☐ Regulated Entity Number (RN) (if site is already regulated by TCEQ)
- ☐ Site/project name and construction activity description
- ☐ County
- ☐ Latitude and longitude <http://www.tceq.texas.gov/gis/sqmaview.html>

- ☐ Site Address/Location. Do not use a rural route or post office box.

#### **GENERAL CHARACTERISTICS**

- ☐ Indian Country Lands –the facility is not on Indian Country Lands.
- ☐ Construction activity related to facility associated to oil, gas, or geothermal resources
- ☐ Primary SIC Code that best describes the construction activity being conducted at the site.  
[www.osha.gov/oshstats/sicser.html](http://www.osha.gov/oshstats/sicser.html)
- ☐ Estimated starting and ending dates of the project.
- ☐ Confirmation of concrete truck washout.
- ☐ Acres disturbed is provided and qualifies for coverage through a NOI.
- ☐ Common plan of development or sale.
- ☐ Receiving water body or water bodies.
- ☐ Segment number or numbers.
- ☐ MS4 operator.
- ☐ Edwards Aquifer rule.

#### **CERTIFICATION**

- ☐ Certification statements have been checked indicating Yes.
- ☐ Signature meets 30 Texas Administrative Code (TAC) §305.44 and is original.

# Instructions for Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

## GENERAL INFORMATION

### Where to Send the Notice of Intent (NOI):

By Regular Mail:

TCEQ

Stormwater Processing Center (MC228)

P.O. Box 13087

Austin, Texas 78711-3087

By Overnight or Express Mail:

TCEQ

Stormwater Processing Center (MC228)

12100 Park 35 Circle

Austin, TX

### Application Fee:

The application fee of \$325 is required to be paid at the time the NOI is submitted. Failure to submit payment at the time the application is filed will cause delays in acknowledgment or denial of coverage under the general permit. Payment of the fee may be made by check or money order, payable to TCEQ, or through EPAY (electronic payment through the web).

### Mailed Payments:

Use the attached General Permit Payment Submittal Form. The application fee is submitted to a different address than the NOI. Read the General Permit Payment Submittal Form for further instructions, including the address to send the payment.

**ePAY Electronic Payment:** <http://www.tceq.texas.gov/epay>

When making the payment you must select Water Quality, and then select the fee category "General Permit Construction Storm Water Discharge NOI Application". You must include a copy of the payment voucher with your NOI. Your NOI will not be considered complete without the payment voucher.

### TCEQ Contact List:

Application – status and form questions:

512-239-3700, [swpermit@tceq.texas.gov](mailto:swpermit@tceq.texas.gov)

Technical questions:

512-239-4671, [swgp@tceq.texas.gov](mailto:swgp@tceq.texas.gov)

Environmental Law Division:

512-239-0600

Records Management - obtain copies of forms:

512-239-0900

Reports from databases (as available):

512-239-DATA (3282)

Cashier's office:

512-239-0357 or 512-239-0187

### Notice of Intent Process:

When your NOI is received by the program, the form will be processed as follows:

- **Administrative Review:** Each item on the form will be reviewed for a complete response. In addition, the operator's legal name must be verified with Texas Secretary of State as valid and active (if applicable). The address(es) on the form must be verified with the US Postal service as receiving regular mail delivery. Do not give an overnight/express mailing address.

- **Notice of Deficiency:** If an item is incomplete or not verifiable as indicated above, a notice of deficiency (NOD) will be mailed to the operator. The operator will have 30 days to respond to the NOD. The response will be reviewed for completeness.
- **Acknowledgment of Coverage:** An Acknowledgment Certificate will be mailed to the operator. This certificate acknowledges coverage under the general permit.

or

**Denial of Coverage:** If the operator fails to respond to the NOD or the response is inadequate, coverage under the general permit may be denied. If coverage is denied, the operator will be notified.

### General Permit (Your Permit)

For NOIs submitted **electronically** through ePermits, provisional coverage under the general permit begins immediately following confirmation of receipt of the NOI form by the TCEQ.

For **paper** NOIs, provisional coverage under the general permit begins **7 days after a completed NOI is postmarked for delivery** to the TCEQ.

You should have a copy of your general permit when submitting your application. You may view and print your permit for which you are seeking coverage, on the TCEQ web site <http://www.tceq.texas.gov>. Search using keyword TXR150000.

### Change in Operator

An authorization under the general permit is not transferable. If the operator of the regulated project or site changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted no later than 10 days prior to the change in Operator status.

### TCEQ Central Registry Core Data Form

The Core Data Form has been incorporated into this form. Do not send a Core Data Form to TCEQ. After final acknowledgment of coverage under the general permit, the program will assign a Customer Number and Regulated Entity Number, if one has not already been assigned to this customer or site.

For existing customers and sites, you can find the Customer Number and Regulated Entity Number by entering the following web address into your internet browser: <http://www15.tceq.texas.gov/crpub/> or you can contact the TCEQ Stormwater Processing Center at 512-239-3700 for assistance. On the website, you can search by your permit number, the Regulated Entity (RN) number, or the Customer Number (CN). If you do not know these numbers, you can select “Advanced Search” to search by permittee name, site address, etc.

The Customer (Permittee) is responsible for providing consistent information to the TCEQ, and for updating all CN and RN data for all authorizations as changes occur. For this permit, a Notice of Change form must be submitted to the program area.

## INSTRUCTIONS FOR FILLING OUT THE NOI FORM

**Renewal of General Permit.** Dischargers holding active authorizations under the expired General Permit are required to submit a NOI to continue coverage. The existing permit number is required. If the permit number is not provided or has been terminated, expired, or denied, a new permit number will be issued.

### Section 1. OPERATOR (APPLICANT)

#### a) Customer Number (CN)

TCEQ's Central Registry will assign each customer a number that begins with CN, followed by nine digits. **This is not a permit number, registration number, or license number.**

If the applicant is an existing TCEQ customer, the Customer Number is available at the following website: <http://www15.tceq.texas.gov/crpub/>. If the applicant is not an existing TCEQ customer, leave the space for CN blank.

#### b) Legal Name of Applicant

Provide the current legal name of the applicant. The name must be provided exactly as filed with the Texas Secretary of State (SOS), or on other legal documents forming the entity, as filed in the county. You may contact the SOS at 512-463-5555, for more information related to filing in Texas. If filed in the county, provide a copy of the legal documents showing the legal name.

#### c) Contact Information for the Applicant (Responsible Authority)

Provide information for the person signing the application in the Certification section. This person is also referred to as the Responsible Authority.

Provide a complete mailing address for receiving mail from the TCEQ. The mailing address must be recognized by the US Postal Service. You may verify the address on the following website: <https://tools.usps.com/go/ZipLookupAction!input.action>.

The phone number should provide contact to the applicant.

The fax number and e-mail address are optional and should correspond to the applicant.

#### d) Type of Customer (Entity Type)

Check only one box that identifies the type of entity. Use the descriptions below to identify the appropriate entity type. Note that the selected entity type also indicates the name that must be provided as an applicant for an authorization.

##### Individual

An individual is a customer who has not established a business, but conducts an activity that needs to be regulated by the TCEQ.

##### Partnership

A customer that is established as a partnership as defined by the Texas Secretary of State Office (TX SOS). If the customer is a 'General Partnership' or 'Joint Venture' filed in the county (not filed with TX SOS), the legal name of each partner forming the 'General Partnership' or 'Joint Venture' must be provided. Each 'legal entity' must apply as a co-applicant.



### **Trust or Estate**

A trust and an estate are fiduciary relationships governing the trustee/executor with respect to the trust/estate property.

### **Sole Proprietorship (DBA)**

A sole proprietorship is a customer that is owned by only one person and has not been incorporated. This business may:

1. be under the person's name
2. have its own name (doing business as or DBA)
3. have any number of employees.

If the customer is a Sole Proprietorship or DBA, the 'legal name' of the individual business 'owner' must be provided. The DBA name is not recognized as the 'legal name' of the entity. The DBA name may be used for the site name (regulated entity).

### **Corporation**

A customer that meets all of these conditions:

1. is a legally incorporated entity under the laws of any state or country
2. is recognized as a corporation by the Texas Secretary of State
3. has proper operating authority to operate in Texas

The corporation's 'legal name' as filed with the Texas Secretary of State must be provided as applicant. An 'assumed' name of a corporation is not recognized as the 'legal name' of the entity.

### **Government**

Federal, state, county, or city government (as appropriate)

The customer is either an agency of one of these levels of government or the governmental body itself. The government agency's 'legal name' must be provided as the applicant. A department name or other description of the organization is not recognized as the 'legal name'.

### **Other**

This may include a utility district, water district, tribal government, college district, council of governments, or river authority. Provide the specific type of government.

#### **e) Independent Entity**

Check No if this customer is a subsidiary, part of a larger company, or is a governmental entity. Otherwise, check Yes.

#### **f) Number of Employees**

Check one box to show the number of employees for this customer's entire company, at all locations. This is not necessarily the number of employees at the site named in the application.

**g) Customer Business Tax and Filing Numbers**

These are required for Corporations and Limited Partnerships. These are not required for Individuals, Government, and Sole Proprietors.

**State Franchise Tax ID Number**

Corporations and limited liability companies that operate in Texas are issued a franchise tax identification number. If this customer is a corporation or limited liability company, enter the Tax ID number.

**Federal Tax ID**

All businesses, except for some small sole proprietors, individuals, or general partnerships should have a federal taxpayer identification number (TIN). Enter this number here. Use no prefixes, dashes, or hyphens. Sole proprietors, individuals, or general partnerships do not need to provide a federal tax ID.

**TX SOS Charter (filing) Number**

Corporations and Limited Partnerships required to register with the Texas Secretary of State are issued a charter or filing number. You may obtain further information by calling SOS at 512-463-5555.

**DUNS Number**

Most businesses have a DUNS (Data Universal Numbering System) number issued by Dun and Bradstreet Corp. If this customer has one, enter it here.

**Section 2. APPLICATION CONTACT**

Provide the name and contact information for the person that TCEQ can contact for additional information regarding this application.

**Section 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE**

**a) Regulated Entity Number (RN)**

The RN is issued by TCEQ's Central Registry to sites where an activity is regulated by TCEQ. This is not a permit number, registration number, or license number. Search TCEQ's Central Registry to see if the site has an assigned RN at <http://www15.tceq.texas.gov/crpub/>. If this regulated entity has not been assigned an RN, leave this space blank.

If the site of your business is part of a larger business site, an RN may already be assigned for the larger site. Use the RN assigned for the larger site.

If the site is found, provide the assigned RN and provide the information for the site to be authorized through this application. The site information for this authorization may vary from the larger site information.

An example is a chemical plant where a unit is owned or operated by a separate corporation that is accessible by the same physical address of your unit or facility. Other examples include industrial parks identified by one common address but different corporations have control of defined areas within the site. In both cases, an RN would be assigned for the physical address location and the permitted sites would be identified separately under the same RN.

**b) Name of the Project or Site**

Provide the name of the site or project as known by the public in the area where the site is located. The name you provide on this application will be used in the TCEQ Central Registry as the Regulated Entity name.

**c) Description of Activity Regulated**

In your own words, briefly describe the primary business that you are doing that requires this authorization. Do not repeat the SIC Code description.

**d) County**

Provide the name of the county where the site or project is located. If the site or project is located in more than one county, provide the county names as secondary.

**e) Latitude and Longitude**

Enter the latitude and longitude of the site in degrees, minutes, and seconds or decimal form. For help obtaining the latitude and longitude, go to:

<http://www.tceq.texas.gov/gis/sqmaview.html>.

**f) Site Address/Location**

If a site has an address that includes a street number and street name, enter the complete address for the site in *Section A*. If the physical address is not recognized as a USPS delivery address, you may need to validate the address with your local police (911 service) or through an online map site used to locate a site. Please confirm this to be a complete and valid address. Do not use a rural route or post office box for a site location.

If a site does not have an address that includes a street number and street name, provide a complete written location description in *Section B*. For example: "The site is located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1."

Provide the city (or nearest city) and zip code of the site location.

**Section 4. GENERAL CHARACTERISTICS**

**a) Indian Country Lands**

If your site is located on Indian Country Lands, the TCEQ does not have authority to process your application. You must obtain authorization through EPA Region 6, Dallas. Do not submit this form to TCEQ.

**b) Construction activity associated with facility associated with exploration, development, or production of oil, gas, or geothermal resources**

If your activity is associated with oil and gas exploration, development, or production, you may be under jurisdiction of the Railroad Commission of Texas (RRC) and may need to obtain authorization from EPA Region 6.

Construction activities associated with a facility related to oil, gas or geothermal resources may include the construction of a well site; treatment or storage facility; underground hydrocarbon or natural gas storage facility; reclamation plant; gas processing facility; compressor station; terminal facility where crude oil is stored prior to refining and at which refined products are stored solely for use at the facility; a

carbon dioxide geologic storage facility; and a gathering, transmission, or distribution pipeline that will transport crude oil or natural gas, including natural gas liquids, prior to refining of such oil or the use of the natural gas in any manufacturing process or as a residential or industrial fuel.

Where required by federal law, discharges of stormwater associated with construction activities under the RRC's jurisdiction must be authorized by the EPA and the RRC, as applicable. Activities under RRC jurisdiction include construction of a facility that, when completed, would be associated with the exploration, development, or production of oil or gas or geothermal resources, such as a well site; treatment or storage facility; underground hydrocarbon or natural gas storage facility; reclamation plant; gas processing facility; compressor station; terminal facility where crude oil is stored prior to refining and at which refined products are stored solely for use at the facility; a carbon dioxide geologic storage facility under the jurisdiction of the RRC; and a gathering, transmission, or distribution pipeline that will transport crude oil or natural gas, including natural gas liquids, prior to refining of such oil or the use of the natural gas in any manufacturing process or as a residential or industrial fuel. The RRC also has jurisdiction over stormwater from land disturbance associated with a site survey that is conducted prior to construction of a facility that would be regulated by the RRC. Under 33 U.S.C. §1342(l)(2) and §1362(24), EPA cannot require a permit for discharges of stormwater from field activities or operations associated with {oil and gas} exploration, production, processing, or treatment operations, or transmission facilities, including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities unless the discharge is contaminated by contact with any overburden, raw material, intermediate product, finished product, byproduct, or waste product located on the site of the facility. Under §3.8 of this title (relating to Water Protection), the RRC prohibits operators from causing or allowing pollution of surface or subsurface water. Operators are encouraged to implement and maintain best management practices (BMPs) to minimize discharges of pollutants, including sediment, in stormwater during construction activities to help ensure protection of surface water quality during storm events.

For more information about the jurisdictions of the RRC and the TCEQ, read the Memorandum of Understanding (MOU) between the RRC and TCEQ at 16 Texas Administrative Code, Part 1, Chapter 3, Rule 3.30, by entering the following link into an internet browser:

[http://texreg.sos.state.tx.us/public/readtac\\$ext.TacPage?sl=R&app=9&p\\_dir=&p\\_rloc=&p\\_tloc=&p\\_ploc=&pg=1&p\\_tac=&ti=16&pt=1&ch=3&rl=30](http://texreg.sos.state.tx.us/public/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=16&pt=1&ch=3&rl=30) or contact the TCEQ Stormwater Team at 512-239-4671 for additional information.

**c) Primary Standard Industrial Classification (SIC) Code**

Provide the SIC Code that best describes the construction activity being conducted at this site.

Common SIC Codes related to construction activities include:

- 1521 - Construction of Single Family Homes
- 1522 - Construction of Residential Buildings Other than Single Family Homes
- 1541 - Construction of Industrial Buildings and Warehouses

- 1542 - Construction of Non-residential Buildings, other than Industrial Buildings and Warehouses
- 1611 - Highway and Street Construction, except Highway Construction
- 1622 - Bridge, Tunnel, and Elevated Highway Construction
- 1623 - Water, Sewer, Pipeline and Communications, and Power Line Construction

For help with SIC Codes, enter the following link into your internet browser: <http://www.osha.gov/pls/imis/sicsearch.html> or you can contact the TCEQ Small Business and Local Government Assistance Section at 800-447-2827 for assistance.

**d) Secondary SIC Code**

Secondary SIC Code(s) may be provided. Leave this blank if not applicable. For help with SIC Codes, enter the following link into your internet browser: <http://www.osha.gov/pls/imis/sicsearch.html> or you can contact the TCEQ Small Business and Environmental Assistance Section at 800-447-2827 for assistance.

**e) Total Number of Acres Disturbed**

Provide the approximate number of acres that the construction site will disturb. Construction activities that disturb less than one acre, unless they are part of a larger common plan that disturbs more than one acre, do not require permit coverage. Construction activities that disturb between one and five acres, unless they are part of a common plan that disturbs more than five acres, do not require submission of an NOI. Therefore, the estimated area of land disturbed should not be less than five, unless the project is part of a larger common plan that disturbs five or more acres. Disturbed means any clearing, grading, excavating, or other similar activities.

If you have any questions about this item, please contact the stormwater technical staff by phone at 512-239-4671 or by email at [swgp@tceq.texas.gov](mailto:swgp@tceq.texas.gov).

**f) Common Plan of Development**

Construction activities that disturb less than five acres do not require submission of an NOI unless they are part of a common plan of development or for sale where the area disturbed is five or more acres. Therefore, the estimated area of land disturbed should not be less than five, unless the project is part of a larger common plan that disturbs five or more acres. Disturbed means any clearing, grading, excavating, or other similar activities.

For more information on what a common plan of development is, refer to the definition of “Common Plan of Development” in the Definitions section of the general permit or enter the following link into your internet browser: [www.tceq.texas.gov/permitting/stormwater/common\\_plan\\_of\\_development\\_steps.html](http://www.tceq.texas.gov/permitting/stormwater/common_plan_of_development_steps.html)

For further information, go to the TCEQ stormwater construction webpage enter the following link into your internet browser: [www.tceq.texas.gov/goto/construction](http://www.tceq.texas.gov/goto/construction) and search for “Additional Guidance and Quick Links”. If you have any further questions about the Common Plan of Development you can contact the TCEQ Stormwater Team at 512-239-4671 or the TCEQ Small Business and Environmental Assistance at 800-447-2827.

**g) Estimated Start Date of the Project**

This is the date that any construction activity or construction support activity is initiated at the site. If renewing the permit provide the original start date of when construction activity for this project began.

**h) Estimated End Date of the Project**

This is the date that any construction activity or construction support activity will end and final stabilization will be achieved at the site.

**i) Will concrete truck washout be performed at the site?**

Indicate if you expect that operators of concrete trucks will washout concrete trucks at the construction site.

**j) Identify the water body(s) receiving stormwater runoff**

The stormwater may be discharged directly to a receiving stream or through a MS4 from your site. It eventually reaches a receiving water body such as a local stream or lake, possibly via a drainage ditch. You must provide the name of the water body that receives the discharge from the site (a local stream or lake).

If your site has more than one outfall you need to include the name of the first water body for each outfall, if they are different.

**k) Identify the segment number(s) of the classified water body(s)**

Identify the classified segment number(s) receiving a discharge directly or indirectly. Enter the following link into your internet browser to find the segment number of the classified water body where stormwater will flow from the site:

[www.tceq.texas.gov/waterquality/monitoring/viewer.html](http://www.tceq.texas.gov/waterquality/monitoring/viewer.html) or by contacting the TCEQ Water Quality Division at (512) 239-4671 for assistance.

You may also find the segment number in TCEQ publication GI-316 by entering the following link into your internet browser: [www.tceq.texas.gov/publications/gi/gi-316](http://www.tceq.texas.gov/publications/gi/gi-316) or by contacting the TCEQ Water Quality Division at (512) 239-4671 for assistance.

If the discharge is into an unclassified receiving water and then crosses state lines prior to entering a classified segment, select the appropriate watershed:

- 0100 (Canadian River Basin)
- 0200 (Red River Basin)
- 0300 (Sulfur River Basin)
- 0400 (Cypress Creek Basin)
- 0500 (Sabine River Basin)

Call the Water Quality Assessments section at 512-239-4671 for further assistance.

**l) Discharge into MS4 – Identify the MS4 Operator**

The discharge may initially be into a municipal separate storm sewer system (MS4). If the stormwater discharge is into an MS4, provide the name of the entity that operates the MS4 where the stormwater discharges. An MS4 operator is often a city, town, county, or utility district, but possibly can be another form of government. Please note that the Construction General Permit requires the Operator to supply the MS4 with a

copy of the NOI submitted to TCEQ. For assistance, you may call the technical staff at 512-239-4671.

**m) Discharges to the Edwards Aquifer Recharge Zone and Certification**

The general permit requires the approved Contributing Zone Plan or Water Pollution Abatement Plan to be included or referenced as a part of the Stormwater Pollution Prevention Plan.

See maps on the TCEQ website to determine if the site is located within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer by entering the following link into an internet browser:

[www.tceq.texas.gov/field/eapp/viewer.html](http://www.tceq.texas.gov/field/eapp/viewer.html) or by contacting the TCEQ Water Quality Division at 512-239-4671 for assistance.

If the discharge or potential discharge is within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer, a site-specific authorization approved by the Executive Director under the Edwards Aquifer Protection Program (30 TAC Chapter 213) is required before construction can begin.

For questions regarding the Edwards Aquifer Protection Program, contact the appropriate TCEQ Regional Office. For projects in Hays, Travis and Williamson Counties: Austin Regional Office, 12100 Park 35 Circle, Austin, TX 78753, 512-339-2929. For Projects in Bexar, Comal, Kinney, Medina and Uvalde Counties: TCEQ San Antonio Regional Office, 14250 Judson Rd., San Antonio, TX 78233-4480, 210-490-3096.

**Section 5. NOI CERTIFICATION**

**Note: Failure to indicate Yes to all of the certification items may result in denial of coverage under the general permit.**

**a) Certification of Understanding the Terms and Conditions of Construction General Permit (TXR150000)**

Provisional coverage under the Construction General Permit (TXR150000) begins 7 days after the completed paper NOI is postmarked for delivery to the TCEQ. Electronic applications submitted through ePermits have immediate provisional coverage. You must obtain a copy and read the Construction General Permit before submitting your application. You may view and print the Construction General Permit for which you are seeking coverage at the TCEQ web site by entering the following link into an internet browser: [www.tceq.texas.gov/goto/construction](http://www.tceq.texas.gov/goto/construction) or you may contact the TCEQ Stormwater processing Center at 512-239-3700 for assistance.

**b) Certification of Legal Name**

The full legal name of the applicant as authorized to do business in Texas is required. The name must be provided exactly as filed with the Texas Secretary of State (SOS), or on other legal documents forming the entity, that is filed in the county where doing business. You may contact the SOS at 512-463 5555, for more information related to filing in Texas.

**c) Understanding of Notice of Termination**

A permittee shall terminate coverage under the Construction General Permit through the submittal of a NOT when the operator of the facility changes, final stabilization has

been reached, the discharge becomes authorized under an individual permit, or the construction activity never began at this site.

**d) Certification of Stormwater Pollution Prevention Plan**

The SWP3 identifies the areas and activities that could produce contaminated runoff at your site and then tells how you will ensure that this contamination is mitigated. For example, in describing your mitigation measures, your site's plan might identify the devices that collect and filter stormwater, tell how those devices are to be maintained, and tell how frequently that maintenance is to be carried out. You must develop this plan in accordance with the TCEQ general permit requirements. This plan must be developed and implemented before you complete this NOI. The SWP3 must be available for a TCEQ investigator to review on request.

**Section 6. APPLICANT CERTIFICATION SIGNATURE**

The certification must bear an original signature of a person meeting the signatory requirements specified under 30 Texas Administrative Code (TAC) §305.44.

**If you are a corporation:**

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(1) (see below). According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

**If you are a municipality or other government entity:**

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(3) (see below). According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statute(s) under which your government entity was formed. An NOI or similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to §305.44(a)(3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the TCEQ's Environmental Law Division at 512-239-0600.



## 30 Texas Administrative Code

### §305.44. Signatories to Applications

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the

corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).

# Texas Commission on Environmental Quality General Permit Payment Submittal Form

**Use this form to submit your Application Fee only if you are mailing your payment.**

## Instructions:

- Complete items 1 through 5 below:
- Staple your check in the space provided at the bottom of this document.
- *Do not mail this form with your NOI form.*
- *Do not mail this form to the same address as your NOI.*

## Mail this form and your check to either of the following:

### *By Regular U.S. Mail*

Texas Commission on Environmental Quality  
Financial Administration Division  
Cashier's Office, MC-214  
P.O. Box 13088  
Austin, TX 78711-3088

### *By Overnight or Express Mail*

Texas Commission on Environmental Quality  
Financial Administration Division  
Cashier's Office, MC-214  
12100 Park 35 Circle  
Austin, TX 78753

**Fee Code: GPA General Permit: TXR150000**

1. Check or Money Order No:

2. Amount of Check/Money Order:

3. Date of Check or Money Order:

4. Name on Check or Money Order:

5. NOI Information:

If the check is for more than one NOI, list each Project or Site (RE) Name and Physical Address exactly as provided on the NOI. **Do not submit a copy of the NOI with this form, as it could cause duplicate permit application entries!**

If there is not enough space on the form to list all of the projects or sites the authorization will cover, then attach a list of the additional sites.

Project/Site (RE) Name:

Project/Site (RE) Physical Address:

**Staple the check or money order to this form in this space.**



# LARGE CONSTRUCTION SITE NOTICE

FOR THE  
Texas Commission on Environmental Quality (TCEQ)  
Stormwater Program  
**TPDES GENERAL PERMIT TXR150000**

## ***“PRIMARY OPERATOR” NOTICE***

This notice applies to construction sites operating under Part II.E.3. of the TPDES General Permit Number TXR150000 for discharges of stormwater runoff from construction sites equal to or greater than five acres, including the larger common plan of development. The information on this notice is required in Part III.D.2. of the general permit. Additional information regarding the TCEQ stormwater permit program may be found on the internet at:

<https://www.tceq.texas.gov/permitting/stormwater/construction>

Site-Specific TPDES Authorization Number:	
Operator Name:	
Contact Name and Phone Number:	
Project Description: <i>Physical address or description of the site's location, and estimated start date and projected end date, or date that disturbed soils will be stabilized.</i>	
Location of Stormwater Pollution Prevention Plan:	



# SMALL CONSTRUCTION SITE NOTICE

FOR THE  
Texas Commission on Environmental Quality (TCEQ)  
Stormwater Program  
**TPDES GENERAL PERMIT TXR150000**

The following information is posted in compliance with **Part II.E.2.** of the TCEQ General Permit Number TXR150000 for discharges of stormwater runoff from small construction sites. Additional information regarding the TCEQ stormwater permit program may be found on the internet at:

<https://www.tceq.texas.gov/permitting/stormwater/construction>

Operator Name:	
Contact Name and Phone Number:	
Project Description: <i>Physical address or description of the site's location, estimated start date and projected end date, or date that disturbed soils will be stabilized</i>	
Location of Stormwater Pollution Prevention Plan:	

For Small Construction Activities Authorized Under Part II.E.2. (Obtaining Authorization to Discharge) the following certification must be completed:

I \_\_\_\_\_ (Typed or Printed Name Person Completing This Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part II.E.2. of TPDES General Permit TXR150000 and agree to comply with the terms of this permit. A stormwater pollution prevention plan has been developed and will be implemented prior to construction, according to permit requirements. A copy of this signed notice is supplied to the operator of the MS4 if discharges enter an MS4. I am aware there are significant penalties for providing false information or for conducting unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_ Date Notice Removed

\_\_\_\_\_ MS4 operator notified per Part II.F.3.

**ATTACHMENT 3**

**TPDES OPERATOR'S INFORMATION**

Owner's Name and Address:

City of \_\_\_\_\_

Mr. \_\_\_\_\_  
(City Official)

Address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Contractors' Names and Addresses:

General Contractor:

\_\_\_\_\_

\_\_\_\_\_

Telephone:

\_\_\_\_\_

Site Superintendent:

\_\_\_\_\_

\_\_\_\_\_

Telephone:

\_\_\_\_\_

Erosion Control and  
Maintenance Inspection:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone:

\_\_\_\_\_

Subcontractors' Names and Addresses:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Phone: \_\_\_\_\_

Note: Insert name, address, and telephone number of person or firms

**ATTACHMENT 4**

**CONTRACTOR'S / SUBCONTRACTOR'S**

**CERTIFICATION FOR TPDES PERMITTING**

I certify under penalty of law that I understand the terms and conditions of the general Texas Pollutant Discharge Elimination System (TPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature: \_\_\_\_\_

Name: (printed or typed) \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: (printed or typed) \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: (printed or typed) \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

# 2017 Construction General Permit Inspection Report Template – Field Version

## Purpose

This Inspection Report Template (or “template”) is to assist you in preparing inspection reports for EPA’s 2017 Construction General Permit (CGP). If you are covered under the 2017 CGP, you can use this template to create an inspection report form that is customized to the specific circumstances of your site and that complies with the minimum reporting requirements of Part 4.7 of the permit. Note that the use of this form is optional; you may use your own inspection report form provided it includes the minimum information required in Part 4.7 of the CGP.

If you are covered under a state CGP, this template may be helpful in developing a form that can be used for that permit; however, it will need to be modified to meet the specific requirements of that permit. If your permitting authority requires you to use a specific inspection report form, you should not use this form.

## Notes:

While EPA has made every effort to ensure the accuracy of all instructions contained in the Inspection Report Template, it is the permit, not the template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between the Inspection Report Template and any corresponding provision of the 2017 CGP, you must abide by the requirements in the permit. EPA welcomes comments on the Inspection Report Template at any time and will consider those comments in any future revision of this document. You may contact EPA for CGP-related inquiries at [cgp@epa.gov](mailto:cgp@epa.gov).

## Overview of Inspection Requirements (see CGP Part 4)

Construction operators covered under the 2017 CGP are subject to the following inspection requirements:

### Person(s) Responsible for Inspecting the Site (see Part 4.1)

The person(s) inspecting your site must be a “qualified person” who may be either on your staff or a third party you hire to conduct such inspections.

- A “qualified person” is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

### Inspection Frequency (see Part 4.2)

You are required to conduct inspections either:

- Once every 7 calendar days; or
- Once every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt sufficient to cause a discharge.

Your inspection frequency is increased if the site discharges to a sensitive water. See Part 4.3. Your inspection frequency may be decreased to account for stabilized areas, or for arid, semi-arid, or drought-stricken conditions, or for frozen conditions. See Part 4.4.

### Areas That Need to Be Inspected (see Part 4.5)

During each inspection, you must inspect the following areas of your site:

- Cleared, graded, or excavated areas of the site;
- Stormwater controls (e.g., perimeter controls, sediment basins, inlets, exit points etc.) and pollution prevention practices (e.g., pollution prevention practices for vehicle fueling/maintenance and washing, construction product storage, handling, and disposal, etc.) at the site;
- Material, waste, or borrow areas covered by the permit, and equipment storage and maintenance areas;
- Areas where stormwater flows within the site;
- Stormwater discharge points; and
- Areas where stabilization has been implemented.

### What to Check For During Your Inspection (see Part 4.6)

During your site inspection, you are required to check:

- Whether stormwater controls or pollution prevention practices are properly installed, require maintenance or corrective action, or whether new or modified controls are required;
- For the presence of conditions that could lead to spills, leaks, or other pollutant accumulations and discharges;
- For locations where new or modified stormwater controls are necessary to meet requirements of the permit;

- Whether there are visible signs of erosion and sediment accumulation at points of discharge and to the channels and streambanks that are in the immediate vicinity of the discharge;
- If a stormwater discharge is occurring at the time of the inspection, whether there are obvious, visual signs of pollutant discharges; and
- If any permit violations have occurred on the site.

#### Inspection Reports (see Part 4.7)

Within 24 hours of completing each inspection, you are required to complete an inspection report that includes:

- Date of inspection;
- Names and titles of person(s) conducting the inspection;
- Summary of inspection findings;
- Rain gauge or weather station readings if your inspection is triggered by the 0.25-inch storm threshold; and
- If you determine that a portion of your site is unsafe to access for the inspection, documentation of what conditions prevented the inspection and where these conditions occurred on the site

### Instructions for Using This Template

This Field Version of the Inspection Report Template is intended to be used in the field and filled out by hand. If you will be filling out the Inspection Report Template electronically (i.e., you will be typing in your findings), please use the Electronic Version of the Inspection Report Template available at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>. The Electronic Version includes text fields with instructions for what to enter.

Keep in mind that this document is a template and not an "off-the-shelf" inspection report that is ready to use without some modification. You must first customize this form to include the specifics of your project in order for it to be useable for your inspection reports. Once you have entered all of your site-specific information into these fields, you may print out this form for use in the field to complete inspection reports.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required text fields.** Fill out all text fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may leave those rows blank. Or, if you need more space to document your findings, you may add an additional sheet.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Sign and certify each inspection report.** The operator or a duly authorized representative (see Appendix I, Part I.11.2) must sign and certify each inspection report for it to be considered complete. Where a contractor or subcontractor carries out your inspections, it is recommended that you also have the inspector sign and certify the form, in addition to the signature and certification required of the permitted operator. The template includes a signature block for both parties.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain in your records copies of all inspection reports in accordance with the requirements in Part 4.7.3 of the 2017 CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated.

### Section-by-Section Instructions

You will find specific instructions corresponding to each section of the report form on the reverse side of each page. These instructions provide you with more details in terms of what EPA expects to be documented in these reports.





## Instructions for Filling Out “General Information” Section

### **Name of Project**

Enter the name for the project.

### **NPDES ID No.**

Enter the NPDES ID number that was assigned to your NOI for permit coverage.

### **Inspection Date**

Enter the date you conducted the inspection.

### **Weather Conditions During Inspection**

Enter the weather conditions occurring during the inspection, e.g., sunny, overcast, light rain, heavy rain, snowing, icy, windy.

### **Inspection start and end times**

Enter the time you started and ended the inspection.

### **Inspector Name, Title & Contact Information**

Provide the name of the person(s) (either a member of your company's staff or a contractor or subcontractor) that conducted this inspection. Provide the inspector's name, title, and contact information as directed in the form.

### **Present Phase of Construction**

If this project is being completed in more than one phase, indicate which phase it is currently in.

### **Inspection Location**

If your project has multiple locations where you conduct separate inspections, specify the location where this inspection is being conducted. If only one inspection is conducted for your entire project, enter “Entire Site.” If necessary, complete additional inspection report forms for each separate inspection location.

### **Inspection Frequency**

Check the box that describes the inspection frequency that applies to you. Note that you may be subject to different inspection frequencies in different areas of your site. If your project does not discharge to a “sensitive water” (i.e., a water impaired for sediment or nutrients, or listed as Tier 2, 2.5, or 3 by your state or tribe) and you are not affected by any of the circumstances described in CGP Part 4.4, then you can choose your frequency based on CGP Part 4.2 – either every 7 calendar days, or every 14 calendar days and within 24 hours of a 0.25-inch storm event. For any portion of your site that discharges to a sensitive water, your inspection frequency for that area is fixed under CGP Part 4.3 at every 7 calendar days and within 24 hours of a 0.25-inch storm event. If portions of your site are stabilized, are located in arid, semi-arid, or drought-stricken areas, or are subject to frozen conditions, consult CGP Part 4.4 for the applicable inspection frequency. Check all the inspection frequencies that apply to your project.

### **Was This Inspection Triggered by a 0.25 Inch Storm Event or the occurrence of runoff from snowmelt sufficient to cause a discharge?**

If you were required to conduct this inspection because of a 0.25-inch (or greater) rain event, indicate whether you relied on an on-site rain gauge or a nearby weather station (and where the weather station is located). Also, specify the total amount of rainfall for this specific storm event. If you were required to conduct this inspection because of the occurrence of runoff from snowmelt, then check the appropriate box.

### **Unsafe Conditions for Inspection**

Inspections are not required where a portion of the site or the entire site is subject to unsafe conditions. See CGP Part 4.5. These conditions should not regularly occur, and should not be consistently present on a site. Generally, unsafe conditions are those that render the site (or a portion of it) inaccessible or that would pose a significant probability of injury to applicable personnel. Examples could include severe storm or flood conditions, high winds, and downed electrical wires.

If your site, or a portion of it, is affected by unsafe conditions during the time of your inspection, provide a description of the conditions that prevented you from conducting the inspection and what parts of the site were affected. If the entire site was considered unsafe, specify the location as “Entire site”

Condition and Effectiveness of Erosion and Sediment (E&S) Controls (CGP Part 2.2)				
(see reverse for instructions)				
Type/Location of E&S Control [Add an additional sheet if necessary]	Maintenance Needed?*	Corrective Action Required?*	Date on Which Maintenance or Corrective Action First Identified?	Notes
1.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
2.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
4.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
5.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
6.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
7.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
8.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
9.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
10.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		

\* **Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>. See Part 5 of the permit for more information.

## Instructions for Filling Out the "Erosion and Sediment Control" Table

### Type and Location of E&S Controls

Provide a list of all erosion and sediment (E&S) controls that your SWPPP indicates will be installed and implemented at your site. This list must include at a minimum all E&S controls required by CGP Part 2.2. Include also any natural buffers established under CGP Part 2.2.1. Buffer requirements apply if your project's earth-disturbing activities will occur within 50 feet of a water of the U.S. You may group your E&S controls on your form if you have several of the same type of controls (e.g., you may group "Inlet Protection Measures", "Perimeter Controls", and "Stockpile Controls" together on one line), but if there are any problems with a specific control, you must separately identify the location of the control, whether maintenance or corrective action is necessary, and in the notes section you must describe the specifics about the problem you observed.

### Maintenance Needed?

Answer "yes" if the E&S control requires maintenance due to normal wear and tear in order for the control to continue operating effectively. At a minimum, maintenance is required in the following specific instances: (1) for perimeter controls, whenever sediment has accumulated to half or more the above-ground height of the control (CGP Part 2.2.3.a); (2) where sediment has been tracked-out onto the surface of off-site streets or other paved areas (CGP Part 2.2.4); (3) for inlet protection measures, when sediment accumulates, the filter becomes clogged, and/or performance is compromised (CGP Part 2.2.10); and (4) for sediment basins, as necessary to maintain at least half of the design capacity of the basin (CGP Part 2.2.12.f). Note: In many cases, "yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "yes" if work to fix the problem is still ongoing from the previous inspection.

### Corrective Action Needed?

Answer "yes" if during your inspection you found any of the following conditions to be present (CGP, Part 5.1): (1) a required E&S control needs repair or replacement (beyond routine maintenance required under Part 2.1.4); (2) a required E&S control was never installed or was installed incorrectly; (3) you become aware that the inadequacy of the E&S control has led to an exceedance of an applicable water quality standard; (4) one of the prohibited discharges in Part 1.3 is occurring or has occurred; or (5) EPA requires corrective action for an E&S control as a result of a permit violation found during an inspection carried out under Part 4.8. If you answer "yes", you must take corrective action and complete a corrective action report, found at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>. Note: You should answer "yes" if work to fix the problem from a previous inspection is still ongoing.

### Date on Which Maintenance or Corrective Action First Identified?

Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

### Notes

For each E&S control and the area immediately surrounding it, note whether the control is properly installed and whether it appears to be working to minimize sediment discharge. Describe any problem conditions you observed such as the following, and why you think they occurred as well as actions (e.g., maintenance or corrective action) you will take or have taken to fix the problem:

1. Failure to install or to properly install a required E&S control
2. Damage or destruction to an E&S control caused by vehicles, equipment, or personnel, a storm event, or other event
3. Mud or sediment deposits found downslope from E&S controls
4. Sediment tracked out onto paved areas by vehicles leaving construction site
5. Noticeable erosion at discharge outlets or at adjacent streambanks or channels
6. Erosion of the site's sloped areas (e.g., formation of rills or gullies)
7. E&S control is no longer working due to lack of maintenance

For buffer areas, make note of whether they are marked off as required, whether there are signs of construction disturbance within the buffer, which is prohibited under the CGP, and whether there are visible signs of erosion resulting from discharges through the area.

If maintenance or corrective action is required, briefly note the reason. If maintenance or corrective action have been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action report describing the condition and your work to fix the problem.*

Condition and Effectiveness of Pollution Prevention (P2) Practices (CGP Part 2.3)				
(see reverse for instructions)				
Type/Location of P2 Practices [Add an additional sheet if necessary]	Maintenance Needed?*	Corrective Action Required?*	Date on Which Maintenance or Corrective Action First Identified?	Notes
1.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
2.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
4.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
5.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
6.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
7.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
8.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
9.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
10.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		

\* **Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>. See Part 5 of the permit for more information.

## Instructions for Filling Out the "Pollution Prevention (P2) Practice" Table

### Type and Location of P2 Controls

Provide a list of all pollution prevention (P2) practices that are implemented at your site. This list must include all P2 practices required by Part 2.3, and those that are described in your SWPPP.

### Maintenance Needed?

Answer "yes" if the P2 practice requires maintenance due to normal wear and tear in order for the control to continue operating effectively. Note: In many cases, "yes" answers are expected and indicate a project with an active operation and maintenance program.

### Corrective Action Needed?

Answer "yes" if during your inspection you found any of the following conditions to be present (CGP, Part 5.1): (1) a required P2 practice needs repair or replacement (beyond routine maintenance required under Part 2.1.4); (2) a required P2 practice was never installed or was installed incorrectly; (3) you become aware that the inadequacy of the P2 practice has led to an exceedance of an applicable water quality standard; (4) one of the "prohibited discharges" listed in CGP Part 1.3 is occurring or has occurred, or (5) EPA requires corrective action for a P2 practice as a result of a permit violation found during an inspection carried out under Part 4.8. If you answer "yes", you must take corrective action and complete a corrective action report (see <https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources>). Note: You should answer "yes" if work to fix the problem from a previous inspection is still ongoing.

### Date on Which Maintenance or Corrective Action First Identified?

Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

### Notes

For each P2 control and the area immediately surrounding it, note whether the control is properly installed, whether it appears to be working to minimize or eliminate pollutant discharges, and whether maintenance or corrective action is required. Describe problem conditions you observed such as the following, and why you think they occurred, as well as actions you will take or have taken to fix the problem:

1. Failure to install or to properly install a required P2 control
2. Damage or destruction to a P2 control caused by vehicles, equipment, or personnel, or a storm event
3. Evidence of a spill, leak, or other type of pollutant discharge, or failure to have properly cleaned up a previous spill, leak, or other type of pollutant discharge
4. Spill response supplies are absent, insufficient, or not where they are supposed to be located
5. Improper storage, handling, or disposal of chemicals, building materials or products, fuels, or wastes
6. P2 practice is no longer working due to lack of maintenance

If maintenance or corrective action is required, briefly note the reason. If maintenance or corrective action have been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action report describing the condition and your work to fix the problem.*

Stabilization of Exposed Soil (CGP Part 2.2.14)			
(see reverse for instructions)			
Stabilization Area [Add an additional sheet if necessary]	Stabilization Method	Have You Initiated Stabilization?	Notes
1.		<input type="checkbox"/> YES <input type="checkbox"/> NO If yes, provide date:	
2.		<input type="checkbox"/> YES <input type="checkbox"/> NO If yes, provide date:	
3.		<input type="checkbox"/> YES <input type="checkbox"/> NO If yes, provide date:	
4.		<input type="checkbox"/> YES <input type="checkbox"/> NO If yes, provide date:	
5.		<input type="checkbox"/> YES <input type="checkbox"/> NO If yes, provide date:	

Description of Discharges (CGP Part 4.6.6)	
(see reverse for instructions)	
Was a stormwater discharge or other discharge occurring from any part of your site at the time of the inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If "yes", provide the following information for each point of discharge:	
Discharge Location [Add an additional sheet if necessary]	Observations
1.	Describe the discharge:  At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? <input type="checkbox"/> Yes <input type="checkbox"/> No  If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
2.	Describe the discharge:  At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? <input type="checkbox"/> Yes <input type="checkbox"/> No  If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:

## Instructions for Filling Out the “Stabilization of Exposed Soil” Table

### Stabilization Area

List all areas where soil stabilization is required to begin because construction work in that area has permanently stopped or temporarily stopped (i.e., work will stop for 14 or more days), and all areas where stabilization has been implemented.

### Stabilization Method

For each area, specify the method of stabilization (e.g., hydroseed, sod, planted vegetation, erosion control blanket, mulch, rock).

### Have You Initiated Stabilization

For each area, indicate whether stabilization has been initiated.

### Notes

For each area where stabilization has been initiated, describe the progress that has been made, and what additional actions are necessary to complete stabilization. Note the effectiveness of stabilization in preventing erosion. If stabilization has been initiated but not completed, make a note of the date it is to be completed. If stabilization has been completed, make a note of the date it was completed. If stabilization has not yet been initiated, make a note of the date it is to be initiated, and the date it is to be completed.

## Instructions for Filling Out the “Description of Discharges” Table

You are only required to complete this section if a discharge is occurring at the time of the inspection.

### Was a Stormwater Discharge Occurring From Any Part of Your Site At The Time of the Inspection?

During your inspection, examine all points of discharge from your site, and determine whether a discharge is occurring. If there is a discharge, answer “yes” and complete the questions below regarding the specific discharge. If there is not a discharge, answer “no” and skip to the next page.

### Discharge Location (repeat as necessary if there are multiple points of discharge)

*Location of discharge.* Specify the location on your site where the discharge is occurring. The location may be an outlet from a stormwater control or constructed stormwater channel, a discharge into a storm sewer inlet, or a specific point on the site. Be as specific as possible; it is recommended that you refer to a precise point on your site map.

*Describe the discharge.* Include a specific description of any noteworthy characteristics of the discharge such as color; odor; floating, settled, or suspended solids; foam; oil sheen; and other obvious pollution indicators.

*Are there visible signs of erosion or sediment accumulation?* At each point of discharge and the channel and streambank in the immediate vicinity, visually assess whether there are any obvious signs of erosion and/or sediment accumulation that can be attributed to your discharge. If you answer “yes”, include a description in the space provided of the erosion and sediment deposition that you have found, specify where on the site or in the water of the U.S. it is found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue.



**Contractor or Subcontractor Signature and Certification**

(see reverse for instructions)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

**Signature of Contractor or Subcontractor:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Printed Name and Affiliation:** \_\_\_\_\_

**Operator Signature and Certification**

(see reverse for instructions)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

**Signature of Operator or "Duly Authorized Representative":** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Printed Name and Affiliation:** \_\_\_\_\_

## Instructions for Signature/Certification

Each inspection report must be signed and certified to be considered complete.

### Contractor or Subcontractor Signature and Certification

Where you rely on a contractor or subcontractor to carry out the inspection and complete the inspection report, you should require the inspector to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the inspection report as well.

### Operator Signature and Certification

At a minimum, the inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply to scenarios (1) and (2):

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation:* A responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship:* A general partner or the proprietor, respectively.
- *For a municipality, state, federal, or other public agency:* Either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.



TCEQ Office Use Only  
Permit No:  
CN:  
RN:  
Region:

## Notice of Termination (NOT) for Authorizations under TPDES General Permit TXR150000

### IMPORTANT INFORMATION:

Please read and use the General Information and Instructions prior to filling out each question in the form.

Effective September 1, 2018, this paper form must be submitted to TCEQ with a completed electronic reporting waiver form (TCEQ-20754).

**ePermits:** This form is available on our online permitting system.

Sign up for online permitting at: <https://www3.tceq.texas.gov/steers/>

**What is the permit number to be terminated?**

TXR15  TXRCW

### Section 1. OPERATOR (Permittee)

a) What is the Customer Number (CN) issued to this entity?

CN

b) What is the Legal Name of the current permittee?

c) Provide the contact information for the Operator (Responsible Authority).

Prefix (Mr. Ms. or Miss):

First and Last Name:  Suffix:

Title:  Credentials:

Phone Number:  Fax Number:

Email:

Mailing Address:

City, State, and Zip Code:

Country Mailing Information, if outside USA:

### Section 2. APPLICATION CONTACT

This is the person TCEQ will contact if additional information is needed regarding this application.

Is the application contact the same as the permittee identified above?

☐ Yes, go to Section 3.

☐ No, complete section below

Prefix (Mr. Ms. or Miss):   
First and Last Name:  Suffix:   
Title:  Credentials:   
Phone Number:  Fax Number:   
Email:   
Mailing Address:   
City, State, and Zip Code:   
Country Mailing Information, if outside USA:

### Section 3. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE

- a) TCEQ issued RE Reference Number (RN): RN
- b) Name of project or site as known by the local community:
- c) County, or counties if more than 1:
- d) Latitude:  Longitude:
- e) Site Address/Location:  
If the site has a physical address such as 12100 Park 35 Circle, Austin, TX 78753, complete Section 3A.  
If the site does not have a physical address, provide a location description in Section 3B.  
Example: located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1.

#### Section 3A: Physical Address of Project or Site:

Street Number and Name:   
City, State, and Zip Code:

#### Section 3B: Site Location Description:

Location description:   
  
City where the site is located or, if not in a city, what is the nearest city:   
Zip Code where the site is located:

### Section 4. REASON FOR TERMINATION

Check the reason for termination:

- ☐ Final stabilization has been achieved on all portions of the site that are the responsibility of the Operator and all silt fences and other temporary erosion controls have been removed, or scheduled for removal as defined in the SWP3.
- ☐ Another permitted Operator has assumed control over all areas of the site that have not been finally stabilized, and temporary erosion controls that have been identified in the SWP3 have been transferred to the new Operator.

- ☐ The discharge is now authorized under an alternate TPDES permit.
- ☐ The activity never began at this site that is regulated under the general permit.

## Section 5. CERTIFICATION

Signatory Name:

Signatory Title:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature (use blue ink): \_\_\_\_\_ Date: \_\_\_\_\_

# Instructions for Notice of Termination (NOT) for Authorizations under TPDES General Permit TXR150000

## GENERAL INFORMATION

### Where to Send the Notice of Termination (NOT):

#### BY REGULAR U.S. MAIL:

Texas Commission on Environmental Quality  
Stormwater Processing Center (MC-228)  
P.O. Box 13087  
Austin, Texas 78711-3087

#### BY OVERNIGHT/EXPRESS MAIL:

Texas Commission on Environmental Quality  
Stormwater Processing Center (MC-228)  
12100 Park 35 Circle  
Austin, TX 78753

### TCEQ Contact List:

Application status and form questions:	512-239-3700, <a href="mailto:swpermit@tceq.texas.gov">swpermit@tceq.texas.gov</a>
Technical questions:	512-239-4671, <a href="mailto:swgp@tceq.texas.gov">swgp@tceq.texas.gov</a>
Environmental Law Division:	512-239-0600
Records Management - obtain copies of forms:	512-239-0900
Reports from databases (as available):	512-239-DATA (3282)
Cashier's office:	512-239-0357 or 512-239-0187

### Notice of Termination Process:

A Notice of Termination is **effective on the date postmarked for delivery to TCEQ.**

When your NOT is received by the program, the form will be processed as follows:

- 1) Administrative Review: The form will be reviewed to confirm the following:
  - the permit number is provided;
  - the permit is active and has been approved;
  - the entity terminating the permit is the current permittee;
  - the site information matches the original permit record; and
  - the form has the required original signature with title and date.
- 2) Notice of Deficiency: If an item is incomplete or not verifiable as indicated above, a phone call will be made to the applicant to clear the deficiency. A letter will not be sent to the permittee if unable to process the form.
- 3) Confirmation of Termination: A Notice of Termination Confirmation letter will be mailed to the operator.

### Change in Operator:

An authorization under the general permit is not transferable. If the operator of the regulated entity changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted not later than 10 days prior to the change in Operator status.

## INSTRUCTIONS FOR FILLING OUT THE FORM

The majority of permit information related to the current operator and regulated entity are available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).

## **Section 1. Operator (Current Permittee):**

- a) Customer Number (CN)  
TCEQ's Central Registry assigns each customer a number that begins with CN, followed by nine digits. This is not a permit number, registration number, or license number. The Customer Number, for the current permittee, is available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).

- b) Legal Name of Operator  
The operator must be the same entity as previously submitted on the original Notice of Intent for the permit number provided. The current operator name, as provided on the current authorization, is available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).

- c) Contact Information for the Operator (Responsible Authority)  
Provide information for person signing the NOT application in the Certification section. This person is also referred to as the Responsible Authority.

Provide a complete mailing address for receiving mail from the TCEQ. Update the address if different than previously submitted for the Notice of Intent or Notice of Change. The mailing address must be recognized by the US Postal Service. You may verify the address on the following website: <https://tools.usps.com/go/ZipLookupAction!input.action>.

The phone number should provide contact to the operator.

The fax number and e-mail address are optional and should correspond to the operator.

## **Section 2. Application Contact:**

Provide the name, title and contact information of the person that TCEQ can contact for additional information regarding this application.

## **Section 3. Regulated Entity (RE) Information on Project or Site:**

- a) Regulated Entity Reference Number (RN)  
A number issued by TCEQ's Central Registry to sites where an activity regulated by TCEQ. This is not a permit number, registration number, or license number. The Regulated Entity Reference Number is available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).
- b) Name of the Project or Site  
Provide the name of the site as known by the public in the area where the site is located.
- c) County  
Identify the county or counties in which the regulated entity is located.
- d) Latitude and Longitude  
Enter the latitude and longitude of the site in degrees, minutes, and seconds or decimal form. The latitude and longitude as provided on the current authorization is available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).
- e) Site/Project (RE) Physical Address/Location Information  
The physical address/location information, as provided on the current authorization, is available at the following website: [http://www2.tceq.texas.gov/wq\\_dpa/index.cfm](http://www2.tceq.texas.gov/wq_dpa/index.cfm).

Section 3A. If a site has an address that includes a street number and street name, enter the complete address for the site. If the physical address is not recognized as a USPS delivery address, you may need to validate the address with your local police (911 service) or through an online map site used to locate the site. Please confirm this to be a complete and valid address. Do not use a rural route or post office box for a site location.

Section 3B. If a site does not have an address that includes a street number and street name, provide a complete written location description. For example: "The site is located on the north side of FM 123, 2 miles west of the intersection of FM 123 and Highway 1."

Provide the city (or nearest city) and Zip Code of the facility location.

#### **Section 4. Reason for Termination:**

The Notice of Termination form is only for use to terminate the authorization (permit). The Permittee must indicate the specific reason for terminating by checking one of the options. If the reason is not listed then provide an attachment that explains the reason for termination.

Please read your general permit carefully to determine when to terminate your permit. Permits will not be reactivated after submitting a termination form. The termination is effective on the date postmarked for delivery to TCEQ.

#### **Section 5. Certification:**

The certification must bear an original signature of a person meeting the signatory requirements specified under 30 Texas Administrative Code §305.44.

##### *IF YOU ARE A CORPORATION:*

The regulation that controls who may sign an application form is 30 Texas Administrative Code §305.44(a), which is provided below. According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

##### *IF YOU ARE A MUNICIPALITY OR OTHER GOVERNMENT ENTITY:*

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a), which is provided below. According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statutes under which your government entity was formed. An NOI or similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to §305.44(a) (3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the Texas Commission on Environmental Quality's Environmental Law Division at 512-239-0600.



*30 Texas Administrative Code §305.44. Signatories to Applications*

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).

SECTION 01 45 16.13  
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Quality assurance and control of installation and manufacturer's field services and reports.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid.

1.03 RELATED WORK

- A. Submittal procedures are included in Section 01 33 00.
- B. Testing Laboratory Services are included in Section 01 45 29.

1.04 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01 33 00 – Submittals.

1.05 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Contractor will maintain an adequate internal inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents, and conforms to the Construction Schedule.
- B. Monitor quality control over suppliers, Manufacturers, products, services, site conditions, and workmanship, to produce the Work of specified quality at no additional cost to the Owner.
- C. Comply fully with Manufacturers' installation instructions, including each step in sequence.
- D. Request clarification from Engineer before proceeding should Manufacturers' instructions conflict with Contract Documents.
- E. Comply with specified Standards as minimum requirements for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- F. Perform work by persons qualified to produce the specified level of workmanship.
- G. Obtain copies of Standards and maintain at Project Site when required by individual Technical Specifications.
- H. Maintain complete inspection records and make them available at all times to the Engineer and Owner. Records shall include a Daily Report, Daily Inspection Log and Daily Quality Control tasks complete with date stamped photos. All records shall be uploaded to Owner's Electronic Document Management System.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual Technical Specifications, provide material or product suppliers' or manufacturers' technical Construction Manager to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, operator training, test, adjust, and balance of equipment as applicable, and to initiate operation, as required. Conform to minimum time requirements for start-up operations and operator training if defined in Technical Specifications.
- B. At the Owner's Construction Manager request, submit qualifications of Manufacturer's Construction Manager fifteen (15) days in advance of required Construction Manager's services. The Construction Manager shall be subject to approval of Owner's Construction Manager .
- C. Manufacturer's Construction Manager shall report observations and site decisions, or instructions given to applicators or installers that are supplemental or contrary to Manufacturers' written instructions. Submit report within one (1) day of observation to Owner's Construction Manager for review.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 45 29  
TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 CONDITIONS

- A. Testing, inspection, and control of materials required by these specifications shall be performed by a commercial testing laboratory meeting the specified requirements.
- B. Engineer will select and pay for services of commercial testing laboratory to perform density tests for field control and to perform the various laboratory testing services necessary for field control of the work as specified in respective specification sections, except Contractor shall pay for services of commercial testing laboratory approved by Engineer and Owner to perform the following:
  - 1. Laboratory services required to establish mix design proposed for use for Portland cement concrete, asphaltic concrete mixtures, and other material mixes requiring control by testing laboratory.
  - 2. Analysis of aggregates, fixing gradations, and the preparation and testing of design cylinders, beams, or specimens, and other services required to establish design or redesign of material mixes requiring control by testing laboratory when required because of change in source of materials or other conditions not caused by Owner.
  - 3. Tests required to establish optimum moisture and maximum dry density of earth and base materials and to determine required compactive effort to meet density requirements (Contractor shall pay for all proctor curves to establish optimum moisture and Engineer shall pay for all density tests).
  - 4. Cores to test for thickness of paving that are performed at Contractor's election.
  - 5. Testing and inspection performed for the Contractor's convenience.
  - 6. Retesting and repetitions of laboratory services when initial tests indicate work does not comply with requirements of Contract Documents.
- C. Specified testing frequencies are recommended standards, and may be increased or decreased by the Engineer as deemed necessary for quality control of materials and the work.
- D. Reports and commentaries by testing laboratory shall in no way relieve Contractor of his obligation to perform work in full compliance with standards and provisions of the Contract Documents.
- E. The Contractor shall not be relieved of his obligation to perform work in full compliance with the standards and provisions of the Contract Documents by reason of the Engineer's performance in testing or refraining from testing the work.
- F. Engineer reserves right to take samples and specimens, and conduct tests on material and work provided by Contractor to assure quality control.

- G. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.

#### 1.02 REQUIREMENTS OF LABORATORY

- A. Meet basic requirements of ASTM E329, latest edition.
- B. Testing Equipment: Calibrated at maximum twelve-month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
- C. Testing laboratory is only required to have testing facilities for work included in this project.
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection.
- E. Submit memorandum of remedies of any deficiencies reported by inspection to Owner and Engineer.

#### 1.03 LABORATORY DUTIES AND LIMITATIONS OF AUTHORITY

- A. Cooperate with Owner's Representative, Engineer and Contractor.
  - 1. Unless directed by Engineer, types and frequencies of tests as specified in specifications sections for field quality control shall not be exceeded.
  - 2. Engineer may not accept charges for tests in excess of types and frequencies specified in specifications sections unless authorized by the Engineer.
  - 3. Charges for tests to be paid for by Engineer shall be submitted promptly to Engineer to allow adequate time for his review before time for payment.
  - 4. Unless otherwise directed or stipulated, samples, specimens, and field test locations shall be selected under the control of the Engineer.
- B. Provide qualified personnel promptly on notice.
- C. Perform required inspections, sampling, and testing of materials and methods of construction, including making and curing concrete test specimens.
- D. Ascertain Contractor's compliance with specifically named standards of the Contract Documents.
- E. Comply with specified testing and sampling standards, or recognized authoritative testing and sampling standards when none are specifically named in the Specifications.
- F. Immediately notify Engineer and Contractor of irregularities or deficiencies of work which are observed during performance of services. Immediately is defined as the same day that the irregularity or deficiency is determined and shall be in person, by telephone or by e-mail. G. Promptly distribute copies of reports of inspections and tests:

1. Owner: One copy.
  2. Engineer: One copy.
  3. Contractor: Two copies.
- G. Perform additional services as required by Engineer.
- H. Laboratory is not authorized to:
1. Revoke, alter, enlarge on, or waive requirements of Contract Documents.
  2. Approve or accept any portion of work.
  3. Reject or stop work, but only shall notify Engineer of any failure, deficiencies, or irregularities immediately.
  4. Perform any duties of Contractor.

1.04 CONTRACTOR'S RESPONSIBILITIES

- A. Before starting to use proposed design mix and mix materials in construction, arrange for testing of design mixes and mix materials for Portland cement concrete, asphaltic concrete, and other material mixes requiring control by testing laboratory.
- B. Cooperate with laboratory personnel, provide access to work, and to construction and fabrication operations.
- C. Provide samples of materials to be tested in required quantities.
- D. Provide adequate on site storage area for testing laboratory.
- E. Furnish copies of mill test reports for the materials being used on the job when requested by Engineer.
  1. Mill certificates will be acceptable when it is definite that certified mill test sheets apply to the material being supplied.
- F. Furnish labor to provide access to work to be tested, to obtain and handle samples at site, and to facilitate inspections and tests.
- G. Notify laboratory and Engineer 48 hrs. minimum in advance of operations requiring control by testing laboratory, to allow for assignment of personnel and scheduling of tests.
  1. When tests or inspections cannot be performed after such notice, reimburse Engineer for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- H. Contractor shall notify the Laboratory and Engineer immediately upon discovery of conditions or circumstances requiring cancellation of work.
- I. Arrange with laboratory and pay for:

1. Retesting required for failed tests.
  2. Retesting for nonconforming Work.
  3. Additional sampling and tests requested by Contractor beyond specified requirements.
  4. Insufficient notification of cancellation of tests for work scheduled but not performed.
- J. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard requirements for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

1.05 SPECIFIC TESTS, INSPECTIONS AND METHODS REQUIRED

- A. Certification of Products: As required by respective specification sections.
- B. Test, Adjust and Balance of Equipment: As required by respective specification sections.
- C. Sampling and Laboratory Tests: As required by respective specification sections.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary facilities and the necessary controls for the project including utilities, telephone, sanitary facilities, field office, storage sheds and building, safety requirements, first aid equipment, fire protection, security measures, protection of the Work and property, access roads and parking, environmental controls, disposal of trash, debris, and excavated material, pest and rodent control, water runoff and erosion control.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment for work under this section. Include the costs for performing the work in project costs.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. The facilities and controls specified in this section are considered minimum for the Project. The Contractor may provide additional facilities and controls for the proper execution of the Work and to meet Contractor's responsibilities for protection of persons and property.
- B. Comply with applicable requirements specified in other sections of the Specifications.
  - 1. Maintain and operate temporary facilities and systems to assure continuous service.
  - 2. Modify and extend systems as Work progress requires.
  - 3. Completely remove temporary materials and equipment when their use is no longer required.
  - 4. Restore existing facilities used for temporary services to specified or to original condition.

1.04 TEMPORARY UTILITIES

- A. Obtaining Temporary Service.
  - 1. Make arrangements with utility service companies for temporary services.
  - 2. Abide by rules and regulations of the utility service companies or authorities having jurisdiction.
  - 3. Be responsible for utility service costs until the Work is substantially complete. Included are fuel, power, light, heat, and other utility services necessary for execution, completion, testing, and initial operation of the Work.



**B. Water**

1. Provide water required for and in connection with Work to be performed and for specified tests of piping, equipment, devices, or for other use as required for proper completion of the Work.
2. Contractor shall not operate any fire hydrants without first having a meter from the District and having placed this meter on the hydrant. The Contractor shall operate fire hydrant(s) only with an approved hydrant wrench.
3. Provide and maintain an adequate supply of potable water for domestic consumption by Contractor personnel.

**C. Electricity and Lighting.**

1. Provide electric power service as required for the Work, including testing of Work. Provide power for lighting, operation of the Contractor's equipment, or for any other use by Contractor.
2. Electric power service includes temporary power service or generator to maintain plant operations during any scheduled shutdown.
3. Minimum lighting level shall be 5 foot candles for open areas; 10 foot candles for stairs and shops.

**D. Temporary Heat and Ventilation**

1. Provide temporary heat as necessary for protection or completion of the Work.
2. Provide temporary heat and ventilation to assure safe working conditions; maintain enclosed areas at a minimum of 50°F.

**E. Sanitary Facilities**

1. Provide and maintain sanitary facilities for persons on the job site; comply with the regulations of State and local departments of health.
2. Enforce the use of sanitary facilities by construction personnel at the job site. Such facilities shall be enclosed. Pit type toilets will not be permitted. No discharge will be allowed from these facilities. Collect and store sewage and waste so as not to cause a nuisance or health problem; have sewage and waste hauled off-site and properly disposed in accordance with local regulations.
3. Locate toilets near the Work site and secluded from view insofar as possible. Keep toilets clean and supplied throughout the course of the Work.

**F. Internet**

1. Provide a dedicated T1 internet connection to the Engineer's field office as described in Section 1.05 below. The T1 line shall be for the exclusive use of the Engineer. Contractor shall coordinate with the Internet service provider to provide all necessary hardware for the

T1 connection. Engineer will provide all networking hardware downstream of the T1 connection.

1.05 FIELD OFFICE

- A. The facilities and controls specified in this section are considered minimum for the project. After obtaining approval, the Contractor can provide additional facilities and controls which he deems necessary for proper execution of the work and to meet his responsibilities for protection of persons and property.
- B. Temporary offices shall be established on the job site where approved or directed by the Engineer, adequately furnished, and maintained in a clean, orderly condition by the Contractor. The Contractor or an authorized representative shall be present in the field office at all times while work is in progress. Instructions received there from the Engineer shall be considered as delivered to the Contractor.
- C. Contractor shall provide either a separate building or a partitioned off space in Contractor's building for the exclusive use of the Engineer throughout the period of construction. The Engineers space shall include one furnished office of minimum 140 sq ft each and a furnished meeting room to accommodate seating for 12 persons. The temporary office shall be weathertight, have a tight floor at least elevation 24.00 (NAVD88), at least 18" from natural grade, and shall be insulated all around with rigid insulation board not less than 1/2 in thick and suitably ventilated. The office shall have at least three screened windows capable of being opened, a screen door and a solid door provided with cylinder lock and three keys. The office shall be provided with janitor service, heating and cooling equipment, electrical wiring, outlets and fixtures suitable to light the tables and desk adequately as directed. Provide separate toilet facilities for the exclusive use of the Engineer.
- D. The field office, as equipped with furnishings, fittings, equipment, and utility connections, will remain the property of the Contractor. The Contractor shall retain responsibility for risk of loss or damage to the field office during performance of the Contract.
- E. Field office may be either new or used. Used office shall be free of damage and defects which would impair its suitability to perform the intended function. Used office will be inspected by the Owner for suitability prior to installation at the work site. Used offices found unsuitable will not be approved for use and shall not be transported to the work site.
- F. Provide the following furniture and equipment in field office for the Engineer's use:
  - 1. One plan table, 3-ft by 5-ft and one
  - 2. Desk about 3-ft by 5-ft with desk chair
  - 3. Two additional chairs in each office
  - 4. Plan rack, as directed
  - 5. Shelves, as directed
  - 6. Four drawer, filing cabinet with lock

7. Coat rack and hooks
  8. Rain gauge
  9. Thermostat control
  10. Duplicating photocopy/printing machine (must be able to print 11x17 sheets of paper).
  11. One conference table to accommodate 12 seated persons.
  12. Eight folding chairs.
  13. First aid kit suitable for ten people with manual, that meets ANSI 2308.1-1998.
  14. Fire extinguisher, 8-1/2 pounds, type ABC.
  15. Hi-Lo Thermometer.
  16. Fax machine, plain paper.
  17. Electric water cooler with refrigerator compartment, drinking cup dispenser, cups, and cup disposal.
  18. Water closet, lavatory with hot and cold water supply, mirror, soap holder, toilet tissue dispenser, and paper towel dispenser.
- G. Supply all fuel for heating and pay all electrical bills.
- H. An approved, suitably constructed and equipped trailer of proper size may be furnished for the Engineer's office.

1.06 STORAGE OF MATERIALS

- A. Provide adequately ventilated, watertight storage facilities with floor above ground level for materials and equipment susceptible to weather damage.
- B. Storage of materials not susceptible to weather damage may be on blocks off the ground.
- C. Store materials in a neat and orderly manner. Place materials and equipment to permit easy access for identification, inspection and inventory.
- D. Contractor is responsible for materials and equipment stored on and off site.

1.07 SAFETY REQUIREMENTS

- A. Submit and follow a safety program. Include in the safety program documented response to trench safety requirements as specified in Section 31 23 33.14 – Trench Excavation Safety Systems.
- B. Conduct operations in strict accord with applicable Federal, State and local safety codes and statutes and with good construction practice. The Contractor is fully responsible and obligated

to establish and maintain procedures for safety of all work, personnel and equipment involved in the Project.

- C. Observe and comply with Texas Occupational Safety Act (Art. 5182a, V.C.S.) and with all safety and health standards promulgated by Secretary of Labor under Section 107 of Contract Work Hours and Standards Act, published in 29 CFR Part 1926 and adopted by Secretary of Labor as occupational safety and health standards under the Williams Steiger Occupational Safety and Health Act of 1970, and to any other legislation enacted for safety and health of Contractor employees. Such safety and health standards apply to subcontractors and their employees as well as to the Contractor and its employees.
- D. Observance of and compliance with the regulations shall be solely and without qualification the responsibility of the Contractor without reliance or superintendence of or direction by the Owner Representative. Immediately advise the Owner Representative of investigation or inspection by Federal Safety and Health inspectors of the Contractor or subcontractor's work or place of work on the job site under this Contract, and after such investigation or inspection, advise the Owner Representative of the results. Submit one copy of accident reports to Owner Representative within 10 business days of occurrence.
- E. Protect areas occupied by workmen using the best available devices for detection of lethal and combustible gases. Test such devices frequently to assure their functional capability. Constantly observe infiltration of liquids into the Work area for visual or odor evidences of contamination, immediate take appropriate steps to seal off entry of contaminated liquids to the Work area.
- F. Safety measures, including but not limited to safety personnel, first aid equipment, ventilating equipment and safety equipment, in the specifications and shown on the Drawings are obligations of the Contractor.
- G. Maintain required coordination with the local Police and Fire Departments during the entire period covered by the Contract.
- H. Include project safety analysis in safety plan. Itemize major tasks and potential safe hazards. Plan to eliminate hazards or protect workers and public from each hazard.

#### 1.08 FIRST AID EQUIPMENT

- A. Provide a first aid kit throughout the construction period. List telephone numbers for physicians, hospitals, and ambulance services in each first aid kit.
- B. Have at least one person thoroughly trained in first aid procedures present on the site whenever Work is in progress. Contractor to conform to protocols and requirements for training and protection against "blood borne pathogens."

#### 1.09 FIRE PROTECTION

- A. Fire Protection Standards.
  - 1. Conform to specified fire protection and prevention requirements as well as those which may be established by Federal, State, or local governmental agencies.

2. Comply with all applicable provisions of NFPA Standard No. 241, Safeguarding Building Construction and Demolition Operations.
3. Provide portable fire extinguishers, rated not less than 2A or 5B in accordance with NFPA Standard No. 10, Portable Fire Extinguishers, for each temporary building, and for every 3000 square feet of floor area of facilities under construction.
4. Locate portable fire extinguishers within 50 feet maximum from any point in the Project area in which work is performed.

**B. Fire Prevention and Safety Measures.**

1. Prohibit smoking in hazardous areas. Post suitable warning signs in areas which are continuously or intermittently hazardous.
2. Use metal safety containers for storage and handling of flammable and combustible liquids.
3. Do not store flammable or combustible liquids in or near stairways or exits.
4. Maintain clear exits from all points within a structure.

**1.10 SECURITY MEASURES**

- A. Protect all Work materials, equipment, and property from loss, theft, damage, and vandalism. Contractor's duty to protect property includes Owner's property.
- B. If existing fencing or barriers are breached or removed for purposes of construction. Provide and maintain temporary security fencing equal to existing.

**1.11 PROTECTION OF PUBLIC UTILITIES**

- A. Prevent damage to existing public utilities during construction. These utilities are shown on the Drawings at their approximate locations, but all lines may not be shown. Pre-locate, by whatever means may be required (metal detection equipment, probes, excavation, survey), all underground utilities before excavating in area. All investigative work will be done and all repairs required after investigation will be accomplished by Contractor. Contractor is responsible for damages caused by failure to locate and preserve these underground utilities. Give owners of these utilities at least 48 hours notice before commencing Work in area, for locating utilities during construction and allow adequate time for making adjustments or relocation of the utilities when they conflict with proposed Work. Any temporary relocation of utilities if necessary to accommodate construction will not be paid for separately. Bypassing of sanitary waste to storm drainage facilities is not allowed. Utility service lines are not shown on Drawings. Anticipate that such service lines exist and repair them if damaged due to any construction activity. No separate payment will be made for this repair work.
- B. Prior to abandonment of utility, make appropriate arrangements with District and owner of utility to terminate service, remove meters, transformers, and poles as may be required by site conditions.

- C. When excavating near pipelines and prior to start of excavation, request a representative of pipeline company to come to construction site(s) to meet representatives of Contractor and Owner Representative to discuss actual procedures that will be used. Request pipeline company's representative to probe and locate the pipelines in at least three locations: one at each side of proposed excavation and one at centerline of proposed utility. The Contractor may be required to locate the pipeline as directed by the pipeline company at no cost to the project. Representative of pipeline company and Owner Representative must be present to observe activities of Contractor at all times when excavation is being conducted within 15 feet of pipeline company's pipeline.

## 1.12 PROTECTION OF THE WORK AND PROPERTY

### A. Preventive Actions

- 1. Take precautions, provide programs, and take actions necessary to protect the Work and public and private property from damage.
- 2. Take action to prevent damage, injury or loss, including, but not limited to, the following:
  - a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with progress of the Work or the Work of any other contractor, any utility service company, or the Owner's operations.
  - b. Provide suitable storage for materials which are subject to damage by exposure to weather, theft, breakage, or otherwise.
  - c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
  - d. Frequently clean up refuse, rubbish, scrap materials, and debris caused by construction operations, keeping the Project site safe and orderly.
  - e. Provide safe barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways, and other hazardous areas.
- 3. Obtain written consent from proper parties before entering or occupying with workers, tools, materials or equipment, privately owned land except on easements provided for construction.
- 4. Assume full responsibility for the preservation of public and private property on or adjacent to the site. If any direct or indirect damage is done by or on account of any act, omission, neglect, or misconduct in execution of the Work by the Contractor, it shall be restored by the Contractor to a condition equal to or better than that existing before the damage was done.

### B. Barricades and Warning Signals

- 1. Where work is performed on or adjacent to any roadway, right-of-way, or public place; furnish and erect barricades, fences, lights, warning signs, and danger signals; provide watchmen; and take other precautionary measures for the protection of persons or property and protection of the Work. Barricades shall be painted to be visible at night. From sunset to sunrise, furnish and maintain at least one light at each barricade. Erect sufficient barricades to keep vehicles from being driven and pedestrians from walking on or into Work under construction. Furnish watchmen in sufficient numbers to protect the Work.

Responsibility of maintenance of barricades, signs, lights and for providing watchmen shall continue until the Project is accepted by the Owner.

- C. Tree and Plant Protection. Comply with requirements of Section 01 35 43 –Environmental Procedures.
- D. Protection of Existing Structures
  - 1. Underground Structures:
    - a. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels, and other existing subsurface installations located within or adjacent to the limits of the Work.
    - b. Known underground structures, including water, sewer, electric, and telephone services are shown on the Drawings in accordance with the best information available, but is not guaranteed to be correct or complete.
    - c. Explore ahead of trenching and excavation work and uncover obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption of utility services. Restore to original condition damages to underground structure at no additional cost to the Owner.
    - d. Necessary changes in location of the Work may be made by the Owner Representative to avoid unanticipated underground structures.
    - e. If permanent relocation of an underground structure or other subsurface installations is required and not otherwise provided for in the Contract Documents, the Owner Representative will direct Contractor in writing to perform the Work, which shall be paid for under the provisions for changes in the Contract Price as described in the General Conditions.
  - 2. Surface Structures:
    - a. Surface structures are defined as existing buildings, structures and other constructed installations above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks, guard cables, fencing, and other facilities that are visible above the ground surface.
  - 3. Protection of Underground and Surface Structures:
    - a. Support in place and protect from direct or indirect injury to underground and surface structures located within or adjacent to the limits of the Work. Install such supports carefully and as required by the party owning or controlling such structure. Before installing structure supports, Contractor shall satisfy the Owner Representative that the methods and procedures to be used have been approved by the owner of the structure.
    - b. Avoid moving or in any way changing the property of public utilities or private service corporations without prior written consent of a responsible official of that service or public utility. Representatives of these utilities reserve the right to enter within the limits of this project for the purpose of maintaining their properties, or of making such changes or repairs to their property that may be considered necessary by performance of this Contract.
    - c. Notify the owners and/or operators of utilities and pipelines of the nature of construction operations to be performed and the date or dates on which those

operations will be performed. When construction operations are required in the immediate vicinity of existing structures, pipelines, or utilities, give a minimum of 5 working days advance notice. Probe and flag the location of underground utilities prior to commencement of excavation. Keep flags in place until construction operation reach and uncover the utility.

- d. Assume risks attending the presence or proximity of underground and surface structures within or adjacent to the limits to the Work including but not limited to damage and expense for direct or indirect injury caused by the Work to any structure. Immediately repair damage caused, to the satisfaction of the owner of the damaged structure.
- E. Employ a structural engineer to ensure protection measures are adequate for the safety and integrity of structures and facilities.
- F. Protection of Installed Products.
  - 1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
  - 2. Control traffic to prevent damage to equipment, materials, and surfaces.

#### 1.13 ROADS AND PARKING

- A. Prevent interference with traffic and Owner operations on existing roads.
- B. Designate temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. Locate as approved by Owner.
- C. Minimize use by construction traffic of existing residential streets and driveways.
- D. Do not allow heavy vehicles or construction equipment in existing parking areas.

#### 1.14 ENVIRONMENTAL CONTROLS

- A. Provide and maintain methods, equipment, and temporary construction as necessary for controls over environmental conditions at the construction site and adjacent areas.
- B. Comply with statutes, regulations, and ordinances which relate to the proposed Work for the prevention of environmental pollution and preservation of natural resources, including but not limited to the National Environmental Policy Act of 1969, PL 91 190, Executive Order 11514.
- C. Recognize and adhere to the environmental requirements of the Project. Disturbed areas shall be strictly limited to boundaries established by the Contract Documents. Particularly avoid pollution of "on site" streams, sewers, wells, or other water sources. The District recognizes that the project area has considerable natural value and that construction of projects should be completed with a minimum of impact to the surrounding environment. Attention is directed to this concept. Adopt construction procedures that do not cause unnecessary excavation and filling of the terrain, indiscriminate destruction of vegetation, air or stream pollution, nor the harassment or destruction of wildlife, migratory birds and Threatened and Endangered Species.
- D. Burning of rubbish, debris or waste materials is not permitted.



1.15 POLLUTION CONTROL

- A. Provide methods, means, and facilities required to prevent contamination of soil, water or atmosphere by discharge of noxious substances from construction operations.
- B. Provide equipment and personnel to perform emergency measures required to contain any spillage, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth offsite in accordance with laws and regulations, and replace with suitable compacted fill and topsoil.
- C. Take special measures to prevent harmful substances from entering public waters. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
- D. Provide systems for control of atmospheric pollutants.
  - 1. Prevent toxic concentrations of chemicals.
  - 2. Prevent harmful dispersal of pollutants into the environment.
- E. Use equipment during construction that conforms to current Federal, State, and local laws and regulations.

1.16 PEST AND RODENT CONTROL

- A. Provide rodent and pest control as necessary to prevent infestation of construction or storage areas.
- B. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

1.17 NOISE CONTROL

- A. Provide vehicles, equipment, and construction activities that minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and noise Ordinances of each local jurisdiction for each project site, and in no case will noise levels be permitted which create a nuisance in the surrounding neighborhoods. Refer to Specification 01 35 00 for requirements.
- B. Conduct construction operations during daylight hours except as approved by Owner Representative.

1.18 DUST CONTROL

- A. Control objectionable dust caused by operation of vehicles and equipment. Apply water or use other methods, subject to approval of the Owner Representative, which will control the amount of dust generated.

1.19 WATER RUNOFF AND EROSION CONTROL

- A. Provide methods to control surface water, runoff, subsurface water, and water pumped from excavations and structures to prevent damage to the Work, the site, or adjoining properties.
- B. Control fill, grading and ditching to direct water away from excavations, pits, and other construction areas; and to direct drainage to proper runoff courses so as to prevent any erosion, sedimentation or damage.
- C. Provide, operate, and maintain equipment and facilities of adequate size to control surface water.
- D. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and in conformance with environmental requirements.
- E. Retain existing drainage patterns external to the construction site by constructing temporary earth berms, sedimentation basins, retaining areas, and temporary ground cover as needed to control conditions.
- F. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
  - 1. Keep to a minimum the area of bare soil exposed at one time.
  - 2. Provide temporary control measures, such as berms, dikes, and drains.
- G. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.
  - 1. Inspect earthwork periodically to detect any evidence of the start of erosion. Apply corrective measures as required to control erosion.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. The Engineer's field office, including access and parking, shall be installed prior to beginning construction activities at the work site.

3.02 ACCESS AND PARKING

- A. Field office shall be located with clear access from public streets.
- B. Parking space shall be provided for not less than five (5) vehicles adjacent to the field office.
- C. If necessary, access road and parking space shall be graded for drainage and surfaced with gravel, asphalt, or concrete.

3.03 MAINTENANCE

- A. Field office shall be maintained and serviced weekly, during normal working hours. Servicing shall include complete janitorial services including supplies such as soap, toilet tissue, paper towels, and cups.

3.04 REMOVAL

- A. Prior to substantial completion, remove all temporary buildings, storage facilities, sanitary conveniences, and signs. Disconnect all temporary utility connections. Clear the area of unnecessary safety items and temporary controls. Remove or restore, as required, all temporary roads and parking areas. Clean up the entire area as specified in Section 01 74 23 – Final Cleaning.

END OF SECTION

SECTION 01 66 00  
DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's instructions.
- B. Schedule delivery to reduce long term on site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- F. Provide necessary equipment and personnel to unload all items delivered to the site.
- G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.04 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him/her. Instruction shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.
- B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

- C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.
- D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.
  - 1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.
  - 2. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal to metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
  - 3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
  - 4. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies administrative, verification and procedural requirements for project closeout, including but not limited to:
  - 1. Closeout Procedure.
  - 2. Final cleaning.
  - 3. Project Record Documents.
  - 4. Spare parts and maintenance materials (spare paint, lubricants, special tools).
  - 5. Warranties, guarantees, and bonds.
  - 6. Reconciliation of final accounting, final change order, final payment application.
  - 7. Permit close-outs including Certificate of Occupancy or Certificate of Completion.

1.02 RELATED WORK

- A. Operation and Maintenance (O&M) data and manuals Section 01 78 23 and applicable Sections in Technical Divisions.
- B. Final cleaning is included in Section 01 74 23.
- C. Project Record Documents are included in Section 01 78 39.
- D. Spare parts and maintenance materials (spare paint, lubricants, special tools) are included in applicable Sections in Divisions 26 and 40.
- E. Warranties, guarantees, and bonds are included in Section 01 70 49 and applicable Sections in Technical Divisions 26 and 40.
- F. Payment Application is included in Section 00 62 76.

1.03 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, work has been inspected and that work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide all deliverables as specified, prior to submitting the final payment application.

- C. Provide submittals to Engineer that are required by governing or other authorities having applicable jurisdiction including but not limited to permit close out information, certificates of occupancy, etc.
- D. Submit Application for Final Payment identifying total adjusted Contract Sum, previous payments and sum remaining due, following submittal and approval of Record Documents and Record Drawings.
- E. Provide Project Record Documents prior to request for final closeout.
- F. Complete or correct items on punch list, with no new items added to said punch list.
- G. Any punch list items will be completed to the Owner's satisfaction prior to final payment.
- H. Submit Contractor's Final Release and Release of Liens with final payment application.

1.04 FINAL CLEANING

- A. Contractor to complete final cleaning prior to submittal of the final application for payment.
- B. Contractor to comply with requirements as specified in Section 01 74 23.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 70 49  
WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 RELATED WORK

- A. Refer to Conditions of Contract for the general requirements relating to warranties and bonds.
- B. General closeout requirements are included in Section 01 70 00 – Execution and Closeout Requirements.
- C. Specific requirements for warranties for the work and products and installations that are specified to be warranted are included in the individual Sections.

1.04 SUBMITTALS

- A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the work, or a designated portion of the work, submit written warranties upon request of the Owner.
- B. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within 15 days of completion of that designated portion of the Work.
- C. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties.

1.05 WARRANTY REQUIREMENT

- A. Refer to individual Sections of Each Division for specific content requirements, and particular requirements for submittal of special warranties.
  - 1. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall commence at the time when District Council approves Final Completion of the project.



2. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 26 and 40 and which has a 1 HP motor or which lists for more than \$1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.
  3. For certain pieces of equipment, the District may require a warranty of longer duration. The requirement for a warranty of longer duration shall be specified in individual sections of the Specifications.
- B. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
  - C. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
  - D. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract
  - E. Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.
  - F. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - G. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.
  - H. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

#### 1.06 MANUFACTURERS CERTIFICATIONS

- A. Where required, the Contractor shall supply evidence, satisfactory to the Engineer, that the Contractor can obtain manufacturers' certifications as to the Contractor's installation of equipment.

1.07 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 71 23.16  
CONSTRUCTION SURVEYING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for surveyors and surveys.
- B. Procedures pertaining to survey control points and reference points.

1.02 MEASUREMENT AND PAYMENT

- A. Unless indicated as a Bid Item, no separate payment will be made for Work performed under this Section. Include cost in Bid Items for which this Work is a component.

1.03 RELATED WORK

- A. Section 01 33 00 – Submittals
- B. Section 01 78 39 – Project Record Document

1.04 QUALITY CONTROL

- A. Conform to State of Texas laws for surveys requiring licensed surveyors. Employ a land surveyor acceptable to Engineer and licensed in the State of Texas.

1.05 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01 33 00 – Submittals.
- B. Submit to Engineer the name, address, and telephone number of Surveyor before starting survey work.
- C. Submit documentation verifying accuracy of survey work on request.
- D. Submit benchmark data confirmation control plan sheets and diagrams.

1.06 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.
- B. Submit Record Documents under provisions of Section 01 78 39 – Project Record Documents.
- C. Prepare a certified survey setting forth dimensions, locations, angles, and elevations of construction and site work upon completion of foundation walls and major site improvements.

1.07 EXAMINATION

- A. Verify locations of survey control points prior to starting Work.

- B. Notify Engineer immediately of any discrepancies discovered.

#### 1.08 SURVEY REFERENCE POINTS

- A. Control datum for survey is that established by Owner-provided survey and indicated on the Drawings.
- B. Locate and protect survey control points, including property corners, prior to starting site work. Use caution to preserve permanent reference points during construction.
- C. The Contractor shall not reset; nor cause to be reset, lost, disturbed, or damaged; control points. Promptly notify Engineer of disturbance or damage to any control point(s).
- D. Notify Engineer 48 hours in advance of need for relocation of reference points due to changes in grades or other reasons.
- E. Report promptly to Engineer the loss or destruction of any reference point.
- F. Any re-staking of control points lost, disturbed, or damaged by Contractor's operations will be provided by Owner at Contractor's expense.
- G. Employ a Registered Public Land Surveyor to reset any missing, disturbed, or damaged monumentation.

#### 1.09 SURVEY REQUIREMENTS

- A. Utilize recognized engineering survey practices.
- B. Establish a minimum of two permanent bench marks on Project Site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
- C. Establish and record in survey notes elevations, lines and levels to provide quantities required for Measurement and Payment and to provide appropriate controls for the Work. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading; fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Monumented Baseline.
- D. Verify periodically layouts by same means.

#### PART 2 PRODUCTS - NOT USED

#### PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 73 29  
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers the cutting, coring, rough and finished patching of holes and openings in existing construction, or in parts of new construction. Procedures for cutting and patching will be the same for either condition.
- B. All cutting, coring, and rough patching shall be performed by the General Contractor. Finish patching shall be the responsibility of the General Contractor and shall be performed by the trade associated with the application of the particular finish.
- C. Provide all cutting, fitting and patching, including attendant excavation and backfill, required to complete the work or to:
  - 1. Remove and replace defective Work or Work not conforming to the Drawings and Specifications.
  - 2. Take samples of installed Work as required for testing.
  - 3. Remove construction required to provide for specified alteration or addition to existing work.
  - 4. Uncover Work to provide for inspection or reinspection of covered Work by the Owner's Construction Manager or regulatory agencies having jurisdiction.
  - 5. Connect any Work that was not accomplished in the proper sequence to completed Work.
  - 6. Remove or relocate existing utilities and pipes which obstruct Work to which connections must be made.
  - 7. Make connections or alterations to existing or new facilities.
  - 8. Provide openings, channels, chases and flues, if any, and do cutting, patching and finishing.
  - 9. Restore existing work to a state equal to or better than that prior to cutting and patching. Restore new Work to standards of these Specifications.
  - 10. Support, anchor, attach, match, trim and seal materials to the Work of others. Unless otherwise specified, furnish and install sleeves, inserts, hangers, required for the execution of the Work.
  - 11. Provide shoring, bracing and support as required to maintain structural integrity and protect adjacent Work from damage during cutting and patching. Before cutting beams or other structural members, anchors, lintels or other supports, request written instructions from the Owner' Construction Manager. Follow such instructions, as applicable.

1.02 RELATED WORK

- A. Summary of Work is included in Section 01 11 00.
- B. Concrete is included in Division 03.

1.03 SUBMITTALS

- A. Submit, in accordance with Section 01 33 00, a written request prior to executing any cutting or alteration which is not shown or detailed on the contract documents which affects or requires:
  - 1. Cutting structural members.
  - 2. Holes drilled in beams or other structural members.
  - 3. Work of the Owner or any separate contractor.
  - 4. Structural value or integrity of any element of the project.
  - 5. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
  - 6. Efficiency, operational life, maintenance or safety of operational elements.
  - 7. Visual qualities of sight-exposed elements.
- B. Request shall include:
  - 1. Identification of the project.
  - 2. Description of affected work.
  - 3. The reason for cutting, alteration or excavation.
  - 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of project.
  - 5. Description of proposed work:
    - a. Method and extent of cutting, patching, alteration, or excavation.
    - b. Trades who will execute the work.
    - c. Products proposed to be used.
    - d. Extent of refinishing to be done.
  - 6. Alternatives to cutting and patching.
  - 7. If the work is considered out of scope, provide a cost proposal.
  - 8. Confirmation of coordination with any separate contractor whose work will be affected.
  - 9. Related shutdown requests if required to do the work.
  - 10. Request for hot work permit if required to do the work.

- C. Submit written notice to the Engineer designating the date and the time the work will be uncovered for observation. Do not begin cutting or patching operations until authorized by the Owner's Construction Manager.
- D. When a written request is required, do not proceed with the work until a written notice to proceed is received from the Engineer.

#### 1.04 CONNECTIONS TO EXISTING FACILITIES

- A. Perform construction necessary to complete connections and tie ins to existing facilities. Keep all existing facilities in continuous operation unless otherwise specifically permitted in these Specifications or approved by the Owner's Construction Manager.
- B. Coordinate with the Owner's Construction Manager, interruption of service requiring connection into existing facilities. Bypassing of sludge to waterways is not permitted. Provide temporary pumping facilities to handle sludge if necessary. Use temporary bulkheads (e.g., inflatable plugs) to minimize disruption. Provide temporary power supply and piping to facilitate construction where necessary.
- C. Submit a detailed schedule of proposed connections, including shut downs and tie ins. Include in the submittal the proposed time and date as well as the anticipated duration of the Work. Submit the detailed schedule coordinated with the construction schedule.
  - 1. Provide specific time and date information to the Owner's Construction Manager 48 hours in advance of proposed Work.
- D. Procedures and Operations:
  - 1. Only District personnel shall operate any valve, gate or other item of equipment without authorization of the Owner.
  - 2. Insofar as possible, equipment shall be tested and in operating condition before final tie ins are made to connect equipment to the existing facility.
  - 3. Carefully coordinate Work and schedules. Provide written notice to the Owner's Construction Manager at least 48 hours before shut downs or by passes are required.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Comply with specifications and standards for each specific product involved. Where there is no equivalent specification, the Contractor shall notify the Engineer who will provide a specification for the materials to be used.
- B. Concrete and grout for rough patching shall be as specified in Division 03.
- C. Materials for finish patching shall be equal to those of adjacent construction. Where existing materials are no longer available, use materials with equivalent properties and that will provide the same appearance. The materials are to be approved by the Engineer prior to their use.



**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to the Engineer in writing; do not proceed with work until the Engineer has provided further instructions.

**3.02 PREPARATION**

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Protect surrounding materials and equipment prior to starting work.
- C. Contain and control cooling liquids and slurry produced by the cutting and coring operations.
- D. When the cutting or coring will result in the structure or equipment being exposed to provide adequate weather protection.

**3.03 PERFORMANCE**

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work. When excavating in close proximity to piping, duct banks or other items subject to damage, use hand excavation.
- C. All equipment and workplace safety shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.
- D. Where possible, employ original installer or fabricator to perform cutting and patching for:
  - 1. Weather-exposed or moisture-resistant elements.
  - 2. Sight-exposed finished surfaces.
- E. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- F. Restore work which has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
- G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to nearest intersection.
2. For an assembly, refinish entire unit.

H. Remove rubble and excess patching materials from the premises.

### 3.04 CORING

- A. All coring shall be performed in such a manner as to limit the extent of patching. Locate the rebar before coring to minimize cut throughs
- B. Coring shall be performed with an approved non-impact rotary tool with diamond core drills.
- C. Size of holes shall be suitable for pipe, conduit, sleeves, equipment or mechanical seals to be installed.
- D. Fit work to minimize space to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- E. Fit to pipes and other penetrations in tanks to be water tight using seals or other methods defined in the specifications.
- F. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved. All work shall be performed by mechanics skilled in this type of work.
- G. If holes are cored through floor slabs they shall be drilled from below where possible. If holes are drilled from above, provide protection and containment below the area being drilled to catch the plug and contain liquid and slurry.

### 3.05 CUTTING

- A. All cutting shall be performed in such a manner as to limit the extent of patching.
- B. Fit work to minimize space to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- C. Cutting shall be performed with a concrete saw and diamond saw blades of proper size.
- D. Provide for control of slurry generated by sawing operation on both sides of wall and from below if cutting a floor.
- E. When cutting a reinforced concrete wall or floor, the cutting shall be done so as not to damage the bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.
- F. Adequate bracing of area to be cut shall be installed prior to start of cutting. Check area during sawing operations for partial cracking and provide additional bracing as required to prevent a partial release of cut area during sawing operations.
- G. Provide equipment of adequate size to remove cut panel.

- H. Saw cut concrete and masonry prior to breaking out sections.
- I. Install work at such time as to require the minimum amount of cutting and patching.
- J. All cutting of structural members shall be done in a manner directed by the Engineer.
- K. Cut opening only large enough to allow easy installation of the equipment, ducting, piping or conduit.
- L. When existing conduits or pipe sleeves are cut off at the floor line or wall line, they shall be filled with grout or suitable patching material.

**3.06 PROTECTION**

- A. Provide devices and methods to protect other portions of project from damage.
- B. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work.
- C. Maintain excavations free from water.

**3.07 PATCHING**

- A. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown.
- B. Finish patching shall match existing surfaces as approved.
- C. Patching shall be of the same kind and quality of material as was removed.
- D. The completed patching work shall restore the surface to its original appearance or better.
- E. Patching of waterproofed surfaces shall render the area of the patching completely waterproofed to include the joint between the existing material and the patch.
- F. Equipment damaged during cutting and patching shall be replaced or repaired by the equipment manufacturer, at the Engineer's sole discretion and at the expense of the Contractor doing the work.
- G. Repaint any damage to factory applied paint finishes using touch-up paint furnished by the equipment manufacturer. The entire damaged panel or section shall be repainted at the expense of the Contractor doing the work.
- H. Slurry or tailings resulting from coring or cutting operations shall be contained and vacuumed or otherwise removed from the area following drilling or cut.
- I. Equipment shall be protected against mechanical and water damage during cutting and patching. Provide protective covers or use other means such as temporary relocation to protect equipment that is at risk of damage from the cutting and patching

- J. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

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SECTION 01 74 19  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required to provide surficial cleanup and ultimate off-site disposal of waste material and salvageable material. Waste disposal and transport must comply with all federal, state, and local laws, codes, and ordinances.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made under this Section. Include payment in the Lump Sum Bid Form.

1.03 SUBMITTALS

- A. Submittals shall conform to requirements of all Sections and provisions of these contract documents.
- B. Obtain and submit disposal permits for proposed disposal sites if required by local ordinances. Disposed material placed as fill shall be approved by the Owner and shall be in accordance with all local, state and federal requirements.
- C. Submit a copy of written permission from property owner, along with description of property, prior to disposal of excess material adjacent to the Project. Submit a written and signed release from property owner upon completion of disposal work.
- D. Submit records of volume of sludge disposed of including; manifests, volumes, location of site, basin cleaned, associated TCLP Test Number and lab name. Hard copy shall be submitted monthly and the complete record for the project submitted in Excel, Lotus or equal after all sludge settlement has been disposed of.
- E. Submit records of receiving facility is permitted and approved by the appropriate Federal and State Agencies to accept waste material associated with this project.
- F. Describe waste materials expected to be stored on-site and a description of controls to reduce Pollutants from these materials, including storage practices to minimize exposure of materials to storm water; and spill prevention and response measures in the Project's Storm Water Pollution Prevention Plan (SWPPP). Refer to Section 01 41 00 – Regulatory Requirements.

1.04 WASTE MATERIAL DISPOSAL PLAN

- A. Contractor shall formulate and implement a plan for the collection and disposal of waste materials on the Project Site which includes the following information:
  - 1. Schedule for collection and inspection.
  - 2. Location of trash and waste receptacles.

3. Provisions for liquid waste and potential water pollutants material.

- B. The plan shall comply with applicable federal, state, and local health and safety regulations and applicable specifications.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 EXCESS MATERIAL, WASTE, AND EQUIPMENT**

- A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become the property of Contractor and shall be removed from the job site and legally disposed of.
- B. Any suitable excess material may be incorporated into the site grounding plan, providing the current/proposed drainage patterns are maintained.
- C. Dispose of removed equipment, materials, waste and debris in a manner conforming to applicable laws and regulations.
- D. Excess soil may be deposited on private property adjacent to the Project Site when written permission is obtained from property owner under the provisions of this Section, 1.04D.
- E. Verify the flood plain status of any proposed disposal site. Do not dispose of excavated materials in an area designated as within the 100-year Flood Hazard Area unless the proper permit has been obtained. Excess material placed in a "100-year Flood Hazard Area" within the project site, without a permit, shall be removed by Contractor at no additional cost to the Owner.
- F. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.
- G. No materials shall be disposed in a manner to damage the Owner in any way.
- H. Hazardous waste shall be separated, stored, and disposed of in accordance with the requirements of authorities having jurisdiction and shall be managed by a licensed hazardous waste vendor.

**3.02 SALVAGEABLE MATERIAL**

- A. Base, surface, and bedding material: Deliver shell, gravel, bituminous, or other base and surfacing material designated for salvage to the location designated by the Owner's Construction Manager.
- B. Pipe culvert: Deliver culverts designated for salvage to Owner's storage area.
- C. Other salvageable materials: Conform to requirements of individual Specification Sections.
- D. Coordinate delivery of salvageable material with Owner's Construction Manager.

3.03 SEDIMENT DISPOSAL

- A. Remove sediment deposits and dispose of them at the designated spoil site for the Project. If a spoil site is not designated on the Drawings, dispose of sediment off site at a location not in or adjacent to a stream or floodplain.
- B. Off-site disposal is the responsibility of the Contractor.
- C. Sediment to be placed at the Project Site should be spread evenly throughout the designated area, compacted and stabilized. Sediment shall not be allowed to flush into a stream or drainage way.

If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state, and local rules and regulations.

END OF SECTION



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SECTION 01 74 23  
FINAL CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Execute cleaning, during progress of the work, and at completion of the work, as required by General Conditions.
- B. Maintaining premises and public properties (including storage yards) free from accumulations of waste, debris and rubbish caused by operations.
  - 1. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials:
  - 2. Clean all surfaces exposed to sight.
  - 3. Leave project clean and ready for occupancy or use

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for cleaning under this section. Include payment in the lump sum base bid.

1.03 RELATED WORK

- A. Standard General Conditions of the Construction Contract are included in Division 0.
- B. Each Section: Cleaning for specific products or work.

1.04 DISPOSAL AND CLEANING

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

## PART 3 EXECUTION

### 3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide onsite containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.
- D. Wet down dry materials and rubbish to settle dust and prevent blowing dust.
- E. At daily intervals during progress of work, clean site and public properties.
- F. Legally and properly dispose of waste materials, debris, and rubbish.
- G. Provide wire fence or equivalent around debris piles to prevent blowing of debris from project site.
- H. Legally dispose of debris at public or private dumping areas off Owner's property.
- I. Handle materials in a controlled manner with as few handlings as possible.
- J. Owner may dictate cleaning equipment and methodology.
- K. Hazards Control:
  - 1. Remove containers from premises daily.
  - 2. Prevent accumulation of wastes which create hazardous conditions.
  - 3. Provide adequate ventilation during use of volatile or noxious substances.
- L. Conduct cleaning and disposal operations to comply with local ordinances and anti pollution laws:
  - 1. Do not burn or bury rubbish and waste materials on project site.
  - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 3. Do not dispose of wastes into stream or waterways.
  - 4. Cleanup after haul trucks.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight exposed interior and exterior surfaces.
- C. Wash and shine glazing and mirrors.
- D. Polish glossy surfaces to a clear shine.
- E. Ventilating Systems:
  - 1. Clean permanent filters and replace disposable filters if units were operated during construction.
  - 2. Clean ducts, blowers and coils if units were operated without filters during construction.
- F. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- G. Prior to final completion, or Owner occupancy, conduct an inspection of sight exposed interior and exterior surfaces and all work areas, to verify that the entire work is clean.

END OF SECTION

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SECTION 01 75 16  
STARTUP PROCEDURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide a competent, certified field services technician of the manufacturers of all equipment furnished under Divisions 26 and 40 to supervise installation, adjustment, initial operation and testing, performance testing, final acceptance testing and startup of the equipment.
- B. Perform specified equipment field performance tests, final acceptance tests and startup services.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for equipment testing and startup under this section. Include payment in the lump sum base bid.

1.03 RELATED WORK

- A. Operation and Maintenance Data is included in Section 01 78 23.
- B. Performance and acceptance testing and startup requirements are included in the respective sections of Divisions 26 and 40.

1.04 SUBMITTALS

- A. Submit name, address and resume of proposed field services technicians at least 30 days in advance of the need for such services.
- B. Submit, in accordance with Section 01 33 00, detailed testing procedures for shop tests, field performance tests and final acceptance tests as specified in the various equipment sections. Submittals shall include the following:
  - 1. Test procedures shall be submitted at least 30 days in advance of the proposed test dates and shall include at least the following information:
    - a. Name, classification, model and serial number of equipment to be tested, including reference to specifications section number and title.
    - b. Testing schedule of proposed dates and times for testing.
    - c. Summary of power, lighting, chemical, water, sludge, gas, etc., needs and identification of who will provide them.
    - d. Outline specific assignment of the responsibilities of the Contractor and manufacturers' factory Construction Managers or field service personnel.
    - e. Detailed description of step-by-step testing requirements, with reference to appropriate standardized testing procedures and laboratory analyses by established technical organizations (e.g., ASTM, WPCF Standard Methods, etc.).
    - f. Samples of forms to be used to collect and record test data and to present tabulated test results.

2. Copies of test reports upon completion of specified shop, performance and acceptance tests. Test reports shall incorporate the information provided in the test procedures submittals and modified to reflect actual conduct of the tests and the following additional information:
  - a. Copy of all test data sheets and results of lab analyses.
  - b. Summary comparison of specified test and performance requirements vs actual test results.
  - c. Should actual test results fail to meet specified test and performance requirements, describe action to be taken prior to re-testing the equipment.
3. Copies of the manufacturer's field service technician's report summarizing the results of his/her initial inspection, operation, adjustment and pre-tests. The report shall include detailed descriptions and tabulations of the points inspected, tests and adjustments made, quantitative results obtained, suggestions for precautions to be taken to ensure proper maintenance, and the equipment supplier's Certificate of Installation in the format specified herein.
4. Submit three (3) copies of required certifications:
  - a. Manufacturer's Certificate of Installation
  - b. Manufacturer's Certificate of Field Testing

#### 1.05 REFERENCE STANDARDS

- A. American Water Works Association (AWWA)
  1. AWWA C653 - Disinfection for Water Treatment Plants.
- B. American Society for Testing and Materials (ASTM)
- C. Water Environment Federation (WEF)
- D. Standard Methods for the Examination of Water and Wastewater (Latest Revision)
- E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.06 QUALITY ASSURANCE

- A. Field service technicians shall be competent and experienced in the proper installation, adjustment, operation, testing and startup of the equipment and systems being installed.
- B. Manufacturers' sales and marketing personnel will not be accepted as field service technicians.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY REQUIREMENTS

- A. Coordinate schedule for testing and startup with Owner.
- B. Notify Project Manager seven days prior to testing and startup of each item.
- C. After installation of the equipment has been completed and the equipment is presumably ready for operation, before it is operated by others, the manufacturer's field service technician shall inspect, operate, test and adjust the equipment. The inspection shall include at least the following points where applicable:
  - 1. Soundness (without crack or otherwise damaged parts).
  - 2. Completeness in all details, as specified and required.
  - 3. Correctness of setting, alignment and relative arrangement of various parts.
  - 4. Adequacy and correctness of packing, sealing and lubricants.
- D. The operation, testing and adjustment shall be as required to prove that the equipment has been left in proper condition for satisfactory operation under the conditions specified.
- E. Upon completion of this work, the manufacturer's field service technician shall submit a signed report of the results of his/her inspection, operation, adjustments and tests.

3.02 WITNESS REQUIREMENTS

- A. Shop tests or factory tests may be witnessed by the Owner and/or Owner's Construction Managers, as required by the various equipment specifications.
- B. Field performance and acceptance tests shall be performed in the presence of the Owner, the Owner's designed personnel and/or Owner's Construction Managers.

3.03 STARTUP AND ACCEPTANCE OF EQUIPMENT AND RELATED SYSTEMS

- A. General Requirements
  - 1. Successfully execute the step-by-step procedure of startup, normal operation, shutdown, and performance demonstration specified herein.
  - 2. The startup and performance demonstration shall be successfully executed prior to Substantial Completion and acceptance by the Owner of the equipment and its related systems.
  - 3. All performance tests and inspections shall be scheduled at least 10 working days in advance or as otherwise specified with the Owner and the Engineer. All performance tests



and inspections shall be conducted during the work week of Monday through Friday, unless otherwise specified.

**B. Preparation for Startup**

1. Upon completion of the installation of equipment and all related systems, all channels, basins and tanks shall be flushed with potable water and hydraulically checked for leaks, cracks, and defects. They shall also be disinfected in accordance with AWWA C653.
2. All mechanical and electrical equipment shall be checked, including rotation testing, to ensure that it is in good working order and properly connected. Preliminary run-ins of the various pumps, compressors, and other remaining equipment shall be made. All systems shall be cleaned and purged as required. All sumps, tanks, basins, chambers, pump wells and pipelines which are hydraulically checked shall be drained and returned to their original condition once the water testing is complete.
3. All instruments and controls shall be calibrated through their full range. All other adjustments required for proper operation of all instrumentation and control equipment shall be made.
4. Perform all other tasks needed for preparing and conditioning the equipment for proper operation.
5. No testing or equipment operation shall take place until it has been verified by the Engineer that all specified safety equipment has been installed and is in good working order.
6. No testing or equipment operation shall take place until it has been verified by the Engineer that all lubricants, tools, maintenance equipment, spare parts and approved equipment operation and maintenance manuals have been furnished as specified.

**C. Facilities Startup**

1. Startup period shall not begin until all new treatment facilities and equipment have been tested as specified and are ready for operation and the appropriate, properly executed Manufacturer's Certificates of Installation are provided. The Owner shall receive spare parts, safety equipment, tools and maintenance equipment, lubricants, approved operation and maintenance data and the specified operation and maintenance instruction prior to the startup with raw water. All valve tagging shall also be complete prior to this startup.
2. Demonstrate a 72-hour consecutive period of successful operation of the facility as a prerequisite of Substantial Completion and Acceptance or before proceeding to the next phase of irreversible demolition/construction unless otherwise stated in each individual equipment specification. Engineer/Owner may shorten start-up times of any piece of equipment or construction phase at their sole discretion. The 72-hour consecutive period of successful operation may only begin after receipt of acceptable lab result data.
3. In the event of failure to demonstrate satisfactory performance of the equipment on the first or any subsequent attempt, all necessary alterations, adjustments, repairs and replacements shall be made. When the equipment is again ready for operation, it shall be brought on line

and a new test shall be started. This procedure shall be repeated as often as necessary until the equipment has operated continuously to the satisfaction of the Owner and Engineer, for the specified duration.

4. The Owner will furnish all operating personnel (other than vendor's or subcontractor's service personnel) needed to operate equipment during the final test period; however, said personnel will perform their duties under Contractor's direct supervision. Until performance tests are completed and units and systems are accepted by the Owner as substantially complete, the Contractor shall be fully responsible for the operation and maintenance of all new facilities.
5. The Owner will provide all necessary electricity. However, the Contractor shall provide all necessary personnel of the various construction trades, i.e., electricians, plumbers, etc., and field service personnel of the major equipment suppliers on an 8 hour per day basis at the facilities and on a 24 hour per day basis locally during the startup period.
6. Do not, at any time, allow the equipment to be operated in a manner which subjects equipment to conditions that are more severe than the maximum allowable operating conditions for which the equipment was designed.

END OF SECTION

EQUIPMENT SUPPLIER'S CERTIFICATE OF INSTALLATION

Owner Brushy Creek Municipal Utility District

Project Winterization and Electrical Improvements

Contract No. \_\_\_\_\_

EQUIPMENT SPECIFICATION SECTION \_\_\_\_\_

EQUIPMENT DESCRIPTION \_\_\_\_\_

I \_\_\_\_\_, Authorized Construction Manager  
of \_\_\_\_\_ (Print Name)

\_\_\_\_\_  
(Print Manufacturer's Name)

hereby CERTIFY that \_\_\_\_\_  
(Print equipment name and model with serial no.)

\_\_\_\_\_  
installed for the subject project has (have) been installed in a satisfactory manner, has (have) been tested  
and adjusted, and is (are) ready for field testing on:

Date \_\_\_\_\_

Time \_\_\_\_\_

CERTIFIED BY: \_\_\_\_\_ (Signature of Manufacturer's  
Certified Construction Manager)

Date \_\_\_\_\_

EQUIPMENT SUPPLIER'S CERTIFICATE OF FIELD TESTING

Owner: Brushy Creek Municipal Utility District

Project: Winterization and Electrical Improvements

Contract No. \_\_\_\_\_

EQUIPMENT SPECIFICATION SECTION \_\_\_\_\_

EQUIPMENT DESCRIPTION \_\_\_\_\_

I \_\_\_\_\_, Authorized Construction Manager  
of \_\_\_\_\_ (Print Name)

\_\_\_\_\_ (Print  
Manufacturer's Name)

hereby CERTIFY that \_\_\_\_\_  
(Print equipment name and model with serial no.)

has been satisfactorily Field Tested, cleaned, lubricated and is ready for operation on:

Date \_\_\_\_\_

Time \_\_\_\_\_

CERTIFIED BY: \_\_\_\_\_ (Signature of Manufacturer's  
Certified Construction Manager)

Date \_\_\_\_\_

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SECTION 01 78 23  
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes procedural requirements for compiling and submitting operation and maintenance data required to complete the project.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for operating and maintenance data under this section. Include payment in the lump sum base bid.

1.03 RELATED WORK

- A. Special Provisions are included in 01 35 00.
- B. Submittals are included in Section 01 33 00.
- C. Contract closeout is included in Section 01 70 00.
- D. Warranties and Bonds are included in Section 01 70 49.

1.04 QUALITY ASSURANCE

- A. The CONTRACTOR shall verify that each submittal under this section meets the Contract requirements.
- B. Preparation of all operations and maintenance data shall be done by personnel: Trained and experienced in maintenance and operation of described products;
  - 1. Familiar with requirements of this section;
  - 2. Skilled as technical writer to the extent required to communicate essential data;
  - 3. Skilled as draftsman competent to prepare required drawings.

1.05 OPERATING MANUALS

- A. Provide specific operation and maintenance instructions for all electrical, mechanical, and instrumentation & controls equipment furnished under various technical specifications Sections.
- B. Separate manuals shall be provided for each type of equipment, or each Section number. Each manual shall contain the following:
  - 1. Format and Materials
    - a. Binders:
      - 1) Commercial quality three ring binders with durable and cleanable plastic covers
      - 2) Maximum ring width capacity: 3 inches

- 3) When multiple binders are used, correlate the data into related consistent groupings/volumes.
- b. Identification: Identify each volume on the cover AND spine with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". Include the following:
  - 1) Title of Project.
  - 2) Identify the general subject matter covered in the manual.
  - 3) Identify structure(s) and/or location(s), of the equipment provided.
  - 4) Specification Section number.
  - 5) Name of manufacturer and/or supplier of equipment covered in the manual.
- c. 20 lb loose leaf paper, with hole reinforcement
- d. Page size: 8-1/2 inch by 11 inch
- e. Provide heavy-duty fly leaves (section separators), matching the table of contents, for each separate product, each piece of operating equipment, and organizational sections of the manual.
- f. Provide reinforced punched binder tab; bind in with text.
- g. Reduce larger drawings and fold to the size of text pages - but not larger than 11 inches x 17 inches.
- h. Operation and Maintenance Manual to be provided in electronic format on CD to accompany hard copies with the following requirements:
  - 1) File Format – All documents will be delivered in Adobe Acrobat Portable Document format (PDF).
    - a) Electronic file shall be named according to the submittal number and the title of the corresponding specification section. In the case of multiple manuals being generated for the same specification section, provide a unique descriptor in addition to the specification section (e.g. M-11363-001Centrifuge.pdf; M-11320-Grit Removal System-Grit Capture Unit.pdf)
  - 2) Page Format
    - a) Size – Two page sizes; 8 ½ x 11 inches in either landscape or portrait and 11 x 17 inches in landscape only.
    - b) Content – The content of the pages will be either scanned image or text and graphics converted to Adobe Acrobat pdf. Where page content is from a scanned image, the following minimum specifications will be followed.
  - 3) Scanned Page Content:
    - a) Resolution – 300 dpi
  - 4) Color Levels:
    - a) Text only – Monochrome black and white
    - b) Text with gray tone images – 256 levels of gray
    - c) Color images – Color images can be 256 levels of gray except where color is needed to properly utilize the image in an operations and maintenance reference situation.
  - 5) File Organization – All document files will follow the order and structure of approved printed versions of the vendor manuals. The following outline details the specific organization of how the electronic document files will be compiled.
    - a) A cross-reference listing of the file names and sections of the vendor manuals will be supplied in Microsoft Excel format. The cross-reference list will include the pdf file name, submittal number and the design specification number related to the file.
    - b) Each PDF file will include only the pages of an individual item from the submitted vendor manuals.

- c) Each PDF file will contain bookmark links in a hierarchical table format to access information pertaining to the supplied equipment.
    - d) No bookmark links will reference files external to the pdf file containing the bookmark links.
    - e) Each bookmark will access the beginning location of the related information.
    - f) All pages of the PDF file(s) of the CD-ROM will be searchable. The user shall perform a search on the PDF file by using the Search function to look for a specific word or string of words. Electronic manuals produced by scanning hard copy documents shall utilize text recognition software to ensure that even scanned pages shall be text searchable.
  - 6) Delivery – All files will be delivered on standard 650 MB CD-ROM. The CDROM will be formatted in ISO – 9660 format where each file will maintain its full name. Files names should not be truncated to an 8-character DOS format. Each CD-ROM will be labeled and will be permanently marked with the job name, vendor name, submittal number, and date the CD-ROM was made. A transmittal will be submitted with each CD-ROM. The transmittal will include the CD-ROM label information.
2. Contents:
- a. A table of contents/Index, divided into section reflective of the major components provided.
  - b. Specific description of each system and components
  - c. Name, address, telephone number(s) and e-mail address(es) of vendor(s) and local service representative(s)
  - d. Specific on-site operating instructions (including starting and stopping procedures)
  - e. Safety considerations
  - f. Project specific operational procedures and recommended log sheet(s).
  - g. Project specific maintenance procedures
  - h. Manufacturer's operating and maintenance instructions – specific to the project
  - i. Copy of each wiring diagram
  - j. Copy of approved shop drawing(s) and Contractor's coordination/layout drawing(s)
  - k. List of spare parts and recommended quantities
  - l. Product Data: Mark each sheet to clearly identify specific products and component parts and data applicable to installation. Delete or clearly cross-out inapplicable information. Markings shall be photo reproducible. Highlighting will not be accepted.
  - m. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams
  - n. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified.
  - o. Warranties and Bonds, as specified in the General Conditions
3. Transmittals
- a. Prepare separate transmittal sheets for each manual. Each transmittal sheet shall include at least the following: the Contractor's name and address, Owner's name, project name, project number, submittal number, description of submittal and number of copies submitted.
  - b. Submittals shall be transmitted or delivered directly to the office of the Engineer, as indicated in the Contact Documents or as otherwise directed by the Engineer.



- c. Provide copies of transmittals directly to the Resident Project Representative.
- C. Manuals for Equipment and Systems - In addition to the requirements listed above, for each System, provide the following:
  - 1. Overview of system and description of unit or system and component parts. Identify function, normal operating characteristics and limiting conditions. Include legible performance curves, with engineering data and tests and complete nomenclature and commercial number of replaceable parts.
  - 2. Panelboard circuit directories including electrical service characteristics, controls and communications and color-coded wiring diagrams as installed.
  - 3. Operating procedures: include start-up, break-in and routine normal operating instructions and sequences; regulation, control, stopping, shut-down and emergency instructions; and summer, winter and any special operating instructions.
  - 4. Maintenance Requirements
    - a. Procedures and guides for trouble-shooting; disassembly, repair, and reassembly instructions
    - b. Alignment, adjusting, balancing and checking instructions
    - c. Servicing and lubrication schedule and list of recommended lubricants
    - d. Manufacturer's printed operation and maintenance instructions
    - e. Sequence of operation by instrumentation and controls manufacturer
    - f. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance
  - 5. Control diagrams by controls manufacturer as installed (as-built)
  - 6. Contractor's coordination drawings, with color coded piping diagrams, as installed (as-built)
  - 7. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams. Include equipment and instrument tag numbers on diagrams.
  - 8. List of original manufacturer's spare parts and recommended quantities to be maintained in storage
  - 9. Test and balancing reports, as required
  - 10. Additional Requirements as specified in individual product specification
  - 11. Design data for systems engineered by the Contractor or its Suppliers

1.06 SERVICES OF MANUFACTURERS' REPRESENTATIVE

- A. All electrical, mechanical, and instrumentation & controls equipment furnished under various technical specifications Sections shall include the cost of a competent representative of the manufacturers of all equipment to supervise the installation, adjustment and testing of the equipment; and, to instruct the Owner's operating personnel on operation and maintenance. This

supervision may be divided into two or more time periods to suit the Contractor's schedule and/or the Owner's personnel availability.

- B. See the detailed specifications for additional requirements for furnishing the services of manufacturer's representatives.
- C. The manufacturer's representative shall certify that the installation of the equipment is satisfactory; that the unit has been satisfactorily tested; that the equipment is ready for operation; and, that the operating personnel have been suitably instructed in the operation, maintenance, care, and safe operation of the equipment. The *Equipment Manufacturer's Certificate of Installation, Testing, and Instruction* attached to this Section shall be used for this certification.
- D. For other materials furnished under other specification Sections, furnish the services of approved representative(s) of the manufacturer when, in the opinion of the Engineer, some evident product failure or malfunction makes such services necessary.

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION

### 3.01 SUBMITTAL SCHEDULE

- A. Operation and maintenance manuals shall be delivered directly to the office of the Engineer, as follows:
  - 1. Provide preliminary copies of each manual to the office of the Engineer, no later than 30 days following approval of the respective shop drawings.
  - 2. Provide final pdf copies of each completed manual prior to testing, and one hardcopy.
  - 3. Provide a letter that grants the Engineer and Owner to the limited right to use and reproduce each manual (in its entirety or any portion thereof) from the respective equipment manufacturer(s). Such limited right shall allow the Engineer and Owner to use each manual or any portion thereof for:
    - a. The assembly of a comprehensive facility operation and maintenance manual for the sole benefit of the Owner; and,
    - b. Supplemental training of the Owner's personnel and operators, over and above the required vendor's training, regarding operation of the facility as a system.
- B. The ENGINEER will review Operation and Maintenance manuals submittals for operating equipment for conformance with the requirements of the applicable specification Section. The review will generally be based on the O&M Manual Review Checklist appended to this Section.
- C. If during test and start-up of equipment, any changes were made to the equipment, provide two hard copies of as-built drawings or any other amendments for insertion, by the contractor, in the previously transmitted final manuals. In addition, provide one revised electronic version including the as-built drawings and any other amendments. The manuals shall be completed, including updates, if any, within 30 days of start-up and testing of the facility.

3.02 VENDOR TRAINING/INSTRUCTIONS (TO OWNER'S PERSONNEL)

- A. Before final initiation of operation, Contractor's vendors shall train/instruct Owner's designated personnel in the operation, adjustment, and maintenance of products, equipment and systems at times convenient to the Owner.
- B. Unless specified otherwise under the respective equipment specification section, vendor training/instruction shall consist of eight hours of training for each type of equipment. Such training/instruction shall be scheduled and held at times to accommodate the work schedules of Owner's personnel, including splitting the required training/instruction time into separate sessions and/or presented at reasonable times other than the Contractor's "normal working hours" or the Owner's normal day shift.
- C. Use operation and maintenance manuals as basis for instruction. Train/instruct the Owner's personnel, in detail, based on the contents of manual explaining all aspects of operation and maintenance of the equipment. If the respective equipment is inter-related to the operation of other equipment, all interlock, constraints, and permissives shall be explained.
- D. At least two weeks prior to the schedule for vendor training, a detailed lesson plan, representative of the material to be covered during instruction, shall be submitted to the Engineer for approval. Lesson plans shall consist of in-depth outlines of the training material, including a table of contents, resume of the instructor, materials to be covered, start-up procedures, maintenance requirements, safety considerations, and shut-down procedures.
- E. Prepare and insert additional data in each Operation and Maintenance Manual when the need for such data becomes apparent during training/instruction.
- F. Vendor's training/instruction will be considered acceptable based on the completed Owner's Acknowledgement of Manufacturer's Instruction as indicated on the Equipment Manufacturer's Certification of Installation, Testing, and Instruction appended to this Section.

3.03 VIDEOGRAPHY OF VENDOR TRAINING/INSTRUCTION

- A. The Contractor shall record audio/video (A/V) (in flash drive format) of the training/instructions as they are being provided to the Owner's personnel. Such recording shall include the entire training/instruction session(s) as well as all questions and answers.
- B. To avoid audio problems, training/instruction shall be held in a location sufficiently removed from construction activity, insulated from the noise of construction activity, or during a time when construction activity is not occurring in the vicinity.
- C. The audio portion of the A/V recording should be done with a microphone (wired or wireless) attached to the trainer/instructor to maximize the quality of speech.
- D. Each A/V recording should have "chapters" to segregate the distinct portions of the training/instruction, or have visual cues at the start of a change in subject.

- E. Two copies of the A/V recordings shall be submitted to the Engineer on flash drives. The flash drives will become the property of the Owner.

END OF SECTION

O&M Manual Review Checklist

Submittal No.: \_\_\_\_\_ Project No.: \_\_\_\_\_ Manufacturer: \_\_\_\_\_

Equipment Submitted: \_\_\_\_\_

Specification Section: \_\_\_\_\_ Date of Submittal: \_\_\_\_\_

	<b>General Data</b>	
1.	Are the area representative's name, address, e-mail address and telephone number included?	
2.	Is the nameplate data for each component included?	
3.	Are all associated components related to the specific equipment included?	
4.	Is non-pertinent data crossed out or deleted?	
5.	Are drawings neatly folded and/or inserted into packets?	
6.	Are all pages properly aligned and scanned legibly?	
7.	Is the .PDF document bookmarked according to the table of contents?	
	<b>Operations and Maintenance Data</b>	
8.	Is an overview description of the equipment and/or process included?	
9.	Does the description include the practical theory of operation?	
10.	Does each equipment component include specific details (design characteristics, operating parameters, control descriptions, and selector switch positions and functions)?	
11.	Are alarm and shutdown conditions specific to the equipment provided on this project clearly identified? Does it describe possible causes and recommended remedies?	
12.	Are step procedures for starting, stopping, and troubleshooting specific to the equipment provided included?	
13.	Is a list of operational parameters to monitor and record specific to the equipment provided included?	
14.	Is a proposed operating log sheet specific to the equipment provided included?	
15.	Is a spare parts inventory list included for each component?	
16.	Is a lubrication schedule for each component specific to the equipment provided included - or does it clearly state "No Lubrication Required"?	
17.	Is a maintenance schedule for each component specific to the equipment provided included?	
18..	Is a copy of the warranty information included?	
19.	Is the Mercury Inventory Form included?	

**Review Comments**

Is the submittal fully approved (yes/no)? \_\_\_\_\_

If not, the following points of rejection must be addressed and require resubmittal by the Contractor:

Item No.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

**Legend**

1 = OK

2 = Not Adequate

3 = Not Included

Note: This submittal has been reviewed for compliance with the Contract Documents.

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SECTION 01 78 39  
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SCOPE

- A. The Contractor shall keep and maintain, at the job site, a copy of contract documents, marked up to indicate all changes made during the course of a project, as specified herein.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for project record documents under this section. Include payment in the lump sum base bid.

1.03 RELATED REQUIREMENTS

- A. Contract close-out submittals are included in Section 01 70 00.
- B. Warranties and bonds are included in Section 01 70 49.
- C. As-built construction schedules are included in Section 01 33 05.
- D. As-built wiring diagrams are included in Section 01 78 23.

1.04 REQUIREMENTS INCLUDED

- A. Contractor shall maintain a record copy of the following documents, marked up to indicate all changes made during the course of a project:
  - 1. Contract Drawings
  - 2. Specifications
- B. Contractor shall assemble copies of the following documents for turnover to the Engineer at the end of the project, as specified.
  - 1. Field Orders, Change Orders, Design Modifications, and RFIs
  - 2. Field Test records
  - 3. Permits and permit close-outs (final approvals)
  - 4. Certificate of Occupancy or Certificate of Completion, as applicable
  - 5. Laboratory test reports (e.g., bacteriological and primary & secondary water quality)
  - 6. Certificates of Compliance for materials and equipment
  - 7. Record Shop Drawings



8. Samples

C. RECORD DRAWINGS

1. The Contractor shall annotate (mark-up) the Contract Drawings to indicate all project conditions, locations, configurations, and any other changes or deviations that vary from the original Contract Drawings. This requirement includes, but is not limited to, buried or concealed construction, and utility features that are revealed during the course of construction. Special attention shall be given to recording the locations (horizontal and vertical) and material of all buried utilities that are encountered during construction – whether or not they were indicated on the Contract Drawings. The record information added to the drawings may be supplemented by detailed sketches, if necessary, clearly indicating, the WORK, as constructed.
2. These annotated Contract Drawings constitute The Contractor's Record Drawings and are actual representations of as-built conditions, including all revisions made necessary by change orders, design modifications, requests for information and field orders.
3. Record drawings shall be accessible to the Owner and Engineer at all times during the construction period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
  1. Provide files and racks for storage of the record documents.
  2. Provide locked cabinet(s) or secure storage space for storage of samples.
- B. File documents and samples in accordance with Construction Specifications Institute (CSI) format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and sample available for inspection by the Engineer or Owner at all times.
- E. Up-to-date Record Drawings may be a pre-requisite of processing periodic monthly pay applications, if so specified under the section for progress payments.

3.02 MARKING METHOD

- A. Use the color Red (indelible ink) to record information on the Drawings and Specifications,
- B. Label each document "PROJECT RECORD" in neat large printed letters.

- C. Unless otherwise specified elsewhere, notations shall be affixed to hardcopies of documents.
- D. Record information contemporaneously with construction progress.

### 3.03 RECORD INFORMATION COMPILATION

- A. Do not conceal any work until the required information is acquired.
- B. Drawings – legibly mark drawings with as-built information. Items to be recorded include, but are not limited to:
  - 1. Location of internal utilities and appurtenances concealed in the construction – referenced to visible and accessible features.
  - 2. Field changes of dimensions and/or details
    - a. Interior equipment and piping relocations.
    - b. Architectural and structural changes, including relocation of doors, windows, etc.
    - c. Architectural schedule changes.
  - 3. Elevations and dimensions of structures and structural elements.
  - 4. All underground utilities (piping and electrical), structures, and appurtenances
    - a. Changes to existing structure, piping and appurtenance locations.
    - b. Record horizontal and vertical locations of underground structures, piping, utilities and appurtenances, referenced to permanent surface improvements.
    - c. Record actual installed pipe material, class, size, joint type, etc.
  - 5. Changes made by Field Order, Change Order, design modification, and RFI.
  - 6. Details not indicated on the original Contract Drawings.
- C. Specifications - legibly mark each Section to record:
  - 1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually installed.
  - 2. Changes made by Field Order, Change Order, RFI, and approved shop drawing.
- D. Shop Drawings (after final review and approval):
  - 1. One set of record drawings for each piece of equipment, piping, electrical system and instrumentation system.

### 3.04 SUBMITTAL

- A. If specified under the section for progress payments, monthly applications for payment will be contingent upon up-to-date Record Drawings. If requested by the Engineer or Owner, Contractor shall provide a copy of the Record Drawings, or present them for review prior to processing monthly applications for payment.

- B. Upon substantial completion of the WORK and prior to final acceptance, the Contractor shall finalize and deliver a complete set of Record Drawings to the ENGINEER conforming to the construction records of the Contractor. The set of drawings shall consist of corrected and annotated drawings showing the recorded location(s) of the WORK. Unless specified otherwise elsewhere, Record Drawings shall be in the form of a set of prints with annotations carefully and neatly superimposed on the drawings in red.
- C. Upon substantial completion of the WORK and prior to final acceptance, the Contractor shall finalize and deliver a complete set of Record Documents to the ENGINEER conforming to the construction records of the Contractor. The set of documents shall consist of corrected and annotated documents showing the as-installed equipment and all other as-built conditions not indicated on the Record Drawings.
- D. The information submitted by the Contractor into the Record Drawings and Record Documents will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and shall bear the costs resulting from the correction of incorrect data.
- E. Delivery of Record Drawings and Record Documents to the ENGINEER will be a prerequisite to Final payment.
- F. The Contractor shall maintain a copy of all books, records, and documents pertinent to the performance under this Agreement for a period of five years following completion of the contract.

END OF SECTION

SECTION 01 89 13  
SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials and equipment required and perform all site preparation, complete as shown on the Drawings and as specified herein.
- B. Obtain all permits required for site preparation work prior to proceeding with the work.
- C. Unless otherwise shown on the Drawings or directed by the Engineer, the areas to be cleared, grubbed and stripped shall generally consist of the entire project site, with the exception of those areas specifically designated to remain in an undisturbed, natural condition.
- D. Refer to Section 01 35 00 for special precautions and requirements for significantly important archeological areas designated on the Drawings.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work under this section. Include payment in the lump sum base bid.

1.03 RELATED WORK

- A. Environmental Protection is included in Section 01 35 43.
- B. Demolition is included in Section 02 41 00.
- C. Earthwork is included in Section 31 00 00.

1.04 SUBMITTALS

- A. Submit, in accordance with Section 01 33 00, copies of all permits required prior to clearing, grubbing, and stripping work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CLEARING

- A. Cut and remove all timber, trees, stumps, brush, shrubs, roots, grass, weeds, rubbish and any other objectionable material resting on or protruding through the surface of the ground.
- B. Preserve and protect trees and other vegetation designated on the Drawings or directed by the Engineer to remain as specified below.

3.02 STRIPPING

- A. Strip topsoil from all areas to be occupied by buildings, structures, and roadways and all areas to be excavated or filled.
- B. Topsoil shall be free from brush, trash, large stones and other extraneous material. Avoid mixing topsoil with subsoil.
- C. Stockpile and protect topsoil until it is used in landscaping, loaming and seeding operations. Dispose of surplus topsoil after all work is completed.

3.03 DISPOSAL

- A. Dispose of material and debris from site preparation operations by hauling such materials and debris to an approved offsite disposal area. No rubbish or debris of any kind shall be buried on the site or included in any new backfill placed.

3.04 PROTECTION

- A. Restrict construction activities to those areas within the limits of construction designated on the Drawings, within public rights-of-way, and within easements provided by the Owner. Adjacent properties and improvements thereon, public or private, which become damaged by construction operations shall be promptly restored to their original condition, to the full satisfaction of the property owner, at no expense to the Owner.

END OF SECTION

SECTION 02 41 00  
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolishing and removing existing structures, equipment and materials only to the extent as required in the execution work detailed in the contract documents.
- B. Disposing of demolished materials and equipment.
- C. Furnish all labor, materials, equipment and incidentals required and demolish, modify, remove and dispose of work shown on the Drawings and as specified herein.
- D. Included, but not limited to, are demolition, modifications and removal of existing materials, equipment or work necessary to install the new work as shown on the Drawings and as specified herein and to connect with existing work in approved manner.
- E. Demolition, modifications and removals which may be specified under other Sections shall conform to requirements of this Section.
- F. Demolition, modifications, and removal of existing equipment include, but are not limited to, the following equipment and process units:

Raw Water Intake Site:

- 1. Demolition of portable generator connection from existing generator breaker.
- 2. Demolition of Protective Relays on MV Switchgear and MV Motor Controls
- 3. Demolition of Reduce Voltage Starters in MV Motor Controls.

Water Treatment Plant:

- 4. Demolition and removal of existing pipe insulation at sample line and chemical lines at WTP Membrane Feed Pump Station.

Well Sites:

- 5. Demolition and removal of existing meter at Well No. 3 and use existing penetration for new MCC feed from ATS.
- 6. Removal of all existing heat trace circuit and pipe insulation protection at Well No.3, No.5 and No.6 as shown on the Drawings and specified herein.
- 7. Removal of a portion of the existing fence at Well No. 6 as shown on the Drawings and specified herein.
- 8. Demolition and removal of the existing flow meter and transmitter at Well No.5 as shown on the Drawings and specified herein.

9. Demolition of the existing clamp-on ultrasonic flow meter and return to owner at Well No.5 as shown on the Drawings and specified herein.
10. Associated miscellaneous structural, electrical, instrumentation and control, and civil sitework demolition and modifications as shown on the Drawings and specified herein.

G. Blasting and the use of explosives will not be permitted for any demolition work.

#### 1.02 UNIT PRICES

- A. Measurement for demolition is on a lump sum basis for each contiguous area, including submittal of proposed demolition and removal schedule.

#### 1.03 SUBMITTALS

- A. Submittals shall conform to requirements of all provisions and sections within these specifications.
- B. Submit proposed methods, equipment, materials and sequence of operations for demolition of structures. Describe coordination for shutting off, capping, and removing utilities. Plan operations to minimize temporary disruption of utilities to existing facilities or adjacent property.
- C. Submit proposed demolition and removal schedule for approval. Notify Owner's Representative in writing at least 72 hours before starting demolition.

#### 1.04 JOB CONDITIONS

##### A. Protection

1. Execute the demolition and removal work to prevent damage or injury to structures, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.
2. Erect and maintain barriers, lights, sidewalk sheds and other required protective devices.

##### B. Scheduling

1. Carry out operations so as to avoid interference with operations and work in the existing facilities.

##### C. Notification

1. At least 48 hours prior to commencement of a demolition or removal, notify the Engineer in writing of proposed schedule. District shall inspect the existing equipment and to identify and mark those items which are to remain the property of the District. No removals shall be started without the permission of the Engineer.

D. Conditions of Structures

1. The District and the Engineer assume no responsibility for the actual condition of the structures to be demolished or modified.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the District insofar as practicable. However, variations within a structure may occur prior to the start of demolition work.

E. Repairs to Damage

1. Promptly repair damage caused to adjacent facilities by demolition operation when directed by Engineer and at no additional cost to the District. Repairs shall be made to a condition at least equal to that which existed prior to construction.

F. Traffic Access

1. Conduct demolition and modification operations and the removal of equipment and debris to ensure minimum interference with roads, streets, walks both onsite and offsite and to ensure minimum interference with occupied or used facilities.
2. Special attention is directed towards maintaining safe and convenient access to the existing facilities by plant personnel and plant associated vehicles.
3. Do not close or obstruct plant roadways, public streets, walks or other occupied or used facilities without permission from the District or Engineer. Furnish alternate routes around closed or obstructed traffic in access ways.

1.05 DISPOSAL OF MATERIAL

- A. Salvageable material and equipment listed hereinafter shall become the property of the District unless otherwise designated in writing. The District shall have first right of refusal to retain all items shown to be demolished and/or removed in the drawings. Prior to initiating demolition, the Contractor, District, and/or District's Resident Project representative shall make a joint inspection to identify all items to be retained by the District. The Contractor shall relocate and store items, to be retained by the District, where directed on the site. Dismantle all such items to a size that can be readily handled and deliver them to a designated storage area. Any such material damaged due to improper handling will not be accepted and the replacement value of the material deducted from the payment to the Contractor .
- B. All other material and items of equipment shown to be demolished and/or removed, which are not retained by the District, shall become the Contractor 's property and must be removed from the site. The Contractor shall remove these items from District property and dispose of these items in accordance with Federal, State and Local regulations.
- C. The storage or sale of removed items on the site will not be allowed.



1.06 OWNERSHIP OF MATERIAL AND EQUIPMENT

- A. Materials and equipment designated for reuse or salvage are listed in Section 01 01 00 - Summary of Work. Protect items designated for reuse or salvage from damage during demolition, handling and storage. Restore damaged items to satisfactory condition.
- B. Materials and equipment not designated for reuse or salvage become the property of the Contractor.

1.07 STORAGE AND HANDLING

- A. Store and protect materials and equipment designated for reuse until time of installation.
- B. Deliver and unload items to be salvaged to storage areas indicated on Drawings.
- C. Remove equipment and materials not designated for reuse or salvage and all waste and debris resulting from demolition from site. Remove material as work progresses to avoid clutter.

1.08 ENVIRONMENTAL CONTROLS

- A. Minimize spread of dust and flying particles. If required by governing regulations, use temporary enclosures and other suitable methods to prevent the spread of dust, dirt and debris.
- B. Use appropriate controls to limit noise from demolition to levels designated in local ordinances.
- C. Do not use water where it can create dangerous or objectionable conditions, such as localized flooding, erosion, or sedimentation of nearby ditches or streams.
- D. Stop demolition and notify Owner's Representative if underground fuel storage tanks, asbestos, PCB's, contaminated soils, or other hazardous materials are encountered.
- E. Dispose of removed equipment, materials, waste and debris in a manner conforming to applicable laws and regulations.

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS FOR DEMOLITION

- A. Use equipment and materials approved under Paragraph 1.03, Submittals.
- B. Fires are not permitted.
- C. Do not use a "drop hammer" where the potential exists for damage to underground utilities, structures, or adjacent improvements.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Prior to demolition, make an inspection with District's Resident Project Representative to determine the condition of existing structures and features adjacent to items designated for demolition. Provide photographs of adjacent properties prior to demolition.
- B. District's Resident Project Representative will mark or list existing equipment to remain the property of the District.
- C. Do not proceed with demolition or removal operations until after the joint inspection and subsequent authorization by District's Resident Project Representative.

### 3.02 PROTECTION OF PERSONS AND PROPERTY

- A. Provide safe working conditions for employees throughout demolition and removal operations. Observe safety requirements for work below grade.
- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to the work.
- C. Perform demolition in a manner to prevent damage to adjacent property. Repair damage to District property, public right of way or adjacent property and facilities at no cost to the owner.
- D. The Contractor shall be responsible for safety and integrity of adjacent structures and shall be liable for any damage due to movement or settlement. Provide proper framing and shoring necessary for support. Cease operations if an adjacent structure appears to be endangered. Resume demolition only after proper protective measures have been taken.
- E. Erect and maintain enclosures, barriers, warning lights, and other required protective devices.

### 3.03 UTILITY SERVICES

- A. Follow rules and regulations of authorities or companies having jurisdiction over communications, pipelines, and electrical distribution services.
- B. Notify and coordinate with utility company and adjacent building occupants when temporary interruption of utility service is necessary.

### 3.04 DISPOSAL

- A. Remove from the site all items contained in or upon the structure not designated for reuse or salvage. Conform to requirements of Section 01500 - Temporary Facilities and Controls or Section 01564 - Waste Material Disposal.
- B. Follow method of disposal as required by regulatory agencies.

3.05 MECHANICAL WORK ITEMS

- A. Mechanical removals consist of dismantling and removing existing piping, pumps, motors, equipment and other appurtenances. It includes cutting, capping, and plugging required to restore use of existing utilities.
- B. Remove existing process, water, chemical, gas, fuel oil and other piping not required for new work. Take out piping to the limits shown or to a point where it will not interfere with the new work. Piping not indicated to be removed or which does not interfere with new work shall be removed to the nearest solid support, capped, and the remainder left in place. Purge chemical and fuel lines and tanks. Verify that such lines are safe prior to removal or capping.
- C. Where piping that is to be removed passes through existing walls, cut and cap piping on each side of the wall. Use cap appropriate for pipe material to be capped. Provide fire-rated sealant for walls classified as fire-rated.
- D. When underground piping, which is not located in the public right-of-way, is to be altered or removed, cap the remaining piping. Abandoned underground piping may be left in place unless it interferes with new work or is shown or specified to be removed. For piping to be abandoned, fill with sand, pressure grout or other approved method and plug with concrete or brick masonry bulkhead unless otherwise approved by the Owner.
- E. Remove waste and vent piping to points shown. Plug pipe and cleanouts and plugs. Where vent stacks pass through an existing roof that is to remain, remove the stack and patch the hole in the roof, making it watertight. Comply with requirements of existing roof installer so as to maintain roof warranty.

3.06 ELECTRICAL WORK ITEMS

- A. Electrical removals consist of disconnecting and removing existing switchgear, distribution switchboards, control panels, bus duct, conduits and wires, panel boards, lighting fixtures, and miscellaneous electrical equipment as shown on the Drawings, specified herein, or required to perform the work.
- B. Remove existing electrical equipment and fixtures to prevent damage to allow continued operation of existing systems and to maintain the integrity of the grounding systems.
- C. Remove poles and metering equipment, if designated for removal on the Drawings. Coordinate electrical removals with the power company, as necessary. Verify that power is properly de-energized and disconnected.
- D. Where shown or otherwise required, remove wiring in underground duct systems. Verify function of wiring before disconnecting and removing. Plug ducts which are not to be reused at entry to buildings.
- E. Changes to electrical systems shall conform to applicable codes.

3.07 CLEAN UP

- A. Remove from the site all debris resulting from the demolition operations as it accumulates. At a minimum debris stockpiles shall be completely removed at a minimum frequency of every 30 days.
- B. Upon completion of the work, all materials, equipment, waste and debris of every sort shall be removed and premises shall be left, clean, neat and orderly.

END OF SECTION

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SECTION 03 10 00  
CONCRETE FORMWORK

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to design, install and remove formwork for cast-in-place concrete complete as shown on the Drawings and specified herein.
- B. Secure to forms as required or set for embedment as required, all miscellaneous metal items, sleeves, reglets, anchor bolts, inserts and other items furnished under other Sections and required to be cast into concrete, or approved in advance by the Engineer.

1.02 RELATED WORK

- A. Concrete Reinforcement is included in Section 03 20 00.
- B. Concrete Joints and Joint Accessories are included in Section 03 25 00.
- C. Cast-in-Place Concrete is included in Section 03 30 00.
- D. Grout is included in Section 03 60 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings, and product data showing materials of construction and details of installation for:
  - 1. Form release agent
  - 2. Form ties
  - 3. Tapered Ties : Proposed method and products for sealing form tie hole.
- B. Samples
  - 1. Demonstrate to the Engineer on a designated area of the concrete substructure exterior surface that the form release agent will not adversely affect concrete surfaces to be painted, coated or otherwise finished and will not affect the forming materials.
- C. Certificates
  - 1. Statement of qualification for the formwork designer retained by Contractor. Formwork designer shall be a professional engineer registered in the same state as the project site. Designer shall have at a minimum five years of experience designing the required formwork and falsework systems.
  - 2. Certify that form release agent is suitable for use in contact with potable water after 30 days (non-toxic and free of taste and odor).

1.04 REFERENCE STANDARDS

- A. American Concrete Institute (ACI)
  - 1. ACI 301 – Standard Specification for Structural Concrete
  - 2. ACI 318 – Building Code Requirements for Reinforced Concrete
  - 3. ACI 347 – Formwork for Concrete
- B. American Plywood Association (APA)
  - 1. Material grades and designations as specified
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 SYSTEM DESCRIPTION

- A. Formwork shall be designed and erected in accordance with the requirements of ACI 301 and ACI 318 and as recommended in ACI 347 and shall comply with all applicable regulations and codes. The design shall consider any special requirements due to the use of plasticized and/or retarded set concrete. Design forms and ties to withstand concrete pressures without budging, spreading, or lifting forms.
- B. Architectural Concrete is wall, slab, beam or column concrete which will have surfaces exposed to view in the finished work. It includes similar exposed surfaces in water containment structures from the top of walls to 2-ft below the normal water surface in open tanks and basins.

PART 2 PRODUCTS

2.01 GENERAL

- A. The usage of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configurations desired.

2.02 MATERIALS

- A. General: Forms for cast in place concrete shall be made of wood, metal, or other approved material. Construct wood forms of sound lumber or plywood of suitable dimensions and free from knotholes and loose knots. Where used for exposed surfaces, dress and match boards. Sand plywood smooth and fit adjacent panels with tight joints. Metal forms may be used when approved by the Engineer and shall be of an appropriate type for the class of work involved. All forms shall be designed and constructed to provide a flat, uniform concrete surface requiring minimal finishing or repairs.
- B. Wall Forms
  - 1. Forms for all exposed exterior and interior concrete walls shall be "Plyform" exterior grade plywood panels manufactured in compliance with the APA and bearing the trademark of

that group, or equal acceptable to the Engineer. Provide B grade or better veneer on all faces to be placed against concrete during forming. The class of material and grades of interior plies shall be of sufficient strength and stiffness to provide a flat, uniform concrete surface requiring minimal finishing and grinding.

2. All joints or gaps in forms shall be taped, gasketed, plugged, and/or caulked with an approved material so that the joint will remain watertight and will withstand placing pressures without bulging.
3. Circular Structures: Use forms conforming to the circular shape of the structure. Straight panels may be substituted for circular form. Provided panels to not exceed two (2) feet in horizontal width and angular deflection is no greater than 3 ½ degrees per joint.

C. Column Forms

1. Rectangular Columns: as specified for walls
2. Circular Columns: Fabricated steel or fiber reinforced plastic with bolted together sections or spirally wound laminated fiber form internally treated with form release agent for height of columns.

- D. Rustication strips shall be at the location and shall conform to the details shown on the Drawings. Moldings for chamfers and rustications shall be milled and planed smooth. Rustications and corner strips shall be of a nonabsorbent material, compatible with the form surface and fully sealed on all sides to prohibit the loss of paste or water between the two surfaces.

E. Form Release Agent

1. Coat all forming surfaces in contact with concrete using an effective, non-staining, non-residual, water based, bond breaking form coating unless otherwise noted. Form release agents used in potable water containment structures shall be suitable for use in contact with potable water and shall be non-toxic and free of taste or odor and meet the requirements of NSF/ANSI Standard 61. Form release agent shall be Farm Fresh by Unitex or Engineer approved equal.

F. Form Ties

1. Form ties encased in concrete other than those specified in the following paragraphs shall be designed so that, after removal of the projecting part, no metal shall remain within 1 1/2 in off the face of the concrete. The part of the tie to be removed shall be at least 1/2 in diameter or be provided with a wood or metal cone at least 1/2 in diameter and 1 1/2 in long. Form ties in concrete exposed to view shall be the cone washer type.
2. Form ties for exposed exterior and interior walls shall be as specified in the preceding paragraph except that the cones shall be of approved wood or plastic.
3. Flat bar ties for panel forms, if used, shall have plastic or rubber inserts having a minimum depth of 1-1/2-in and sufficient dimensions to permit proper patching of the tie hole.



4. Ties for liquid containment structures shall have an integral waterstop that is tightly welded to the tie.
5. Common wire shall not be used for form ties.
6. Alternate form ties consisting of tapered through-bolts at least 1-in in diameter at smallest end or through-bolts that utilize a removable tapered sleeve of the same minimum size may be used at the Contractor's option. Obtain Engineer's acceptance of system and spacing of ties prior to ordering or purchase of forming. Clean, fill and seal form tie hole with non-shrink cement grout. A vinyl plug shall be inserted into the hole to serve as a waterstop. The Contractor shall be responsible for water-tightness of the form ties and any repairs needed.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Forms shall be used for all cast-in-place concrete including sides of footings. Forms shall be constructed and placed so that the resulting concrete will be of the shape, lines, dimensions and appearance indicated on the drawings.
- B. Forms for walls shall have removable panels at the bottom for cleaning, inspection and joint surface preparation. Forms for walls of considerable height (15 feet or greater) shall have closable intermediate inspection ports. Tremies and hoppers for placing concrete shall be used to allow concrete inspection, to prevent segregation and to prevent the accumulation of hardened concrete on the forms above the fresh concrete.
- C. Molding, bevels, or other types of chamfer strips shall be placed to produce block outs, rustications, or chamfers as shown on the Drawings or as specified herein. Chamfer strips shall be provided at horizontal and vertical projecting corners to produce a  $\frac{3}{4}$ -in chamfer. Rectangular or trapezoidal moldings shall be placed in locations requiring sealants where specified or shown on the Drawings. Sizes of moldings shall conform to the sealants manufacturer's recommendations.
- D. Forms shall be sufficiently rigid to withstand construction loads and vibration and to prevent displacement or sagging between supports. Construct forms so that the concrete will not be damaged by their removal. The contractor shall be entirely responsible for the adequacy of the forming system.
- E. Before form material is re-used, all surfaces to be in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn and all protrusions smoothed. Reuse of wooden forms for other than rough finish will be permitted only if a "like new" condition of the form is maintained.

#### 3.02 FORM TOLERANCES

- A. Forms shall be surfaced, designed and constructed in accordance with the recommendations of ACI 301 and shall meet the following additional requirements for the specified finishes.

1. Formed Surface Exposed to View: Edges of all form panels in contact with concrete shall be flush within 1/16-in and forms for plane surfaces shall be such that the concrete will be plane within 3/16-in in 4-ft. Forms shall be tight to prevent the passage of mortar, water and grout. The maximum deviation of the finish wall surface at any point shall not exceed 1/4-in from the intended surface as shown on the Drawings. Form panels shall be arranged symmetrically and in an orderly manner to minimize the number of seams.
2. Formed surfaces not exposed to view or buried shall meet requirements of Class "C" Surface in ACI 301.
3. Formed rough surfaces including mass concrete, pipe encasement, electrical duct encasement and other similar installations shall have no minimum requirements for surface smoothness and surface deflections. The overall dimensions of the concrete shall be plus or minus 1-in.

### 3.03 FORM PREPARATION

- A. Wood forms in contact with the concrete shall be coated with an effective release agent prior to form installation.
- B. Steel forms shall be thoroughly cleaned and mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface for all forms, except those utilized for surfaces receiving a rough finish. All forms shall have the contact surfaces coated with a release agent.

### 3.04 REMOVAL OF FORMS

- A. The Contractor shall be responsible for all damage resulting from removal of forms. Forms and shoring for structural slabs or beams shall remain in place in accordance with ACI 301. Form removal shall conform to the requirements specified in Section 03 30 00 including curing requirements .
- B. Repair all damages resulting from removal of forms.
- C. Clean, fill and seal form tie hole with non-shrink cement grout. The Contractor shall be responsible for the watertightness of the form ties holes and any repair necessary to maintain watertightness of tie holes.

### 3.05 INSPECTION

- A. The Engineer on site shall be notified when the forms are complete and ready for inspection at least 6 hours prior to the proposed concrete placement.
- B. Failure of the forms to comply with the requirements specified herein or to produce concrete complying with the requirements of Section 03 30 00 shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced as directed by the Engineer at no additional cost to the Owner. Such repair or replacement shall be subject to the requirements to this Section and approval of the Engineer.

END OF SECTION

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SECTION 03 20 00  
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install all concrete reinforcement complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03 10 00.
- B. Cast in place Concrete is included in Section 03 30 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Reinforcing steel: Placement drawings shall conform to the recommendations of the CRSI Manual of Standard Practice and ACI SP-66. All reinforcement in a concrete placement shall be included on a single placement drawing or cross referenced to the pertinent main placement drawing. The main drawing shall include the additional reinforcement (around openings, at corners, etc) shown on the standard detail sheets. Bars to have special coatings and/or to be of special steel or special yield strength are to be clearly identified. For all cast-in-place concrete tanks, retaining walls, building stem walls, wall sections shall be included in the drawings.
  - 2. All splice and joint locations shall be indicated on placement drawings. Splice lengths shall be clearly dimensioned.
  - 3. Reinforcement cover shall be clearly indicated.
  - 4. Submit reinforcement shop drawing for each structure as a complete package. Submittal showing portions of a structure will not be acceptable, unless acceptable by Engineer in advance.
  - 5. Submittals consisting of schedules without accompanying placement drawings will not be acceptable, unless acceptable by Engineer in advance.
  - 6. Bar bending details. The bars shall be referenced to the same identification marks shown on the placement drawings and shipping tags. Schedules shall be located on the same sheet where the bar mark is referenced. Schedule of all placements to contain synthetic reinforcing fibers. The amount of fibers per cubic yard to be used for each of the placements shall be noted on the schedule. The name of the manufacturer of the fibers and the product data shall be included with the submittal.

B. Test Reports

1. Certified copy of mill test on each steel proposed for use showing the physical properties of the steel and the chemical analysis.
2. Mechanical Reinforcing Bar Couplers. Current Evaluation Report prepared by ICC-ES or by other approved testing agency.

C. Certificates

1. Welder's certification. The certification shall be in accordance with AWS D1.4 when welding of reinforcement is required.
2. Weld Procedures. Provide procedure for each type of welded reinforcing splice in accordance with AWS D1.4 when welding of reinforcing is required.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184 - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
4. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement
5. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
6. ASTM A615 - Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
7. ASTM A616 - Standard Specification for Rail Steel Deformed and Plain Bars for Concrete Reinforcement
8. ASTM A617 - Standard Specification for Axle Steel Deformed and Plain Bars for Concrete Reinforcement
9. ASTM A706 - Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
10. ASTM A767 - Standard Specification for Zinc Coated (Galvanized) Steel Bars for Concrete Reinforcement
11. ASTM A775 - Standard Specification for Epoxy Coated Reinforcing Steel Bars.

12. ASTM A884 - Standard Specification for Epoxy Coated Steel Wire and Welded Wire Fabric for Reinforcement.
13. ASTM A934 - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.

B. American Concrete Institute (ACI)

1. ACI 301 Standard Specification for Structural Concrete
2. ACI 315 - Details and Detailing of Concrete Reinforcement.
3. ACI 318 Building Code Requirements for Structural Concrete
4. ACI SP 66 - ACI Detailing Manual

C. Concrete Reinforcing Steel Institute (CRSI)

1. Manual of Standard Practice

D. American Welding Society (AWS)

1. AWS D1.4 - Structural Welding Code Reinforcing Steel

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Provide services of a manufacturer's representative, with at least 2 years experience in the use of the reinforcing fibers for a preconstruction meeting and assistance during the first placement of the material.

1.06 DELIVERY, HANDLING AND STORAGE

- A. Reinforcing steel shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.
- B. Reinforcing steel shall be shipped and stored with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same "mark" designations as those shown on the submitted Placing Drawings.
- C. Reinforcing steel shall be stored off the ground and kept free from dirt, oil, or other injurious contaminants

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials shall be new, of domestic manufacture and shall comply with the following material specifications.

- B. Deformed Concrete Reinforcing Bars: ASTM A615, Grade 60 deformed bars.
- C. Concrete Reinforcing Bars required on the Drawings to be Welded: ASTM A706.
- D. Welded Steel Wire Fabric: ASTM A185. Provide in flat sheets.
- E. Welded Deformed Steel Wire Fabric: ASTM A497. Provide in flat sheets.
- F. Welded Plain Bar Mats: ASTM A704 and ASTM A615 Grade 60 plain bars.
- G. Fabricated Deformed Steel Bar Mats: ASTM A184 and ASTM A615 Grade 60 deformed bars.
- H. Reinforcing Steel Accessories
  - 1. Plastic Protected Bar Supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.
  - 2. Stainless Steel Protected Bar Supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.
  - 3. Precast Concrete Block Bar Supports: CRSI Bar Support Specifications, Precast Blocks. Blocks shall have equal or greater strength than the surrounding concrete.
  - 4. Steel Protected Bar Supports: #4 Steel Chairs with plastic or rubber tips.
- I. Tie Wire
  - 1. Tie Wires for Reinforcement shall be 16 gauge or heavier, black annealed wire or stranded wire.
- J. Mechanical Reinforcing Bar Couplers
  - 1. General : Use only at locations indicated on the Drawings or where written approval has been obtained from the Engineer.
  - 2. Mechanical reinforcing steel butt splices shall be positive connecting taper threaded type employing a hexagonal coupler such as Lenton rebar splices as manufactured by Erico Products Inc., Solon, OH or equal. They shall meet all ACI 318 Building Code requirements. Bar ends must be taper threaded with coupler manufacturer's bar threader to ensure proper taper and thread engagement.
  - 3. Bar couplers shall be torqued to manufacturer's recommended value.
  - 4. Unless otherwise noted on the Drawings, mechanical tension splices shall be designed to produce a splice strength in tension or compression of not less than 125 percent of the ASTM specified minimum yield strength of the rebar.
  - 5. Compression type mechanical splices shall provide concentric bearing from one bar to the other bar and shall be capable of developing the ultimate strength of the rebar in compression.

6. Form saver type mechanical couplers shall have flanges with nailing holes to positively attach coupler to formwork.

K. Fiber Reinforcement

1. Synthetic reinforcing fiber for concrete shall be 100 percent polypropylene collated, fibrillated fibers as manufactured by Fibermesh Company of Synthetic Industries Inc., Chattanooga, TN Fibermesh or equal. Fiber length and quantity for the concrete mix shall be in strict compliance with the manufacturer's recommendations as approved by the Engineer.

2.02 FABRICATION

- A. Fabrication of reinforcement shall be in compliance with the CRSI Manual of Standard Practice and ACI SP-66.
- B. Bars shall be cold bent. Bars shall not be straightened or rebent.
- C. Bars shall be bent around revolving collar having a diameter of not less than that recommended by the ACI SP-66.
- D. Bar ends that are to be butt spliced, placed through limited diameter holes in metal, or threaded, shall have the applicable end(s) saw-cut. Such ends shall terminate in flat surfaces within 1-1/2 degrees of a right angle to the axis of the bar.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Surface condition, bending, spacing and tolerances of placement of reinforcement shall comply with the CRSI Manual of Standard Practice and ACI SP-66. The Contractor shall be solely responsible for providing and adequate number of bars and maintaining the spacing and clearances shown on the Drawings.
- B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:
  1. Concrete cast against and permanently exposed to earth: 3-in
  2. Concrete exposed to soil, water, sewage, sludge and/or weather: 2-in (Including bottom cover of slabs over water or sewage)
  3. Concrete not exposed to soil, water, sewage, sludge and/or weather:
    - a. Slabs (top and bottom cover), walls, joists, shells and folded plate members – 3/4 in.
    - b. Beams and columns (principal reinforcement, ties, spirals and stirrups) – 1-1/2 in.
- C. Reinforcement which will be exposed for a considerable length of time after being placed shall be coated with a heavy coat of neat cement slurry.



- D. No reinforcing steel bars shall be welded either during fabrication or erection unless specifically shown on the Drawings or specified herein, or unless prior written approval has been obtained from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall comply with AWS D1.4.
- E. Reinforcing steel interfering with the location of other reinforcing steel, conduits or embedded items, may be moved within the specified tolerances or one bar diameter, whichever is greater. Greater displacement of bars to avoid interference shall only be made with the approval of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.
- F. Securely support and tie reinforcing steel to prevent movement during concrete placement. Secure dowels in place before placing concrete.
- G. Reinforcing steel bars shall not be field bent except where shown on the Drawings or specifically authorized in writing by the Engineer. If authorized, bars shall be cold bent around the standard diameter spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. If the reinforcing steel is damaged, replace, Cadweld or otherwise repair as directed by the Engineer. Do not bend reinforcement after it is embedded in concrete unless specifically shown otherwise on the Drawings.

### 3.02 REINFORCEMENT AROUND OPENINGS

- A. Unless specific additional reinforcement around openings is shown on the Drawings, provide additional reinforcing steel on each side of the opening equivalent to one half of the cross sectional area of the reinforcing steel interrupted by an opening. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

### 3.03 SPLICING OF REINFORCEMENT

- A. Splices designated as compression splices on the Drawings, unless otherwise noted, shall be 30 bar diameters, but not less than 12 in. The lap splice length for column vertical bars shall be based on the bar size in the column above.
- B. Tension lap splices shall be provided at all laps in compliance with ACI SP-66. Splices in adjacent bars shall be staggered. Class A splices may be used when 50 percent or less of the bars are spliced within the required lap length. Class B splices shall be used at all other locations.
- C. Splicing of reinforcing steel in concrete elements noted to be "tension members" on the Drawings shall be avoided whenever possible. However, if required for constructability, splices in the reinforcement subject to direct tension shall be welded to develop, in tension, at least 125 percent of the specified yield strength of the bar. Splices in adjacent bars shall be offset the distance of a Class B splice.
- D. Install wire fabric in as long lengths as practicable. Wire fabric from rolls shall be rolled flat and firmly held in place. Splices in welded wire fabric shall be lapped in accordance with the requirements of ACI SP-66 but not less than 12 in. The spliced fabrics shall be tied together with wire ties spaced not more than 24 in on center and laced with wire of the same diameter as

the welded wire fabric. Do not position laps midway between supporting beams, or directly over beams of continuous structures. Offset splices in adjacent widths to prevent continuous splices.

- E. Mechanical reinforcing steel splicers shall be used only where shown on the Drawings. Splices in adjacent bars shall be offset by at least 30 bar diameters. Mechanical reinforcing splices are only to be used for special splice and dowel conditions approved by the Engineer.

### 3.04 ACCESSORIES

- A. Determine, provide and install accessories such as chairs, chair bars and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.
- B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.
- C. Stainless steel bar supports or steel chairs with stainless steel tips shall be used where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use of galvanized or plastic tipped metal chairs is permissible in all other locations unless otherwise noted on the Drawings or specified herein.
- D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

### 3.05 INSPECTION

- A. In no case shall any reinforcing steel be covered with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been observed by the Engineer and the Engineer's release to proceed with the concreting has been obtained. The Engineer shall be given ample prior notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished his/her observations of the reinforcing steel.

END OF SECTION

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SECTION 03 25 00  
CONCRETE JOINTS AND JOINT ACCESORIES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install accessories for concrete joints as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03 10 00.
- B. Concrete Reinforcement is included in Section 03 20 00.
- C. Cast-In-Place Concrete is included in Section 03 30 00.
- D. Concrete Finishes are included in Section 03 35 00.
- E. Grout is included in Section 03 60 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings and product data. Submittals shall include at least the following:
  - 1. Standard Waterstops: Product data including catalogue cut, technical data, storage requirements, splicing methods and conformity to ASTM standards.
  - 2. Special Waterstops: Product data including catalogue cut, technical data, location of use, storage requirements, splicing methods, installation instructions and conformity to ASTM standards.
  - 3. Premolded joint fillers: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
  - 4. Bond breaker: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
  - 5. Expansion joint dowels: Product data on the complete assembly including dowels, coatings, lubricants, spacers, sleeves, expansion caps, installation requirements and conformity to ASTM standards.
  - 6. Compressible joint filler: Product data including catalogue cut, technical data, storage requirements, installation requirements, location of use and conformity to ASTM standards.
  - 7. Bonding agents: Product data including catalogue cut, technical data, storage requirements, product life, application requirements and conformity to ASTM standards.

B. Certifications

1. Certification that all materials used within the joint system is compatible with each other.
2. Certifications that materials used in the construction of joints are suitable for use in contact with potable water 30 days after installation.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A675 – Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
2. ASTM C881 - Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
3. ASTM C1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
4. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
5. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
6. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
7. ASTM D 746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
8. ASTM D 747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam.
9. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
10. ASTM D1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction. (Nonextruding and Resilient Bituminous Types).
11. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

B. U.S. Army Corps of Engineers (CRD)

1. CRD C572 – Specification for Polyvinylchloride Waterstops.

C. Federal Specifications

1. FS SS-S-210A - Sealing Compound for Expansion Joints.

- D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. All materials used together in a given joint (bond breakers, backer rods, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and produce to ensure compatibility. Under no circumstances shall asphaltic bond breakers or joint fillers be used in joints receiving sealant.
- C. All chemical sealant type waterstops shall be products specifically manufactured for the purpose for which they will be used and the products shall have been successfully used on similar structures for more than five years.

### 2.02 MATERIALS

#### A. Standard Waterstops

1. PVC Waterstops The waterstop shall be made by extruding elastomeric plastic compound with virgin polyvinylchloride as the basic resins. The compound shall contain no reprocessed materials. Minimum tensile strength of waterstop shall be 1750 psi. The waterstop shall conform to CRD C572. The waterstop shall be Greenstreak Group, Inc. model No. 679 or approved equal for construction joints. The waterstop shall be Sika Greenstreak model No. 732 or approved equal for control joints and Sika Greenstreak Model No. 738 for expansion joints. Provide grommets or pre-punched holes spaced at 12 inches on center along length of waterstop.
2. Factory Fabrications: Provide factory made waterstop fabrications for all changes of direction, transitions, and intersections, leaving only straight butt joints of sufficient length for splicing in the field.

#### B. Special Waterstops

1. Retrofit PVC Waterstop - The waterstop shall be made by extruding elastomeric plastic compound with virgin polyvinylchloride as the basic resins. The compound shall contain no reprocessed materials. Minimum tensile strength of waterstop shall be 1750 psi. The waterstop shall conform to CRD C572. Waterstops shall be style 667 by Sika Greenstreak or equal.
2. Expansive hydrophobic waterstops: hydrophilic waterstops shall be bentonite-free and shall expand by a minimum 80 percent of dry volume in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast. The waterstop material shall be dimensionally stable after repeated wet-dry exposures. The waterstop shall be Hydrotite CJ 1020 2K as manufactured by Sika, de Neff Swellseal Joint, by GCP Applied Technologies Inc., or equal. The waterstop and waterstop adhesive shall be

installed in accordance with the manufacturers written recommendations. Provide hydrophilic only where indicated on the drawings.

3. Preformed adhesive waterstops - The waterstop shall be a rope type preformed plastic waterstop meeting the requirements of Federal Specification SS-S-210A. The rope shall have a cross-section of approximately one square inch unless otherwise specified or shown on the Drawings. The waterstop shall be Synko-Flex waterstop as manufactured by Henry Company, Lockstop by Sika Greenstreak , or equal. Primer and surface preparation for the material shall be as recommended by the waterstop manufacturer.

**C. Expansion Joint Material**

1. Joint Material at Structures - Self expanding cork, premolded joint filler shall conform to ASTM D1752, Type III. The thickness shall be 3/4 in unless shown otherwise on the Drawings.
2. Joint Material at sidewalk and roadway concrete pavements or where fiber joint filler is specifically noted on the Drawings - The joint filler shall be asphalt impregnated fiber board conforming to ASTM D1751. Thickness shall be 3/4 in unless otherwise shown on the Drawings.

**D. Bond Breaker**

1. Bond breaker tape shall be an adhesive backed glazed butyl or polyethylene tape which will satisfactorily adhere to the premolded joint filler or concrete surface as required. The tape shall be the same width as the joint.
2. Except where tape is specifically called for on the drawings, bond breaker for concrete shall be either bond breaker tape or a nonstaining type bond prevention coating such as Maxi-Tilt with Dye by Dayton Superior, Inc.; Silcoseal 77, by SCA Construction Supply Division, Superior Concrete Accessories or equal.

**E. Expansion Joint Dowels**

1. Dowels shall be smooth steel conforming to ASTM A675, Grade 70. Dowels must be straight and clean, free of loose flaky rust and loose scale. Dowels may be sheared to length provided deformation from true shape caused by shearing does not exceed 0.04-in on the diameter of the dowel and extends no more than 0.04-in from the end. Bars shall be coated with a bond breaker on the expansion end of the dowel. Expansion caps shall be provided on the expansion end. Caps shall allow for at least 1-1/2-in of expansion.
2. Dowel Bar Sleeves: Provide two component Speed Dowel System by Sika, to accept 1" diameter x 12" long slip dowels. Speed Dowel System is comprised of a reusable base and a plastic sleeve. Both pieces shall be manufactured from polypropylene plastic.

**F. Bonding Agent**

1. Epoxy bonding agent shall be a two component, solvent free, moisture insensitive, epoxy resin material conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32

Hi Mod by Sika Corporation of Lyndhurst, N.J.; MasterEmaco ADH 326 by BASF or equal. Acrylic may be used if approved by the Engineer.

G. Compressible Joint Filler

1. The joint filler shall be a non extruded watertight strip material use to fill expansion joints between structures. The material shall be capable of being compressed at least 40 percent for 70 hours at 68 degrees F and subsequently recovering at least 20 percent of its original thickness in the first 1/2 hour after unloading. Compressible Joint filler shall be Wabo®Evasote, by BASF, Inc., or equal.

H. Joint Sealant

1. The joint sealant shall be a 1-component, polyurethane-based, non-sag elastomeric sealant. Joint sealant shall be Sikaflex-1a or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Standards Waterstops

1. Install waterstops for all joints where indicated on the Drawings. Waterstops shall be continuous around all corners and intersections so that a continuous seal is provided. Provide factory made waterstop fabrications for all changes in direction, intersections and transitions leaving only straight butt joints splices for the field.
2. Horizontal waterstops in slabs shall be clamped in position by the bulkhead (unless previously set in concrete).
3. Waterstops shall be installed so that half of the width will be embedded on each side of the joint. Care shall be exercised to ensure that the waterstop is completely embedded in void free concrete. All waterstops shall be tied to reinforcement with reinforcing tie wire through the factory provided grommets.
4. Waterstops shall be terminated 3-in below the exposed top of walls. Expansion joint waterstop center bulbs shall be plugged with foam rubber, 1-in deep, at point of termination.

B. Special Waterstops

1. Install special waterstops at joints where specifically noted on the Drawings. Waterstops shall be continuous around all corners and intersections so that a continuous seal is provided. Provide factory made waterstop fabrications for all changes in direction, intersections and transitions leaving only straight butt joints splices for the field.
2. Each piece of the waterstop shall be of maximum practicable length to provide a minimum number of connections or splices. Connections and splices shall conform to the manufacturer's recommendations and as specified herein.



3. Waterstops shall be terminated 3-in below the exposed top of walls.

C. Construction Joints

1. Make construction joints only at locations shown on the Drawings or as approved by the Engineer. Any additional or relocation of construction joints proposed by the Contractor, must be submitted to the Engineer for written approval. Joints shall be spaced at a maximum of 40ft O.C. unless noted otherwise on the Drawings.
2. Additional or relocated joints should be located where they least impair strength of the member. In general, locate joints within the middle third of spans of slabs, beams and girders. However, if a beam intersects a girder at the joint, offset the joint a distance equal to twice the width of the member being connected. Locate joints in walls and columns at the underside of floors, slabs, beams or girders and at tops of footings or floor slabs. Do not locate joints between beams, girders, column capitals, or drop panels and the slabs above them. Do not locate joints between brackets or haunches and walls or columns supporting them.
3. All joints shall be perpendicular to main reinforcement. Continue reinforcing steel through the joint as indicated on the Drawings. When joints in beams are allowed, provide a shear key and inclined dowels as approved by the Engineer.
4. Provide sealant grooves for joint sealant where indicated on the Drawings.
5. At all construction joints and at concrete joints designated on the Drawings to be "roughened", uniformly roughen the surface of the concrete to a full amplitude (distance between high and low points or side to side) of approximately 1/4 in to expose a fresh face. Thoroughly clean joint surfaces of loose or weakened materials by water-blasting or sandblasting and prepare for bonding.
6. Provide waterstops in all wall and slab construction joints in liquid containment structures and at other locations shown on the Drawings.
7. Keyways shall not be used in construction joints unless specifically shown on the Drawings or approved by the Engineer.

D. Expansion Joints

1. Do not extend through expansion joints, reinforcement or other embedded metal items that are continuously bonded to concrete on each side of joint.
2. Position premolded joint filler material accurately. Secure the joint filler against displacement during concrete placement and compaction. Place joint filler over the face of the joint, allowing for sealant grooves as detailed on the Drawings. Tape all joint filler splices to prevent intrusion of mortar. Seal expansion joints as shown on the Drawings.
3. Expansion joints shall be 3/4 in in width unless otherwise noted on the Drawings.
4. Where indicated on Drawings, install smooth dowels at right angles to expansion joints. Align dowels accurately with finished surface. Rigidly hold in place and support during

concrete placement. Unless otherwise shown on the Drawings, apply oil or grease to one end of all dowels through expansion joints. Provide plastic expansion caps on the lubricated ends of expansion dowels.

5. Provide center bulb type waterstops in all wall and slab expansion joints in liquid containment structures and at other locations shown on the Drawings.

E. Control Joints

1. Provide sealant grooves, sealants and waterstops at control joints in slabs on grade or walls as detailed. Provide waterstops at all wall and slab control joints in water containment structures and at other locations shown on the Drawings.
2. Control joints may be sawed if specifically approved by the Engineer. If control joint grooves are sawed, properly time the saw cutting with the time of the concrete set. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses have developed sufficiently to induce cracking. No reinforcing shall be cut during sawcutting.
3. Extend every other bar of reinforcing steel through control joints or as indicated on the Drawings. Where specifically noted on the Drawings, coat the concrete surface with a bond breaker prior to placing new concrete against it. Avoid coating reinforcement or waterstops with bond breaker at these locations.

END OF SECTION

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SECTION 03 30 00  
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor and materials required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03 10 00.
- B. Concrete Reinforcement is included in Section 03 20 00.
- C. Concrete Joints and Joint Accessories are included in Section 03 25 00.
- D. Concrete Finishes are included in Section 03 35 00.
- E. Grout is included in Section 03 60 00.
- F. Modifications and Repair to Concrete are included in section 03 74 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings and product data including the following:
  - 1. Sources of cement, pozzolan and aggregates.
  - 2. Material Safety Data Sheets (MSDS) for all concrete components and admixtures.
  - 3. Air entraining admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
  - 4. Water-reducing admixture. Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
  - 5. High-range water reducing admixture (plasticizer). Product data including catalogue cut, technical data, storage requirements, product life, recommended dosage, temperature considerations, retarding effect, slump range and conformity to ASTM standards. Identify proposed locations of use.
  - 6. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio, concrete slump, type and manufacturer of cement. Provide either a. or b. below for each mix proposed.
    - a. Standard deviation data for each proposed concrete mix based on statistical records.

- b. The curve of water-cementitious materials ratio versus concrete cylinder strength for each formulation of concrete proposed based on laboratory tests. The cylinder strength shall be the average of the 28 day cylinder strength test results for each mix. Provide results of 7 and 14 day tests if available.
7. Sheet curing material. Product data including catalogue cut, technical data and conformity to ASTM standard.
8. Liquid curing compound. Product data including catalogue cut, technical data, storage requirements, product life, application rate and conformity to ASTM standards. Identify proposed locations of use.

**B. Samples**

1. Fine and coarse aggregates if requested by the Engineer.

**C. Test Reports**

1. Fine aggregates – Sieve analysis, physical properties, and deleterious substance.
2. Coarse aggregates – Sieve analysis, physical properties, and deleterious substances.
3. Cements – Chemical analysis and physical properties for each type.
4. Pozzolans – Chemical analysis and physical properties.
5. Proposed concrete mixes – Compressive strength, slump and air content.

**D. Certifications**

1. Certify admixtures used in the same concrete mix are compatible with each other and the aggregates.
2. Certify admixtures are suitable for use in contact with potable water after 30 days of concrete curing.
3. Certify curing compound is suitable for use in contact with potable water after 30 days (non-toxic and free of taste or odor).

**1.04 REFERENCE STANDARDS**

**A. American Concrete Institute (ACI).**

1. ACI 301 - Standard Specification for Structural Concrete
2. ACI 305.1 – Standard Specification for Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 318 – Building Code Requirements for Structural Concrete and Commentary

B. American Society for Testing and Materials (ASTM)

1. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C94 - Standard Specification for Ready Mixed Concrete.
6. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete
7. ASTM C150 - Standard Specification for Portland Cement
8. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete
9. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
10. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
11. ASTM C260 - Standard Specification for Air Entraining Admixtures for Concrete.
12. ASTM C309 - Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.
13. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
14. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
15. ASTM C1017 - Standard Specification for Chemical Admixtures for use in Producing Flowing Concrete.

C. Nation Ready Mixed Concrete Association (NRMCA)

- D. Where reference is made to one of the above standards, the revision in effect at the time of bid shall apply.

1.05 QUALITY ASSURANCE

- A. Reinforced concrete shall comply with specifications and standards noted above. The most stringent requirement of the specifications, standards and this Section shall apply when conflicts exist.

- B. Only one source of cement and aggregates shall be used on any one structure. Concrete shall be uniform in color and appearance.
- C. Well in advance of placing concrete, discuss with the Engineer the sources of individual materials and batched concrete proposed for use. Discuss placement methods, waterstops and curing. Propose methods of hot and cold weather concreting as required. Prior to the placement of any concrete containing a high-range water-reducing admixture (plasticizer), the Contractor, accompanied by the plasticizer manufacturer, shall discuss the properties and techniques of batching and placing plasticized concrete.
- D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.
- E. If, during the progress of the work, the materials from the sources originally accepted change in characteristics, the Contractor shall, at his/her expense, make new acceptance tests of aggregates and establish new design mixes.
- F. Testing of the following materials shall be furnished by the Contractor to verify conformity with this Specification Section and the stated ASTM Standards.
  - 1. Fine aggregates for conformity with ASTM C33 - Sieve analysis, physical properties, and deleterious substances.
  - 2. Coarse aggregates for conformity with ASTM C33 - Sieve analysis, physical properties, and deleterious substances.
  - 3. Cements for conformity with ASTM C150 - Chemical analysis and physical properties.
  - 4. Pozzolans for conformity with ASTM C618 - Chemical analysis and physical properties.
  - 5. Proposed concrete mix designs - Compressive strength, slump and air content.
- G. Field testing and inspection services will be provided by the Owner. The cost of such work, except as specifically stated otherwise, shall be paid by the Owner. Testing of the following items shall be by the Owner to verify conformity with this Specification Section.
  - 1. Concrete placements - Compressive strength (cylinders), compressive strength (cores), slump, and air content.
  - 2. Other materials or products that may come under question.
- H. All materials incorporated in the work shall conform to accepted samples.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Cement: Store in weather-tight buildings, bins or silos to provide protection from dampness and contamination and to minimize warehouse set.

- B. Aggregate: Arrange and use stockpiles to avoid excessive segregation or contamination with other materials or with other sizes of like aggregates. Build stockpiles in successive horizontal layers not exceeding 3 feet in thickness. Complete each layer before the next is started. Do not use frozen or partially frozen aggregate.
- C. Sand: Arrange and use stockpiles to avoid contamination. Allow sand to drain to uniform moisture content before using. Do not use frozen or partially frozen aggregates.
- D. Admixtures: Store in closed containers to avoid contamination, evaporation or damage. Provide suitable agitating equipment to assure uniform dispersion of ingredients in admixture solutions which tend to separate. Protect liquid admixtures from freezing and other temperature changes which could adversely affect their characteristics.
- E. Pozzolan: Store in weather-tight buildings, bins or silos to provide protection from dampness and contamination.
- F. Sheet Curing Materials: Store in weather-tight buildings or off the ground and under cover.
- G. Liquid Curing Compounds: Store in closed containers.

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Cement: U.S. made Portland cement complying with ASTM C150. Air entraining cements shall not be used. Cement brand shall be subject to approval by the Engineer and one brand shall be used throughout the work.

### 2.02 MATERIALS

- A. Materials shall comply with this Section and any applicable State or local requirements.
- B. Cement: The following cement type(s) shall be used:
  - 1. All Classes – Type I/II or Type II
- C. Fine Aggregate: Washed inert natural sand conforming to the requirements of ASTM C33.
- D. Coarse Aggregate: Well-graded crushed stone or washed gravel conforming to the requirements of ASTM C33. Grading requirements shall be as listed in ASTM C33 Table 2 for the specified coarse aggregate size number. Limits of Deleterious Substances and Physical Property Requirements shall be as listed in ASTM C33 Table 3 for severe weather regions. Size numbers for the concrete mixes shall be as shown in Table 1 herein.
- E. Water: Potable water free from injurious amounts of oils, acids, alkalis, salts, organic matter, or other deleterious substances.



- F. Admixtures: Admixtures shall be free of chlorides and alkalis (except for those attributable to water). When it is required to use more than one admixture in a concrete mix, the admixtures shall be from the same manufacturer. Admixtures shall be compatible with the concrete mix including other admixtures and shall be suitable for use in contact with potable water after 30 days of concrete curing.
1. Air-Entraining Admixture: The admixture shall comply with ASTM C260. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
  2. Water-Reducing Agent: The admixture shall comply with ASTM C494, Type A. Proportioning and mixing shall be in accordance with manufacturer's recommendations.
  3. High Range Water-Reducer (Plasticizer): The admixture shall comply with ASTM C494, Type F and shall result in non-segregating plasticized concrete with little bleeding and with the physical properties of low water/cement ratio concrete. The treated concrete shall be capable of maintaining its plastic state in excess of 2 hours. Proportioning and mixing shall be in accordance with manufacturer's recommendations. Where walls are 14 inches thick or less and the wall height exceeds 12 feet a mix including a plasticizer must be used.
  4. Admixtures causing retarded or accelerated setting of concrete shall not be used without written approval from the Engineer. When allowed, the admixtures shall be retarding or accelerating water reducing or high range water reducing admixtures.
- G. Pozzolan (Fly Ash): Pozzolan shall be Class C or Class F fly ash complying with ASTM C618 except the Loss on Ignition (LOI) shall be limited to 3% maximum.
- H. Ground-Granulated Blast Furnace Slag. Ground-granulated blast furnace slag shall conform to the following:
1. ASTM C989.
  2. Slag activity classification: Grade 100 or 120.
- I. Sheet Curing Materials. Waterproof paper, polyethylene film or white burlap polyethylene sheeting all complying with ASTM C171.
- J. Liquid Curing Compound. Liquid membrane forming curing compound shall comply with the requirements of ASTM C309, Type 1 D (clear or translucent with fugitive dye) and shall contain no wax, paraffin, or oil. Curing compound shall be approved for use in contact with potable water after 30 days (non-toxic and free of taste or odor). Curing compound shall comply with Federal, State and local VOC limits.

2.03 MIXES

- A. Development of mix designs and testing shall be by an independent testing laboratory acceptable to the Engineer engaged by and at the expense of the Contractor.
- B. Select proportions of ingredients to meet the design strength and materials limits specified in Table 1 and to produce concrete having proper placability, durability, strength, appearance and other required properties. Proportion ingredients to produce a homogenous mixture which will

readily work into corners and angles of forms and around reinforcement without permitting materials to segregate or allowing excessive free water to collect on the surface.

- C. The design mix shall be based on standard deviation data of prior mixes with essentially the same proportions of the same constituents or, if such data is not available, be developed by a testing laboratory, acceptable to the Engineer, engaged by and at the expense of the Contractor. Acceptance of mixes based on standard deviation shall be based on the modification factors for standard deviation tests contained in ACI 318. The water content of the concrete mix, determined by laboratory testing, shall be based on a curve showing the relation between water cementitious ratio and 7 and 28 day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing an average value of at least three test specimens at each age. The curves shall have a range of values sufficient to yield the desired data, including the specified design strengths as modified below, without extrapolation. The water content of the concrete mixes to be used, as determined from the curve, shall correspond to strengths 16 percent greater than the specified design strengths. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratio and net minimum cementitious content as specified in Table 1.
- D. Compression Tests: Provide testing of the proposed concrete mix or mixes to demonstrate compliance with the specified design strength requirements in conformity with the above paragraph.
- E. Entrained air, as measured by ASTM C231, shall be as shown in Table 1.
1. If the air-entraining agent proposed for use in the mix requires testing methods other than ASTM C231 to accurately determine air content, make special note of this requirement in the admixture submittal.
- F. Slump of the concrete as measured by ASTM C143, shall be as shown in Table 1. If a high-range water-reducer (plasticizer) is used, the slump indicated shall be that measured before plasticizer is added. Plasticized concrete shall have a slump ranging from 5 to 8 inches.
- G. Proportion admixtures according to the manufacturer's recommendations. Two or more admixtures specified may be used in the same mix provided that the admixtures in combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.

TABLE 1 – CONCRETE MIX REQUIREMENTS					
Class	Design Strength (1)	Cement (2)	Fine Aggregate (2)	Coarse Aggregate (3)	Cementitious Content (4)
A	2,500	C150 Type II	C33	57	440 min.
B	3,000	C150 Type II	C33	57	480 min.
C	4,000	C150 Type II	C33	57	560 min.
D	5,000	C150 Type II	C33	57	660 min.

TABLE 1 – CONCRETE MIX REQUIREMENTS						
Class	W/cm Ratio (5)	Fly Ash	AE Range (6)	WR (7)	HR WR (8)	Slump Range (inches)
A	0.63 max	--	3.5 to 5	Yes	--	1-4
B	0.54 max	--	3.5 to 5	Yes	*	1-3
C	0.44 max	25% max	3.5 to 5	Yes	*	3-5
D	0.40 max	--	3.5 to 5	Yes	*	3-5
NOTES:						
(1)	Minimum compressive strength in psi at 28 days.					
(2)	ASTM Designation.					
(3)	Size number in ASTM C33.					
(4)	Cementitious content in pounds/cubic yard.					
(5)	W/Cm is water-cementitious ratio by weight.					
(6)	AE is percent air-entrainment.					
(7)	WR is water-reducer admixture.					
(8)	HRWR is high-range water-reducer admixture.					
*	HRWR used at the Contractor's option except where walls are 14 inches thick or less and the wall height exceeds 12 feet, a mix including a plasticizer must be used.					

### PART 3 EXECUTION

#### 3.01 MEASURING MATERIALS

- A. Concrete shall be composed of portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be produced by a plant acceptable to the Engineer. All constituents, including admixtures, shall be batched at the plant except a high-range water-reducer may also be added in the field.
- B. Measure materials for batching concrete by weighing in conformity with and within the tolerances given in ASTM C94 except as otherwise specified. Scales shall have been certified by the local Sealer of Weights and Measures within 1 year of use.
- C. Measure the amount of free water in fine aggregates within 0.3 percent with a moisture meter. Compensate for varying moisture contents of fine aggregates. Record the number of gallons of water as batched on printed batching tickets.
- D. Admixtures shall be dispensed either manually using calibrated containers or measuring tanks, or by means of an automatic dispenser approved by the manufacturer of the specific admixture.
  1. Charge air entraining and chemical admixtures into the mixer as a solution using an automatic dispenser or similar metering device.
  2. Inject multiple admixtures separately during the batching sequence.

**3.02 MIXING AND TRANSPORTING**

- A. Batch plants shall have a current NRMCA Certification or equal.
- B. Concrete shall be ready mixed concrete produced by equipment acceptable to the Engineer. No hand mixing will be permitted. Clean each transit mix truck drum and reverse drum rotation before the truck proceeds under the batching plant. Equip each transit mix truck with a continuous, nonreversible, revolution counter showing the number of revolutions at mixing speeds.
- C. Ready mix concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of their rated capacities as stated on the name plate.
- D. Keep the water tank valve on each transit truck locked at all times. Any addition of water above the appropriate W/Cm ratio must be directed by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket.
- E. All central plant and rolling stock equipment and methods shall comply with ACI 318 and ASTM C94.
- F. Select equipment of size and design to ensure continuous flow of concrete at the delivery end. Metal or metal lined non-aluminum discharge chutes shall be used and shall have slopes not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20-ft long and chutes not meeting slope requirements may be used if concrete is discharged into a hopper before distribution.
- G. Retempering (mixing with or without additional cement, aggregate, or water) of concrete or mortar which has reached initial set will not be permitted.
- H. Handle concrete from mixer to placement as quickly as practicable while providing concrete of required quality in the placement area. Dispatch trucks from the batching plant so they arrive at the work site just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.
- I. Furnish a delivery ticket for ready mixed concrete to the Engineer as each truck arrives. Each ticket shall provide a printed record of the weight of cement and each aggregate as batched individually. Use the type of indicator that returns for zero punch or returns to zero after a batch is discharged. Clearly indicate the weight of fine and coarse aggregate, cement and water in each batch, the quantity delivered, the time any water is added, and the numerical sequence of the delivery. Show the time of day batched and time of discharge from the truck. Indicate the number of revolutions of the truck mixer.
- J. Temperature and Mixing Time Control
  - 1. In cold weather, do not allow the as mixed temperature of the concrete and concrete temperatures at the time of placement in the forms to drop below 40 degrees F.

2. If water or aggregate has been heated, combine water with aggregate in the mixer before cement is added. Do not add cement to mixtures of water and aggregate when the temperature of the mixture is greater than 90 degrees F.
3. In hot weather, cool ingredients before mixing to maintain temperature of the concrete below the maximum placing temperature of 90 degrees F. If necessary, substitute well crushed ice for all or part of the mixing water.
4. The maximum time interval between the addition of mixing water and/or cement to the batch and the placing of concrete in the forms shall not exceed the values shown in Table 2.

TABLE 2 – MAXIMUM TIME TO DISCHARGE OF CONCRETE	
Air or Concrete Temperature (whichever is higher)	Maximum Time
80 to 90 Degree F (27 to 32 Degree C)	45 minutes
70 to 79 Degree F (21 to 26 Degree C)	60 minutes
40 to 69 Degree F (5 to 20 Degree C)	90 minutes

5. If an approved high-range water-reducer (plasticizer) is used to produce plasticized concrete, the maximum time interval shall not exceed 90 minutes.

### 3.03 CONCRETE APPEARANCE

- A. Concrete mix showing either poor cohesion or poor coating of the coarse aggregate with paste shall be remixed. If this does not correct the condition, the concrete shall be rejected. If the slump is within the allowable limit, but excessive bleeding, poor workability, or poor finishability are observed, changes in the concrete mix shall be obtained only by adjusting one or more of the following:
  1. The gradation of aggregate.
  2. The proportion of fine and coarse aggregate.
  3. The percentage of entrained air, within the allowable limits.
- B. Concrete for the work shall provide a homogenous structure which, when hardened, will have the required strength, durability and appearance. Mixtures and workmanship shall be such that concrete surfaces, when exposed, will require no finishing. When concrete surfaces are stripped, the concrete, when viewed in good lighting from 10-ft away, shall be pleasing in appearance, and at 20-ft shall show no visible defects.

### 3.04 PLACING AND COMPACTING

#### A. Placing

1. Verify that all formwork completely encloses concrete to be placed and is securely braced prior to concrete placement. Remove ice, excess water, dirt and other foreign materials from forms. Confirm that reinforcement and other embedded items are securely in place. Have a competent workman at the location of the placement who can assure that reinforcing steel and embedded items remain in designated locations while concrete is being placed. Sprinkle semi porous subgrades or forms to eliminate suction of water from the mix. Seal extremely porous subgrades in an approved manner.
2. Deposit concrete as near its final position as possible to avoid segregation due to rehandling or flowing. Place concrete continuously at a rate which ensures the concrete is being integrated with fresh plastic concrete. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials or on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If the section cannot be placed continuously, place construction joints as specified or as approved.
3. Pumping of concrete will be permitted. Use a mix design and aggregate sizes suitable for pumping and submit for approval.
4. Remove temporary spreaders from forms when the spreader is no longer useful. Temporary spreaders may remain embedded in concrete only when made of galvanized metal or concrete and if prior approval has been obtained.
5. Do not place concrete for supported elements until concrete previously placed in the supporting element (columns, slabs and/or walls) has reached adequate strength.
6. Where surface mortar is to form the base of a finish, especially surfaces designated to be painted, work coarse aggregate back from forms with a suitable tool to bring the full surface of the mortar against the form. Prevent the formation of excessive surface voids.
7. Slabs
  - a. After suitable bulkheads, screeds and jointing materials have been positioned, the concrete shall be placed continuously between construction joints beginning at a bulkhead, edge form, or corner. Each batch shall be placed into the edge of the previously placed concrete to avoid stone pockets and segregation.
  - b. Avoid delays in casting. If there is a delay in casting, the concrete placed after the delay shall be thoroughly spaded and consolidated at the edge of that previously placed to avoid cold joints. Concrete shall then be brought to correct level and struck off with a straightedge. Bullfloats or darbies shall be used to smooth the surface, leaving it free of humps or hollows.
  - c. Where slabs are to be placed integrally with the walls below them, place the walls and compact as specified. Allow 1 hour to pass between placement of the wall and the overlying slab to permit consolidation of the wall concrete. Keep the top surface of the wall moist so as to prevent cold joints.

8. Formed Concrete
  - a. Place concrete in forms using tremie tubes and taking care to prevent segregation. Bottom of tremie tubes shall preferably be in contact with the concrete already placed. Do not permit concrete to drop freely more than 4-ft. Place concrete for walls in 12 to 24 in lifts, keeping the surface horizontal. If plasticized concrete is used, the maximum lift thickness may be increased to 4-ft.
9. Underwater concreting shall be performed in conformity with the recommendations of ACI 304.1. The tremie system shall be used to place underwater concrete. Tremie pipes shall be in the range of 8 to 12-in in diameter and be spaced at not more than 16-ft on centers nor more than 8-ft from an end form. Where concrete is being placed around a pipe, there shall be at least one tremie pipe on each side of each pipe. Where the tremie system is not practical, direct pumped concrete for underwater placement may be used subject to approval of the system including details by the Engineer.

**B. Compacting**

1. Consolidate concrete by vibration, puddling, spading, rodding or forking so that concrete is thoroughly worked around reinforcement, embedded items and openings and into corners of forms. Puddling, spading, etc, shall be continuously performed along with vibration of the placement to eliminate air or stone pockets which may cause honeycombing, pitting or planes of weakness.
2. All concrete shall be placed and compacted with mechanical vibrators. The number, type and size of the units shall be approved by the Engineer in advance of placing operations. No concrete shall be ordered until sufficient approved vibrators (including standby units in working order) are on the job.
3. A minimum frequency of 7000 rpm is required for mechanical vibrators. Insert vibrators and withdraw at points from 18 to 30-in apart. At each insertion, vibrate sufficiently to consolidate concrete, generally from 5 to 15 seconds. Do not over vibrate so as to segregate. Keep a spare vibrator on the site during concrete placing operations.
4. Concrete Slabs: Concrete for slabs less than 8 in thick shall be consolidated with vibrating screeds; slabs 8 to 12 in thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always be placed into concrete vertically and shall not be laid horizontally or laid over.
5. Walls and Columns: Internal vibrators (rather than form vibrators) shall be used unless otherwise approved by the Engineer. In general, for each vibrator needed to melt down the batch at the point of discharge, one or more additional vibrators must be used to densify, homogenize and perfect the surface. The vibrators shall be inserted vertically at regular intervals, through the fresh concrete and slightly into the previous lift, if any.
6. Amount of Vibration: Vibrators are to be used to consolidate properly placed concrete but shall not be used to move or transport concrete in the forms. Vibration shall continue until:
  - a. Frequency returns to normal.
  - b. Surface appears liquefied, flattened and glistening.
  - c. Trapped air ceases to rise.
  - d. Coarse aggregate has blended into surface, but has not disappeared.

3.05 CURING AND PROTECTION

- A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations.
- B. Curing Methods
  - 1. Curing Methods for Concrete Surfaces: Cure concrete to retain moisture and maintain specified temperature at the surface for a minimum of 7 days after placement. Curing methods to be used are as follows:
    - a. Water Curing: Keep entire concrete surface wet by ponding, continuous sprinkling or covered with saturated burlap. Begin wet cure as soon as concrete attains an initial set and maintain wet cure 24 hours a day.
    - b. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.
    - c. Liquid Membrane Curing: Apply over the entire concrete surface except for surfaces to receive additional concrete. Curing compound shall NOT be placed on any concrete surface where additional concrete is to be placed, where concrete sealers or surface coatings are to be used, or where the concrete finish requires an integral floor product. Curing compound shall be applied as soon as the free water on the surface has disappeared and no water sheen is visible, but not after the concrete is dry or when the curing compound can be absorbed into the concrete. Application shall be in compliance with the manufacturer's recommendations.
  - 2. Specified applications of curing methods.
    - a. Slabs for Water Containment Structures: Water curing only.
    - b. Slabs on Grade and Footings (not used to contain water): Water curing, sheet material curing or liquid membrane curing.
    - c. Structural Slabs (other than water containment): Water curing or liquid membrane curing.
    - d. Horizontal Surfaces which will Receive Additional Concrete, Coatings, Grout or Other Material that Requires Bond to the substrate: Water curing.
    - e. Formed Surfaces: None if nonabsorbent forms are left in place 7 days. Water cure if absorbent forms are used. Water cure if forms are removed prior to 7 days. Exposed horizontal surfaces of formed walls or columns shall be water cured for 7 days or until next placement of concrete is made.
    - f. Surfaces of Concrete Joints: Water cured or sheet material cured.
- C. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.
- D. Cold Weather Concreting:
  - 1. "Cold weather" is defined as a period when for more than 3 successive days, the average daily outdoor temperature drops below 40 degrees F. The average daily temperature shall be calculated as the average of the highest and the lowest temperature during the period from midnight to midnight.



2. Cold weather concreting shall conform to ACI 306.1 and the additional requirements specified herein. Temperatures at the concrete placement shall be recorded at 12 hour intervals (minimum).
3. Discuss a cold weather work plan with the Engineer. The discussion shall encompass the methods and procedures proposed for use during cold weather including the production, transportation, placement, protection, curing and temperature monitoring of the concrete. The procedures to be implemented upon abrupt changes in weather conditions or equipment failures shall also be discussed. Cold weather concreting shall not begin until the work plan is acceptable to the Engineer.
4. During periods of cold weather, concrete shall be protected to provide continuous warm, moist curing (with supplementary heat when required) for a total of at least 350 degree days of curing.
  - a. Degree days are defined as the total number of 24 hour periods multiplied by the weighted average daily air temperature at the surface of the concrete (eg: 5 days at an average 70 degrees F = 350 degree days).
  - b. To calculate the weighted average daily air temperature, sum hourly measurements of the air temperature in the shade at the surface of the concrete taking any measurement less than 50 degrees F as 0 degrees F. Divide the sum thus calculated by 24 to obtain the weighted average temperature for that day.
5. Salt, manure or other chemicals shall not be used for protection.
6. The protection period for concrete being water cured shall not be terminated during cold weather until at least 24 hours after water curing has been terminated.

**E. Hot Weather Concreting**

1. "Hot weather" is defined as any combination of high air temperatures, low relative humidity and wind velocity which produces a rate of evaporation estimated in accordance with ACI 305.1, approaching or exceeding 0.2 lbs/sqft/hr).
2. Concrete placed during hot weather, shall be batched, delivered, placed, cured and protected in compliance with the recommendations of ACI 305.1 and the additional requirements specified herein.
  - a. Temperature of concrete being placed shall not exceed 90 degrees F and every effort shall be made to maintain a uniform concrete mix temperature below this level. The temperature of the concrete shall be such that it will cause no difficulties from loss of slump, flash set or cold joints.
  - b. All necessary precautions shall be taken to promptly deliver, to promptly place the concrete upon its arrival at the job and to provide vibration immediately after placement.

**F. The Engineer may direct the Contractor to immediately cover plastic concrete with sheet material.**

1. Discuss with the Engineer a work plan describing the methods and procedures proposed to use for concrete placement and curing during hot weather periods. Hot weather concreting shall not begin until the work plan is acceptable to the Engineer.

### 3.06 REMOVAL OF FORMS

- A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70 percent of its specified design strength for beams and slabs and at least 30 percent of its specified design strength for walls and vertical surfaces, nor before reaching the following number of day degrees of curing (whichever is the longer)

TABLE 3 – MINIMUM TIME TO FORM REMOVAL	
Forms For	Degree Days
Beams and slabs	500
Walls and vertical surfaces	100
(see definition of degree-days in Paragraph <b>ERROR! REFERENCE SOURCE NOT FOUND.</b> above)	

- B. Shores shall not be removed until the concrete has attained at least 70 percent of its specified design strength and also sufficient strength to support safely its own weight and construction live loads.

### 3.07 INSPECTION AND FIELD TESTING

- A. The batching, mixing, transporting, placing and curing of concrete shall be subject to the inspection of the Engineer at all times. The Contractor shall advise the Engineer of his/her readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing steel and the alignment, cleanliness and tightness of formwork. No placement shall be made without the inspection and acceptance of the Engineer.
- B. Sets of field control cylinder specimens will be taken by the Engineer (or inspector) during the progress of the work, in compliance with ASTM C31. The number of sets of concrete test cylinders taken of each class of concrete placed each day shall not be less than one set per day, nor less than one set for each 150 cu yds of concrete nor less than one set for each 5,000 sq ft of surface area for slabs or walls.
1. A "set" of test cylinders consists of five cylinders: one to be tested at 7 days and two to be tested and their strengths averaged at 28 days. The fourth may be used for a special test at 3 days or to verify strength after 28 days if 28 day test results are low. The fifth is to be used at 28 days or 56 days where test results are low.
  2. When the average 28 day compressive strength of the cylinders in any set falls below the specified design strength or below proportional minimum 7 day strengths (where proper relation between seven and 28 day strengths have been established by tests), proportions, water content, or temperature conditions shall be changed to achieve the required strengths.
- C. Cooperate in the making of tests by allowing free access to the work for the selection of samples, providing an insulated closed curing box for specimens, affording protection to the specimens against injury or loss through the operations and furnish material and labor required

for the purpose of taking concrete cylinder samples. All shipping of specimens will be paid for by the Owner. Curing boxes shall be acceptable to the Engineer.

- D. Slump tests will be made in the field immediately prior to placing the concrete. Such tests shall be made in accordance with ASTM C143. If the slump is greater the specified range, the concrete shall be rejected.
- E. Air Content: Test for air content shall be made on fresh concrete samples. Air content for concrete made of ordinary aggregates having low absorption shall be made in compliance with either the pressure method complying with ASTM C231 or by the volumetric method complying with ASTM C173.
- F. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.
- G. Cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. Repair all core holes. The work of cutting and testing the cores will be at the expense of the Owner.
- H. See Specification Section 03900 for Leak Testing.

### 3.08 FAILURE TO MEET REQUIREMENTS

- A. Should the strengths shown by the test specimens made and tested in compliance with the previous provisions fall below the values given in Table 1, the Engineer shall have the right to require changes in proportions outlined to apply to the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in compliance with Sections titled "Strength" and "Failure to Meet Strength Requirements" of ASTM C94. The "purchaser" referred to in ASTM C94 is the Contractor in this Section.
- B. When the tests on control specimens of concrete fall below the specified strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In the case of cores not indicating adequate strength, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Tests need not be made until concrete has aged 60 days.
- C. Should the strength of test cylinders fall below 60 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.09 PATCHING AND REPAIRS

- A. It is the intent of this Section to require quality work including adequate forming, proper mixture and placement of concrete and curing so completed concrete surfaces will require no patching.
- B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified by the Engineer.
- C. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed; recesses left by the removal of form ties shall be filled; and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.
- D. Immediately after removal of forms remove plugs and break off metal ties as required by Section 03100. Promptly fill holes upon stripping as follows: Moisten the hole with water, followed by a 1/16 in brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spiderweb. Trowel smooth with heavy pressure. Avoid burnishing.
- E. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of 1 to 5 days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

3.10 SCHEDULE

- A. The following (Table 4) are the general applications for the various concrete classes and design strengths:

TABLE 4 – CONCRETE SCHEDULE		
Class	Design Strength (psi)	Description
A	2,500	Concrete fill and duct encasement
B	3,000	Concrete overlay slabs and pavements
C	4,000	Walls, slabs on grade, suspended slab and beam systems, columns, grade beams and all other structural concrete
D	5,000	Prestressed concrete

END OF SECTION

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SECTION 03 35 00  
CONCRETE FINISHES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and finish cast in place concrete surfaces as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03 10 00.
- B. Cast In Place Concrete is included in Section 03 30 00.
- C. Grout is included in Section 03 60 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Concrete sealer. Confirmation that the sealer is compatible with additionally applied coatings shall also be submitted.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM C33 - Standard Specification for Concrete Aggregates.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. Finishes
  - 1. For concrete which will receive additional applied finishes or materials, the surface finish specified is required for the proper application of the specified manufacturer's products. Where alternate products are approved for use, determine if changes in finishes are required and provide the proper finishes to receive these products.
  - 2. Changes in finishes made to accommodate products different from those specified shall be performed at no additional cost to the Owner. Submit the proposed new finishes and their construction methods to the Engineer for approval.
  - 3. Services of Manufacturer's Representative
    - a. Make available at no extra cost to the Owner, upon 72 hours notification, the services of a qualified field representative of the manufacturer of curing compound, sealer or

hardener to instruct the user on the proper application of the product under prevailing job conditions.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Chemical hardener shall be Lapidolith by Sonneborn; Hornolith by A.C. Horn; Penalith by W.R. Meadows or equal fluosilicate base material.
- B. Concrete sealer shall be "MasterKure CC 180 WB", by Master Builders Solutions, Shakopee, MN or equal.

## PART 3 EXECUTION

### 3.01 FORMED SURFACES

- A. Forms shall not be removed before the requirements of Section 03 30 00, have been satisfied.
- B. Exercise care to prevent damaging edges or obliterating the lines of chamfers, rustications or corners when removing the forms or performing any other work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete.
- D. Rough Form Finish
  - 1. Immediately after stripping forms and before concrete has changed color, carefully remove all fins and projections.
  - 2. Promptly fill holes left by tie cones and defects as specified in Section 03 30 00.
- E. Rubbed Finish
  - 1. Immediately upon stripping forms and before concrete has changed color, carefully remove all fins. While the wall is still damp apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to provide a bonding coat within all pits, air holes or blemishes in the parent concrete. Avoid coating large areas with the slurry at one time.
  - 2. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout proportioned by volume and consisting of 1 part cement to 1 1/2 parts of clean masonry sand having a fineness modulus of approximately 2.3 and complying with the gradation requirements of ASTM C33 for such a material. Grout shall be uniformly applied by means of damp pads of coarse burlap approximately 6 in square used as a float. Scrub grout into the pits and air holes to provide a dense mortar in all imperfections.
  - 3. Allow the mortar to partially harden for 1 or 2 hours depending upon the weather. If the air is hot and dry, keep the wall damp during this period using a fine, fog spray. When the grout has hardened sufficiently so it can be scraped from the surface with the edge of a steel trowel without damaging the grout in the small pits or holes, cut off all that can be

removed with a trowel. (Note: Grout allowed to remain on the wall too long will harden and will be difficult to remove.)

4. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout shall remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cutoff with the trowel so it can be wiped off clean with the burlap.
5. On the day following the repair of pits, air holes and blemishes, the walls shall again be wiped off clean with dry, used pieces of burlap containing old hardened mortar which will act as a mild abrasive. After this treatment, there shall be no built up film remaining on the parent surface. If, however, such a film is present, a fine abrasive stone shall be used to remove all such material without breaking through the surface film of the original concrete. Such scrubbing shall be light and sufficient only to remove excess material without changing the texture of the concrete.
6. A thorough wash down with stiff bristle brushes shall follow the final bagging or stoning operation. No extraneous materials shall remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least 3 days after the application of the repair grout.
7. It is the intent of this finish to provide a surface that is uniform in appearance with no blemishes, imperfections, discolorations, etc.

**F. Abrasive Blast Finish**

1. Coordinate with Rubbed Finish application. Do not begin until Rubbed Finish operation is complete or before concrete has reached minimum 7 day strength. The Rubbed Finish application may be deleted by the Engineer if the unfinished concrete surface is of superior quality. Apply the abrasive blast finish only where indicated on Drawings.
2. Prepare a sample area of minimum 4 ft high by 16 ft wide Blast Finish as directed by Engineer on a portion of new wall construction which will not be exposed in the final work. Sample area shall contain a variety of finishes obtained with different nozzles, nozzle pressures, grit materials and blasting techniques for selection by Engineer. Final accepted sample shall remain exposed until completion of all Blast Finish operations.
3. Blast finish operation shall meet all regulatory agency requirements. Blast Finish contractor shall be responsible for obtaining all required permits and/or licenses.
4. Perform abrasive blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or area of work. Maintain patterns or variances in depths of blast as present on the accepted sample.
5. Use an abrasive grit of proper type and gradation as well as equipment and technique to expose aggregate and surrounding matrix surfaces as follows:
  - a. Medium: Generally expose coarse aggregate 1/4 in to 3/8 in reveal.



6. Abrasive blast corners and edge of patterns carefully, using back up boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure and blasting techniques required to match Architect's samples.
7. Upon completion of the Blast Finish operation, thoroughly flush finished surfaces with clean clear water to remove residual dust and grit. Allow to air dry until curing of concrete is complete.
8. After the concrete has cured for a minimum of 28 days, apply a clear acrylic sealer as directed by manufacturer.

### 3.02 FLOORS AND SLABS

#### A. Floated Finish

1. Machine Floating
  - a. Screed floors and slabs with straightedges to the established grades shown on the Drawings. Immediately after final screeding, a dry cement/sand shake in the proportion of two sacks of portland cement to 350 lbs of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 lbs /1,000 sq ft of floor. Do not sprinkle neat, dry cement on the surface.
  - b. The application of the cement/sand shake may be eliminated at the discretion of the Engineer if the base slab concrete exhibits adequate fattiness and homogeneity and the need is not indicated. When the concrete has hardened sufficiently to support the weight of a power float without its digging into or disrupting the level surface, thoroughly float the shake into the surface with a heavy revolving disc type power compacting machine capable of providing a 200 lb compaction force distributed over a 24 in diameter disc.
  - c. Start floating along walls and around columns and then move systematically across the surface leaving a matte finish.
  - d. The compacting machine shall be the "Kelly Power Float with Compaction Control" as manufactured by Kelley Industries of SSP Construction Equipment Inc., Pomona, CA or equal. Troweling machines equipped with float (shoe) blades that are slipped over the trowel blades may be used for floating. Floating with a troweling machine equipped with normal trowel blades will not be permitted. The use of any floating or troweling machine which has a water attachment for wetting the concrete surface during finishing will not be permitted.
2. Hand Floating
  - a. In lieu of power floating, small areas may be compacted by hand floating. The dry cement/sand shake previously specified shall be used unless specifically eliminated by the Engineer. Screed the floors and slabs with straightedges to the established grades shown on the Drawings. While the concrete is still green, but sufficiently hardened to support a finisher and kneeboards with no more than 1/4 in indentation, wood float to a true, even plane with no coarse aggregate visible. Use sufficient pressure on the wood floats to bring moisture to the surface.
3. Finishing Tolerances
  - a. Level floors and slabs to a tolerance of plus or minus 1/8 in when checked with a 10-ft straightedge placed anywhere on the slab in any direction. Where drains occur, pitch

floors to drains such that there are no low spots left undrained. Failure to meet either of the above requirements shall be cause for removal, grinding, or other correction as directed by the Engineer.

**B. Broom Finish**

1. Screed slabs with straightedges to the established grades indicated on the Drawings. When the concrete has stiffened sufficiently to maintain small surface indentations, draw a stiff bristle broom lightly across the surface in the direction of drainage, or, in the case of walks and stairs, perpendicular to the direction of traffic to provide a non-slip surface.

**C. Steel Trowel Finish**

1. Finish concrete as specified in Paragraph 3.04 and 3.05. Then, hand steel trowel to a perfectly smooth hard even finish free from high or low spots or other defects.

**D. Concrete Sealer**

1. Prepare and seal surfaces indicated on the room finish schedule to receive a sealer as follows:
  - a. Finish concrete as specified in the preceding paragraphs and in accordance with the Schedule in Paragraph 3.05 below.
  - b. Newly Placed Concrete: Surface must be sound and properly finished. Surface is application ready when it is damp but not wet and can no longer be marred by walking workmen.
  - c. Newly Cured Bare Concrete: Level any spots gouged out by trades. Remove all dirt, dust, droppage, oil, grease, asphalt and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry so that surface is no more than damp, and not wet.
  - d. Aged Concrete: Restore surface soundness by patching, grouting, filling cracks and holes, etc. Surface must also be free of any dust, dirt and other foreign matter. Use power tools and/or strippers to remove any incompatible sealers or coatings. Cleanse as required, following the procedure indicated under cured concrete.
  - e. Methods: Apply sealer so as to form a continuous, uniform film by spray, soft bristle pushbroom, long nap roller or lambswool applicator. Ordinary garden type sprayers, using neoprene hose, are recommended for best results.
  - f. Applications: For curing only, apply first coat evenly and uniformly as soon as possible after final finishing at the rate of 200 to 400 sq ft per gallon. Apply second coat when all trades are completed and structure is ready for occupancy at the rate of 400 to 600 sq ft per gallon.
  - g. To meet guarantee and to seal and dustproof, two coats are required. For sealing new concrete, both coats shall be applied full strength. On aged concrete, when renovating, dustproofing and sealing, the first coat should be thinned 10 to 15 percent with reducer per manufacturer's directions.

**3.03 CONCRETE RECEIVING CHEMICAL HARDENER**

- A. After 28 days, minimum, concrete cure, apply chemical hardener in three applications to a minimum total coverage of the undiluted chemical of 100 sq ft per gallon and in accordance with manufacturer's recommendations as reviewed.

3.04 APPROVAL OF FINISHES

- A. All concrete surfaces, when finished, will be inspected by the Engineer.
- B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked.
- C. After finishing horizontal surfaces, regardless of the finishing procedure specified, the concrete shall be cured in compliance with Section 03 30 00 unless otherwise directed by the Engineer.

3.05 SCHEDULE OF FINISHES

- A. Concrete shall be finished as specified either to remain as natural concrete to receive an additional applied finish or material under another section.
- B. Concrete for the following conditions shall be finished as noted on the Drawings and as further specified herein:
  - 1. Concrete to Receive Dampproofing: Rough form finish. See Paragraph 3.01D above.
  - 2. Concrete Not Exposed to View and Not Scheduled to Receive an Additional Applied Finish or Material: Rough form finish. See Paragraph 3.01D above.
  - 3. Exterior Vertical Concrete Above Grade Exposed to View: Rubbed finish. See Paragraph 3.01E above.
  - 4. Interior Vertical Concrete Exposed to View Except in Water Containment Areas: Rubbed finish. See Paragraph 3.01E above.
  - 5. Vertical Concrete in Water Containment Areas. Rubbed finish on exposed surfaces and extending to two feet below normal operating water level: Rough form finish on remainder of submerged areas. See Paragraphs 3.01E and 3.01D above.
  - 6. Interior and Exterior Underside of Concrete Exposed to View: Rubbed finish. See Paragraph 3.01E above.
  - 7. Exterior surfaces exposed to view and indicated to have an abrasive blast finish. See Paragraph 3.01F above.
  - 8. Interior or Exterior Horizontal Concrete not Requiring Floor Hardener or Sealer: Floated finish. See Paragraph 3.02A above.
  - 9. Concrete for Exterior Walks, Interior and Exterior Stairs: Broomed finish perpendicular to direction of traffic. See Paragraph 3.02B above.
  - 10. Concrete Slabs On Which Process Liquids Flow or In Contact with Sludge: Steel trowel finish. See Paragraph 3.02C above.
  - 11. Concrete to Receive Hardener: See Paragraph 3.03 above.

12. Concrete to Receive Floor Sealer: See Paragraph 3.02D above.
13. Concrete tank bottoms to be covered with grout: See Section 03 60 00.

END OF SECTION

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SECTION 03 60 00  
GROUT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required and install grout complete as shown on the Drawings and as specified herein.

1.02 RELATED WORK

- A. Formwork is included in Section 03 10 00.
- B. Concrete Reinforcement is included in Section 03 20 00.
- C. Concrete Joints and Joint Accessories are included in Section 03 35 00.
- D. Cast-in-Place Concrete is included in Section 03 30 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, shop drawings and product data showing materials of construction and details of installation for:
  - 1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature consideration, conformity to required ASTM standards and Material Safety Data Sheet.
  - 2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.
  - 3. Cement grout. The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, product data on any proposed admixtures and the proposed mix of the grout.
  - 4. Concrete grout. The submittal shall include data as required for concrete as delineated in Section 03 30 00 and for fiber reinforcement as delineated in Section 03 20 00. This includes the mix design, constituent quantities per cubic yard and the water/cement ratio.
- B. Laboratory Test Reports
  - 1. Submit laboratory test data is required under Section 03 30 00 for concrete to be used as concrete grout.

C. Certifications

1. Certify that commercially manufactured grout products and concrete grout admixtures are suitable for use in contact with potable water after 30 days curing.

D. Qualifications

1. Grout manufacturers shall submit documentation that they have at least 10 years' experience in the production and use of the proposed grouts which they will supply.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacing and Polymer Concretes
2. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts and Monolithic Surfacing's and Polymer Concretes
3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non-shrink)

B. U.S. Army Corps of Engineers Standard (CRD)

1. CRD C-621 - Corps of Engineers Specification for Non-shrink Grout

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Grout manufacturer shall have a minimum of 10 years' experience in the production and use of the type of grout proposed for the work.

B. Pre installation Conference

1. Well in advance of grouting, hold a pre installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date.

C. Services of Manufacturer's Representative

1. A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

D. Field Testing

1. All field testing and inspection services required shall be provided by the Owner. The Contractor shall assist in the sampling of materials and shall provide any ladders, platforms, etc, for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.
2. The field testing of Concrete Grout shall be as specified for concrete in Section 03 30 00.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.
- B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.
- C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.
- D. Nonshrink cement based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.
- E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

1.07 DEFINITIONS

- A. Nonshrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to a clean base plate.

PART 2 PRODUCTS

2.01 GENERAL

- A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.
- B. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.



## 2.02 MATERIALS

### A. Nonshrink Cementitious Grout

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be portland cement based, contain a pre proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.
  - a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by the Euclid Chemical Co.; NBEC Grout by U.S. Grout Corp. or equal.
  - b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Corp. ; Supreme Grout by Gifford Hill & Co. ; Five Star Grout by U.S. Grout Corp. or equal.

### B. Nonshrink Epoxy Grout

1. Nonshrink epoxy based grout shall be a pre proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of  $30 \times 10^{-6}$  when tested in conformity with ASTM C531. The grout shall be MasterFlow 648 by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co. or equal.

### C. Cement Grout

1. Cement grouts shall be a mixture of one part portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

### D. Concrete Grout

1. Concrete grout shall conform to the requirements of Section 03 30 00 except as specified herein. It shall be proportioned with cement, coarse and fine aggregates, water, water reducer and air entraining agent to produce a mix having an average strength of 2900 psi at 28 days, or 2500 psi nominal strength. Coarse aggregate size shall be 1/2 in maximum. Slump should not exceed 5 in and should be as low as practical yet still retain sufficient workability.
2. Synthetic reinforcing fibers as specified in Section 03 20 00 shall be added to the concrete grout mix at the rate of 1.5 lbs of fibers per cubic yard of grout. Fibers shall be added from the manufacturer's premeasured bags and according to the manufacturer's recommendations in a manner which will ensure complete dispersion of the fiber bundles as single monofilaments within the concrete grout.

E. Water

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 EXECUTION

3.01 PREPARATION

- A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.
- B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may effect the bond or performance of the grout.
- C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to a minimum of ¼" amplitude or provide a raked finish in order to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.
  1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.
- D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.
- E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24 hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.
- F. Epoxy based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.
- G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.
- H. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.
- I. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

- J. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

### 3.02 INSTALLATION – GENERAL

- A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.
- B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.
- C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 40 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.
- D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.
- E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.
- F. Reflect all existing underlying expansion, control and construction joints through the grout.

### 3.03 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

- A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.
- B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.
- C. Placements greater than 3 in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.
- D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.

- F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.
- G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

### 3.04 INSTALLATION - NONSHRINK EPOXY GROUTS

- A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.
- B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.
- C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.
- D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.
- E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.
- F. Epoxy grouts are self-curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

### 3.05 INSTALLATION - CONCRETE GROUT

- A. Screed underlying concrete to the grade shown on the Drawings. Prepare the surface according to 3.01B. Protect and keep the surface clean until placement of concrete grout.
- B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the tank slab using a strong jet of water. Flushing of debris into tank drain lines will not be permitted.
- C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use of soaker hoses, or by other methods acceptable to the Engineer. Remove excess water just prior to placement of the concrete grout. Place a cement slurry immediately ahead of the concrete grout so that the slurry is moist when the grout is placed. Work the slurry over the surface with a broom until it is coated with approximately 1/16 to 1/8 in thick cement paste. (A bonding grout composed of 1 part portland

cement, 1.5 parts fine sand, an approved bonding admixture and water, mixed to achieve the consistency of thick paint, may be substituted for the cement slurry.)

- D. Place concrete grout to final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated where application is at clarifier bottom. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.
- E. Provide synthetic reinforcing fibers in all applications unless steel reinforcement is indicated in the Drawings.
- F. Provide grout control joints as indicated on the Drawings.
- G. Finish and cure the concrete grout as specified for cast in place concrete.

### 3.06 SCHEDULE

- A. The following list indicates where the particular types of grout are to be used:
- B. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.
- C. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.
- D. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.
- E. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.
- F. Concrete grout: Use for overlaying the base concrete under scraper mechanisms of clarifiers or gravity thickener to allow more control in placing the surface grade. Use at grout fillets or grout pours greater than 4" thick.

END OF SECTION

SECTION 03 74 00  
MODIFICATIONS AND REPAIR TO CONCRETE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and cut, remove, repair or otherwise modify parts of existing concrete structures or appurtenances as shown on the Drawings and as specified herein. Work under this Section shall also include bonding new concrete to existing concrete.

1.02 RELATED WORK

- A. Concrete Formwork is included in Section 03 10 00.
- B. Concrete Reinforcement is included in Section 03 20 00.
- C. Concrete Joints and Accessories are included in Section 03 25 00.
- D. Cast-in-Place Concrete is included in Section 03 30 00.
- E. Concrete Finishes are included in Section 03 35 00.
- F. Grout is included in Section 03 60 00.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Section 01 33 00, a schedule of Demolition and the detailed methods of demolition to be used at each location.
- B. Submit manufacturer's technical literature on all product brands proposed for use, to the Engineer for review. The submittal shall include the manufacturer's installation and/or application instructions.
- C. When substitutions for acceptable brands of materials specified herein are proposed, submit brochures and technical data of the proposed substitutions to the Engineer for approval before delivery to the project.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
  - 1. ASTM C881 – Standards Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
  - 2. ASTM C882 – Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
  - 3. ASTM C883 – Standard Test Method for Effective Shrinkage of Epoxy-Resin Systems Used with Concrete.

4. ASTM D570 – Standard Test Method for Water Absorption of Plastics
  5. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
  6. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
  7. ASTM D732 – Standard Test Method for Shear Strength of Plastics by Punch Tool.
  8. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

#### 1.05 QUALITY ASSURANCE

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. When removing materials or portions of existing structures and when making openings in existing structures, all precautions shall be taken and all necessary barriers, shoring and bracing and other protective devices shall be erected to prevent damage to the structures beyond the limits necessary for the new work, protect personnel, control dust and to prevent damage to the structures or contents by falling or flying debris. Unless otherwise permitted, shown or specified, line drilling will be required in cutting existing concrete.
- C. Manufacturer Qualifications: The manufacturer of the specified products shall have a minimum of 10 years experience in the manufacture of such products and shall have an ongoing program of training, certifying and technically supporting the Contractor's personnel.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver the specified products in original, unopened containers with the manufacturer's name, labels, product identification and batch numbers.
- B. Store and condition the specified product as recommended by the manufacturer.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. General
1. Materials shall comply with this Section and any state or local regulations.
- B. Epoxy Bonding Agent
1. General
    - a. The epoxy bonding agent shall be a two-component, solvent-free, asbestos-free moisture insensitive epoxy resin material used to bond plastic concrete to hardened

concrete complying with the requirements of ASTM C881, Type II and the additional requirements specified herein.

2. Material
  - a. Properties of the cured material
    - 1) Compressive Strength (ASTM D695): 8500 psi minimum at 28 days.
    - 2) Tensile Strength (ASTM D638): 4000 psi minimum at 14 days.
    - 3) Flexural Strength (ASTM D790 Modulus of Rupture): 6,300 psi minimum at 14 days.
    - 4) Shear Strength (ASTM D732): 5000 psi minimum at 14 days.
    - 5) Water Absorption (ASTM D570 2 hour boil): One percent maximum at 14 days.
    - 6) Bond Strength (ASTM C882) Hardened to Plastic: 1500 psi minimum at 14 days moist cure.
    - 7) Effective Shrinkage (ASTM C883): Passes Test.
    - 8) Color: Gray.
3. Approved manufacturers include: Sika Corporation, Lyndhurst, NJ - Sikadur 32, Hi Mod; Master Builder's, Cleveland, OH - Concrecive Liquid (LPL) or equal.

C. Epoxy Paste

1. General
  - a. Epoxy Paste shall be a two component, solvent free, asbestos free, moisture insensitive epoxy resin material used to bond dissimilar materials to concrete and shall comply with the requirements of ASTM C881, Type I, Grade 3 and the additional requirements specified herein. It may also be used to patch existing surfaces where the glue line is 1/8 in or less.
2. Material
  - a. Properties of the cured material:
    - 1) Compressive Properties (ASTM D695): 10,000 psi minimum at 28 days.
    - 2) Tensile Strength (ASTM D638): 3,000 psi minimum at 14 days. Elongation at Break 0.3 percent minimum.
    - 3) Flexural Strength (ASTM D790 Modulus of Rupture): 3,700 psi minimum at 14 days.
    - 4) Shear Strength (ASTM D732): 2,800 psi minimum at 14 days.
    - 5) Water Absorption (ASTM D570): 1.0 percent maximum at 7 days.
    - 6) Bond Strength (ASTM C882): 2,000 psi at 14 days moist cure.
    - 7) Color: Concrete grey.
3. Approved manufacturer's include:
  - a. Sika Corporation, Lyndhurst, N.J. Sikadur Hi mod LV 32; Master Builders, Inc., Cleveland, OH Concrecive 1438 or equal.
  - b. Overhead applications: Sika Corporation, Lyndhurst, NJ Sikadur Hi mod LV 31; Master Builders, Inc., Cleveland, OH Concrecive 1438 or equal.



D. Repair Mortar

1. General

- a. Repair mortar shall be a two-component, polymer modified, cement based, fast-setting, trowel grade, structural repair mortar suitable for use on horizontal, vertical and overhead surfaces prepackaged product specifically formulated for the repair of concrete surface defects.

2. Material

- a. Properties of the cured material:
  - 1) Compressive Strength (2 hours 50 percent RH) – 150 psi minimum
  - 2) Compressive Strength (28 days 50 percent RH) – 150 psi minimum
  - 3) Bond Strength (pull off method) – 100 percent concrete substrate failure
  - 4) This system shall conform with ANSI/NSF standards for surface contact with potable water.

3. Approved manufacturer's include:

- a. Sika Corporation, Lyndhurst, N.J. – SikaTop 122 PLUS or equal.
- b. Overhead applications: Sika Corporation, Lyndhurst, N.J. – SikaTop 123 PLUS or equal.

E. Non Shrink Precision Cement Grout, Non Shrink Cement Grout, Non Shrink Epoxy Grout and Polymer Modified mortar are included in Section 03 60 00 GROUT.

F. Adhesive Capsule type anchor system shall be equal to the HIT-HY 200 adhesive Anchoring System by Hilti Fastening Systems, Tulsa, OK. The capsule shall consist of a sealed glass capsule containing premeasured amounts of polyester or vinylester resin, quartz sand aggregate and a hardener contained in a separate vial within the capsule. Where the adhesive anchor is under sustained tensile loading (i.e. vertically installed anchors) the anchor system shall be Hilti HIT RE-500 SD by Hilti Fastening Systems, Tulsa, OK. All steel reinforcement shall be anchored using the Hilti HIT RE-500 SD adhesive anchoring system.

G. Acrylic Latex Bonding Agents shall not be used for this project.

H. Crack Repair Epoxy Adhesive

1. General

- a. Crack Repair Epoxy Adhesive shall be a two component, solvent free, moisture insensitive epoxy resin material suitable for crack grouting by injection or gravity feed. It shall be formulated for the specific size of opening or crack being injected.
- b. All concrete surfaces containing potable water or water to be treated for potable use that are repaired by the epoxy adhesive injection system shall be coated with an acceptable epoxy coating system that conforms with ANSI/NSF standards for surface contact with potable water.

2. Material

- a. Properties of the cured material
  - 1) Compressive Properties (ASTM D695): 10,000 psi minimum at 28 days.
  - 2) Tensile Strength (ASTM D638): 5,300 psi minimum at 14 days. Elongation at Break 2 to 5 percent.

- 3) Flexural Strength (ASTM D790 Modulus of Rupture): 12,000 psi minimum at 14 days (gravity); 4,600 psi minimum at 14 days (injection)
  - 4) Shear Strength (ASTM D732): 3,700 psi minimum at 14 days.
  - 5) Water Absorption (ASTM D570 2 hour boil): 1.5 percent maximum at 7 days.
  - 6) Bond Strength (ASTM C882): 2,000 psi at 2 days dry; 1,400 psi at 14 days dry plus 12 days moist.
  - 7) Effective Shrinkage (ASTM 883): Passes Test.
3. Approved manufacturer's include:
- a. For standard applications: Sika Corporation, Lyndhurst, NJ Sikadur Hi Mod; Master Builders Inc., Cleveland, OH Concessive 1380 or equal.
  - b. For very thin applications; Sika Corporation, Lyndhurst, NJ Sikadur Hi Mod LV; Master Builders Inc., Cleveland, OH Concessive 1468 or equal.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Drawings, specified herein, or necessary to permit completion of the Work. Finishes, joints, reinforcements, sealants, etc, are specified in respective Sections. All work shall comply with other requirements of this of Section and as shown on the Drawings.
- B. All commercial products specified in this Section shall be stored, mixed and applied in strict compliance with the manufacturer's recommendations.
- C. In all cases where concrete is repaired in the vicinity of an expansion joint or control joint the repairs shall be made to preserve the isolation between components on either side of the joint.
- D. When drilling holes for dowels/bolts at new or existing concrete, drilling shall stop if rebar is encountered. As approved by the Engineer, the hole location shall be relocated to avoid rebar. Rebar shall not be cut without prior approval by the Engineer. Where possible, rebar locations shall be identified prior to drilling using "rebar locators" so that drilled hole locations may be adjusted to avoid rebar interference.

#### 3.02 CONCRETE REMOVAL

- A. Concrete designated to be removed to specific limits as shown on the Drawings or directed by the Engineer, shall be done by line drilling at limits followed by chipping or jack hammering as appropriate in areas where concrete is to be taken out. Remove concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged. Sawcutting at limits of concrete to be removed shall only be done if indicated on the Drawings, or after obtaining written approval from the Engineer.
- B. Where existing reinforcing is exposed due to saw cutting/core drilling and no new material is to be placed on the sawcut surface, a coating or surface treatment of epoxy paste shall be applied to the entire cut surface to a thickness of 1/4 in.

- C. In all cases where the joint between new concrete or grout and existing concrete will be exposed in the finished work, except as otherwise shown or specified, the edge of concrete removal shall be a 1 in deep saw cut on each exposed surface of the existing concrete.
- D. Concrete specified to be left in place which is damaged shall be repaired by approved means to the satisfaction of the Engineer.
- E. The Engineer may from time to time direct the Contractor to make additional repairs to existing concrete. These repairs shall be made as specified or by such other methods as may be appropriate.

### 3.03 SURFACE PREPARATION

- A. Connection surfaces shall be prepared as specified below for concrete areas requiring patching, repairs or modifications as shown on the Drawings, specified herein, or as directed by the Engineer.
- B. Remove all deteriorated materials, dirt, oil, grease, and all other bond inhibiting materials from the surface by dry mechanical means, i.e. sandblasting, grinding, etc, as approved by the Engineer. Be sure the areas are not less than 1/2 in in depth. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded into parent concrete, subject to the Engineer's final inspection.
- C. If reinforcing steel is exposed, it must be mechanically cleaned to remove all contaminants, rust, etc, as approved by the Engineer. If half of the diameter of the reinforcing steel is exposed, chip out behind the steel. The distance chipped behind the steel shall be a minimum of 1/2 in. Reinforcing to be saved shall not be damaged during the demolition operation.
- D. Reinforcing from existing demolished concrete which is shown to be incorporated in new concrete shall be cleaned by mechanical means to remove all loose material and products of corrosion before proceeding with the repair. It shall be cut, bent or lapped to new reinforcing as shown on the Drawings and provided with a minimum cover all around as specified on the contract drawings or 2-in.
- E. The following are specific concrete surface preparation "methods" are to be used where called for on the Drawings, specified herein or as directed by the Engineer. All installation of anchors shall be according to the manufacturer's recommendations.
  - 1. Method A: After the existing concrete surface at connection has been roughened and cleaned, thoroughly moisten the existing surface with water. Brush on a 1/16 in layer of cement and water mixed to the consistency of a heavy paste. Immediately after application of cement paste, place new concrete or grout mixture as detailed on the Drawings.
  - 2. Method B: After the existing concrete surface has been roughened and cleaned, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall comply strictly with the manufacturer's recommendations. Place new concrete or grout mixture to limits shown on the Drawings within time constraints recommended by the manufacturer to ensure bond.

3. Method C: Drill a hole 1/4 in larger than the diameter of the dowel. The hole shall be blown clear of loose particles and dust just prior to installing epoxy. The drilled hole shall first be filled with epoxy paste, and then dowels/bolts shall be buttered with paste then inserted by tapping. Unless otherwise shown on the Drawings, deformed bars shall be drilled and set to a depth of ten bar diameters and smooth bars shall be drilled and set to a depth of fifteen bar diameters. If not noted on the Drawings, the Engineer will provide details regarding the size and spacing of dowels.
4. Method D: Combination of Method B and C.
5. Method E: Capsule anchor system shall be set in existing concrete by drilling holes to the required depth to develop the full tensile and shear strengths of the anchor material being used. The anchor bolts system shall be installed per the manufacturer's recommendation in holes sized as required. The anchor stud bolt, rebar or other embedment item shall be tipped with a double 45 degree chamfered point, securely fastened into the chuck of all rotary percussion hammer drill and drilled into the capsule filled hole.

3.04 GROUTING

- A. Grouting shall be as specified in Section 03 60 0.

3.05 CRACK REPAIR

- A. Cracks on horizontal surfaces shall be repaired by gravity feeding crack sealant into cracks per manufacturer's recommendations. If cracks are less than 1/16 in in thickness they shall be pressure injected.
- B. Cracks on vertical surfaces shall be repaired by pressure injecting crack sealant through valves sealed to surface with crack repair epoxy adhesive per manufacturer's recommendations.
- C. Cracks shall be repaired according to the following generalized procedure:
  1. Remove any efflorescence, dirt, oil, etc, off the surfaces in the vicinity of the observed seepage. Where loose cementitious surfacer/slurry is encountered, it shall be removed to reveal the original concrete surface. Removal shall be performed using mechanical methods chemical solutions provided they are approved by other product manufacturers which are to be used (i.e. paint).
  2. Apply adequate surface seal to crack to prevent leakage of epoxy.
  3. Establish injection points at a distance along crack not less than thickness of cracked member.
  4. Crack injection sequence:
  5. Ensure that tank is full of water.
  6. Inject epoxy into crack from exterior at first port with sufficient pressure to advance epoxy to adjacent port.

7. Seal original port and shift injection to port where epoxy appears.
8. Continue port-to-port injection until crack has been injected for its entire length.
9. For small amounts of epoxy, or where excessive pressure developed by injection pump might further damage structure, premixed epoxy and use hand caulking gun to inject epoxy if acceptable to the Engineer.
10. Seal ports, including adjacent locations where epoxy seepage occurs, as necessary to prevent drips or run out.
11. The crack is considered to be sealed once no moisture is transferred from the concrete to a dry hand for a minimum of 24 hours after injections. Continue injection procedures if the crack does not meet this condition.
12. After epoxy injection is complete, remove surface seal material and refinish concrete in area where epoxy was injected to match existing concrete including applying new surfacer patch material to match existing in thickness, texture, etc. All materials used for patching or repairs shall be coordinated with other products to be used such as paint to ensure conformance and applicability.

END OF SECTION

SECTION 26 00 00  
ELECTRICAL GENERAL PROVISIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Furnish all labor, materials and equipment required to install, test and provide an operational, electrical system as specified and as shown on the Drawings.
- B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.
- C. The work shall include furnishing, installing and testing the equipment and materials detailed in each Section of Division 26.
- D. The work shall include furnishing and installing the following:
  - 1. Conduit, wire and field connections for all motors, motor controllers, control devices, control panels and electrical equipment furnished under other Divisions. The Contractor shall coordinate his construction schedule and electrical interface with the supplier of electrical equipment specified under other Divisions.
  - 2. Conduit, wiring and terminations for all field mounted instruments furnished and mounted under other Divisions, including process instrumentation primary elements, transmitters, local indicators and control panels. Lightning and surge protection equipment wiring at process instrumentation transmitters. Install vendor furnished cables specified under other Divisions.
  - 3. A complete raceway system for the Data Cables and specialty cable systems, including those furnished under other Divisions. Install the Data Cables and other specialty cable systems, in accordance with the system manufacturers' installation instructions. Review the raceway layout, prior to installation, with the Process Control System supplier and the cable manufacturer for raceway compatibility with the systems and materials being furnished. Where redundant cables are furnished, install the cables in separate raceways.
  - 4. Furnish and install precast electrical and instrumentation manholes, handholes and light pole foundations. Pole foundations shall be designed and installed in accordance with the structural Divisions of these Specifications.

1.02 RELATED WORK

- A. Where references are made to the Related Work paragraph in each Specification Section, referring to other Sections and other Divisions of the Specifications, the Contractor shall provide such information or work as may be required in those references, and include such information or work as may be specified.
- B. All raceways, power and control wiring related to Mechanical Division equipment that is shown on the Electrical Drawings, shall be provided under Division 26.

- C. All electrical work provided under any Division of the Specifications shall fully comply with the requirements of Division 26.

#### 1.03 SUBMITTALS

- A. Submit Shop Drawings, in accordance with Division 1 requirements, for equipment, materials and all other items furnished under each Section of Division 26, except where specifically stated otherwise. An individually packaged submittal shall be made for each Section, and shall contain all of the information required by the Section. Partial submittals will not be accepted and will be returned unreviewed.
- B. Submittals will not be accepted for Section 26 00 00 Electrical – General Provisions.
- C. Each Section submittal shall be complete, contain all of the items listed in the Specification Section, and shall be clearly marked to indicate which items are applicable on each cut sheet page. The Submittal shall list any exceptions to the Specifications and Drawings, and the reason for such deviation. Shop drawings, not so checked and noted, will be returned unreviewed.
- D. The Contractor shall check shop drawings for accuracy and contract requirements prior to submittal to the Owner/Engineer. Errors and omissions on approved shop drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by the Specifications and Drawings. Shop drawings shall be stamped with the date checked and a statement indicating that the shop drawings conform to Specifications and Drawings. Only one Specification Section shall be made per transmittal.
- E. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked "APPROVED AS NOTED CONFIRM", "APPROVED AS NOTED RESUBMIT" or "NOT APPROVED".
- F. At the time of jobsite delivery of the equipment, the Contractor shall have an approved shop drawing in his possession for the Owner's Inspector and Owner's Engineer, for verification.
- G. Up-to-date Record Drawings shall be promptly furnished when the equipment installation is complete. Payment will be withheld until Record Drawings have been furnished and approved.

#### 1.04 REFERENCE CODES AND STANDARDS

- A. Electric equipment, materials and installation shall comply with the National Electrical Code (NEC) and with the latest edition of the following codes and standards:
  - 1. National Electrical Safety Code (NESC)
  - 2. Occupational Safety and Health Administration (OSHA)
  - 3. National Fire Protection Association (NFPA)
  - 4. National Electrical Manufacturers Association (NEMA)
  - 5. American National Standards Institute (ANSI)

6. Insulated Cable Engineers Association (ICEA)

7. Instrument Society of America (ISA)

8. Underwriters Laboratories (UL)

9. Factory Mutual (FM)

10. City of Grand Prairie Electrical Code

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

C. All material and equipment, for which a UL standard exists, shall bear a UL label. No such material or equipment shall be brought onsite without the UL label affixed.

D. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents will take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Owner/Engineer.

E. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times

#### 1.05 CODES, INSPECTION AND FEES

A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.

B. Obtain all necessary permits and pay all fees required for permits and inspections.

#### 1.06 SIZE OF EQUIPMENT

A. Investigate each space in the structure through which equipment must pass to reach its final location. Coordinate shipping splits with the manufacturer to permit safe handling and passage through restricted areas in the structure.

B. The equipment shall be kept upright at all times during storage and handling. When equipment must be tilted for passage through restricted areas, brace the equipment in a manner, that tilting does not impair the functional integrity of the equipment..



1.07 RECORD DRAWINGS

- A. As the work progresses, legibly record all field changes on a set of Project Contract Drawings, hereinafter called the "Record Drawings". The Record Drawings and Specifications shall be kept up to date throughout the project.
- B. The Record Drawings shall be reviewed in a meeting with the Owner/Engineer on a monthly basis.
- C. Record Drawings shall accurately show the installed condition of the following items:
  - 1. One line Diagram(s).
  - 2. Raceways and pullboxes.
  - 3. Conductor sizes and conduit fills.
  - 4. Panel Schedule(s).
  - 5. Control Wiring Diagram(s).
  - 6. Lighting Fixture Schedule(s).
  - 7. Lighting fixture, receptacle and switch outlet locations.
  - 8. Underground raceway and duct bank routing.
  - 9. Plan view, sizes and locations of switchgear, distribution transformers, substations, motor control centers and panelboards.
- D. Submit a typical example of a schedule of control wiring raceways and wire numbers, including the following information:
  - 1. Circuit origin, destination and wire numbers.
  - 2. Field wiring terminal strip names and numbers.
- E. As an alternate, submit a typical example of point to point connection diagrams showing the same information, may be submitted in place of the schedule of control wiring raceways and wire numbers.
- F. Submit the record drawings and the schedule of control wiring raceways and wire numbers (or the point to point connection diagram) to the Owner/Engineer.
- G. The Contractor's retainage will not be paid until the point-to-point connection diagrams have been furnished to the Owner / Engineer.

1.08 EQUIPMENT INTERCONNECTIONS

- A. Review shop drawings of equipment furnished under other related Divisions and prepare coordinated wiring interconnection diagrams or wiring tables. Submit copies of wiring diagrams or tables with Record Drawings.
- B. Furnish and install all equipment interconnections.

1.09 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new, except where specifically identified on the Drawings to be re used.
- B. The Contractor shall not bring onsite, material or equipment from a manufacturer, not submitted and approved for this project. Use of any such material or equipment, will be rejected, removed and replaced by the Contractor, with the approved material and equipment at his own expense.
- C. Material and equipment shall be UL listed, where such listing exists.
- D. The Contractor shall be responsible for all material, product, equipment and workmanship being furnished by him for the duration of the project. He shall replace the equipment if it does not meet the requirements of the Contract Documents.

1.10 JOBSITE DELIVERY, STORAGE AND HANDLING

- A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment, an approved copy of all such submittals. Delivery of incomplete constructed equipment, or equipment which failed any factory tests, will not be permitted.,
- B. Equipment and materials shall be handled and stored in accordance with the manufacturer's instructions, and as specified in the individual Specification Sections.

1.11 WARRANTIES

- A. Manufacturer's warranties shall be as specified in each of the Specification Sections.

1.12 EQUIPMENT IDENTIFICATION

- A. Identify equipment (disconnect switches, separately mounted motor starters, control stations, etc.) furnished under Division 26 with the name of the equipment it serves. Motor control centers, control panels, panelboards, switchboards, switchgear, junction or terminal boxes, transfer switches, etc., shall have nameplate designations as shown on the Drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INTERPRETATION OF DRAWINGS

- A. The Drawings are not intended to show exact locations of conduit runs. Coordinate the conduit installation with other trades and the actual supplied equipment.
- B. Install each 3 phase circuit in a separate conduit unless otherwise shown on the Drawings.
- C. Unless otherwise approved by the Owner/Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.
- D. Where circuits are shown as "home runs" all necessary fittings and boxes shall be provided for a complete raceway installation.
- E. Verify the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.
- F. Except where dimensions are shown, the locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Exact locations shall be determined by the Contractor and approved by the Owner/Engineer during construction. Obtain information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Owner/Engineer and furnish all labor and materials necessary to complete the work in an approved manner.
- G. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
- H. Redesign of electrical or mechanical work, which is required due to the Contractor's use of a pre-approved alternate item, arrangement of equipment and/or layout other than specified herein, shall be done by the Contractor at his/her own expense. Redesign and detailed plans shall be submitted to the Owner/Engineer for approval. No additional compensation will be provided for changes in the work, either his/her own or others, caused by such redesign.
- I. Raceways and conductors for lighting, switches, receptacles and other miscellaneous low voltage power and signal systems as specified are not shown on the Drawings. Raceways and conductors shall be provided as required for a complete and operating system. Refer to riser diagrams for signal system wiring. Homeruns, as shown on the Drawings, are to assist the Contractor in identifying raceways to be run exposed and raceways to be run concealed. Raceways installed exposed shall be near the ceiling or along walls of the areas through which they pass and shall be routed to avoid conflicts with HVAC ducts, cranes hoists, monorails, equipment hatches, doors, windows, etc. Raceways installed concealed shall be run in the center of concrete floor slabs, above suspended ceilings, or in partitions as required.
- J. The Contractor shall run all conduit and wire to RTU and/or PLC termination cabinets, where designated on the Drawings. The conduit and wire as shown on the interface drawings may not necessarily be shown on the floor plan.

- K. Install conductors carrying low voltage signals (typically twisted shielded pair cables) in raceways totally separate from all other raceways containing power or 120 volt control conductors.
- L. Raceways and conductors for thermostats controlling HVAC unit heaters, exhaust fans and similar equipment are not shown on the Drawings. Provide raceways and conductors between the thermostats, the HVAC equipment and the motor starters for a complete and operating system. All raceways and power conductors shall be in accordance with Division 26. Raceways shall be installed concealed in all finished space and may be installed concealed or exposed in process spaces. Refer to the HVAC drawings for the locations of the thermostats and controls.
- M. Raceways and conductors for the fire alarm, sound and page party systems are not shown on the Drawings. Provide raceways and conductors as required by the system manufacturer for a complete and operating system. All raceways and power conductors shall be in accordance with Division 26. Raceways shall be installed concealed in all finished spaces and may be installed exposed or concealed in process spaces.

### 3.02 EQUIPMENT PADS AND SUPPORTS

- A. Electrical equipment pads and supports, of concrete or steel including structural reinforcing and lighting pole foundations, are shown on the Structural Drawings.
- B. No electrical equipment or raceways shall be attached to or supported from, sheet metal walls.

### 3.03 SLEEVES AND FORMS FOR OPENINGS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.
- B. Exact locations are required for stubbing up and terminating concealed conduit. Obtain shop drawings and templates from equipment vendors or other subcontractors and locate the concealed conduit before the floor slab is poured.
- C. Where setting drawings are not available in time to avoid delay in scheduled floor slab pours, the Owner/Engineer may allow the installations of such conduit to be exposed. Requests for this deviation shall be submitted in writing. No additional compensation for such change will be allowed.
- D. Seal all openings, sleeves, penetration and slots as specified in Section 26 05 33 Raceways, Boxes, and Fittings for Electrical Systems.

### 3.04 CUTTING AND PATCHING

- A. Coordinate with Divisions 02 and 03 for cutting and patching.
- B. Core drill holes in concrete floors and walls as required. The Contractor shall obtain written permission from the Owner/Engineer before core drilling any holes larger than 2 inches.
- C. Install work at such time, as to require the minimum amount of cutting and patching.

- D. Do not cut joists, beams, girders, columns or any other structural members.
- E. Cut opening only large enough to allow easy installation of the conduit.
- F. Patching shall be of the same kind and quality of material as was removed.
- G. The completed patching work shall restore the surface to its original appearance or better.
- H. Patching of waterproofed surfaces shall render the area of the patching completely waterproofed.
- I. Remove rubble and excess patching materials from the premises.
- J. When existing conduits are cut at the floor line of wall line, they shall be filled with grout of suitable patching material.

### 3.05 INSTALLATION

- A. Any work not installed according to the Drawings and this Section shall be subject to change as directed by the Owner/Engineer. No extra compensation will be allowed for making these changes.
- B. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.
- C. Electrical equipment shall be protected at all times against mechanical injury or damage by water. Electrical equipment shall not be stored outdoors. Electrical equipment shall be stored in dry permanent shelters as required by each Specification Section. Do not install electrical equipment in its permanent location until structures are weather-tight. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and tested as directed by the Owner/Engineer, or shall be replaced at no additional cost, at the Owner/Engineer's discretion.
- D. Equipment, that has been damaged, shall be replaced or repaired by the equipment manufacturer, at the Owner/Engineer's discretion.
- E. Repaint any damage to the factory applied paint finish using touch-up paint furnished by the equipment manufacturer. If the metallic portion of the panel or section is damaged, the entire panel or section shall be replaced, at no additional cost to the Owner.

### 3.06 PHASE BALANCING

- A. The Drawings do not attempt to balance the electrical loads across the phases. Circuits on motor control centers and panelboards shall be field connected to result in evenly balanced loads across all phases.
- B. Field balancing of circuits shall not alter the conductor color coding requirements.

3.07 MANUFACTURER'S SERVICE

- A. Provide manufacturer's services for testing and start-up of the equipment as listed in each individual Specification Section. Monitoring and protective relay settings, including those settings required by the Power System Study, shall be made to the equipment and approved by the Owner/Engineer prior to energizing of the equipment.
- B. Testing and startup shall not be combined with training. Testing and start-up time shall not be used for manufacturer's warranty repairs.

3.08 TESTS AND SETTINGS

- A. Test systems and equipment furnished under Division 26 and repair or replace all defective work. Make adjustments to the systems as specified and/or required.
- B. Prior to energizing electrical equipment, make all tests as required by the individual specification Sections. Submit a sample test form or procedure and submit the required test reports and data to the Owner/Engineer for approval at least two weeks prior to the startup of the tested equipment. Include names of all test personnel and initial each test.
- C. Check motor nameplates for correct phase and voltage. Check bearings for proper lubrication.
- D. Check wire and cable terminations for tightness.
- E. Check rotation of motors prior to energization. Disconnect driven equipment if damage could occur due to wrong rotation. If the motor rotates in the wrong direction, the rotation shall be immediately corrected, or tagged and locked out until rotation is corrected.
- F. Verify all terminations at transformers, equipment, capacitor connections, panels, and enclosures by producing a 1 2 3 rotation on a phase sequenced motor when connected to "A", "B" and "C" phases.
- G. Mechanical inspection, testing and setting of circuit breakers, disconnect switches, motor starters, control equipment, etc for proper operation.
- H. H. Check interlocking, control and instrument wiring for each system and/or part of a system to prove that the system will function properly as indicated by schematic and wiring diagrams.
- I. Check the ampere rating of thermal overloads for motors and submit a typed record to the Owner/Engineer of same, including MCC cubicle location and load designation, motor service factor, horsepower, full load current and starting code letter. If inconsistencies are found, new thermal elements shall be supplied and installed.
- J. Verify motor power factor capacitor ratings.
- K. Testing shall be scheduled and coordinated with the Owner/Engineer at least two weeks in advance. Provide qualified test personnel, instruments and test equipment.
- L. Refer to the individual equipment sections for additional specific testing requirements.

- M. Make adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

END OF SECTION

SECTION 26 00 40  
SYSTEMS PRE-PERFORMANCE CHECKLIST

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

This Section expands on and defines responsibilities of the Contractor regarding Pre-functional Checklists and start-up portions of the Commissioning process and addresses validation of proper and thorough installation of mechanical, plumbing and fire protection systems.

- A. Contractor shall oversee the Commissioning activities with the Contractor's Subcontractors and the Owner.
- B. Contractor shall completely install, thoroughly inspect, start-up, test, adjust and integrate electrical testing on systems and equipment. All activities shall be documented on specific, procedural forms developed for that purpose. Contractor shall notify Owner in writing that systems are complete and ready for verification and Functional Performance Tests.
- C. Completed Pre-functional Checklists for all pieces of equipment shall be submitted to the Owner prior to Functional Performance testing.

1.03 REFERENCE STANDARDS

The latest published edition of ANSI/NETA ATS Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems. All materials, installation and workmanship shall comply with all applicable requirements and standards.

1.04 SUBMITTALS

Pre-functional Checklists, Pre-functional Tests, and Start-up documents are the normal procedure of ensuring that the mechanical, plumbing, and fire protection system components are properly installed.

- A. The Subcontractor in cooperation with the Owner and Contractor shall develop Pre-functional Checklists and Pre-functional Tests during the Construction Phase.
- B. Completeness of Pre-functional Checklists: This Section summarizes the minimum Guideline for systems and equipment checkout. A record of testing and acknowledgement that a procedure has been completed and that it checks out acceptably must be included in the Pre-functional Checklists. The Pre-functional Checklist shall identify in columnar format each



device, location, test method, control sequence of operation reference, device code reported, and other data as appropriate.

- C. Equipment Data Documentation: Provide completed, as-installed, specific product nameplate data, product numbers, serial numbers, etc. to fully define the asset for Owner's use in maintenance management and asset tracking. This data may be incorporated within the Equipment List/Matrix as described in Division 01 as a spreadsheet format or electronic database. In addition to specific manufacturer's name and specific product identifiers such as model number, serial numbers, date of manufacture, etc., the following information shall be included with the equipment data documentation:
  - 1. Capacity data: Where applicable, use equipment schedules on the Drawings as a guideline for fields to be used.
  - 2. Location identifier field for each of the three dimensions (Floor Level, X axis, and Y axis) using the Drawing column grids as the basis for location.
- D. Submit the equipment data documentation with the draft Pre-functional Checklists to the Owner for approval. Owner will review the Pre-functional Checklists and request any additional information required to meet the Commissioning Plan criteria.
- E. Written Certification: The Contractor shall certify that the installation, Start-up, Pre-functional Checklist, and initial operation of the system or component are in accordance with the Contract Documents, Commissioning Plan, and manufacturer's requirements, and that the system is ready for Functional Performance Tests. Any outstanding items or non-conformance shall be clearly indicated and highlighted on the Pre-functional Checklist and an action item shall have been initiated. Refer to Division 01 for specific details on non-conformance issues relating to Pre-functional Checklists.
- F. Refer to Section 26 08 00 – Electrical Systems Commissioning for additional documentation requirements.

## PART 2 PRODUCTS

### 2.01 GENERAL

All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

- A. The Pre-functional Checklist procedures described in this Section provide minimum guidelines for development of Pre-functional Checklists; Start-up procedures, and Pre-functional Tests. Contractor shall prepare the Pre-functional Checklists using these procedures and that of the manufacturer's and/or applicable codes and standards.
- B. The Pre-functional Checklist form shall acknowledge that installation and Start-up procedures were successfully adhered to and completely performed and shall document relevant parameters (panel and equipment connections, measured values, ground faults, trip settings, etc.). When indicated as performing a checkout on multiple items or multiple procedure items, Pre-functional Checklist forms shall itemize each individual item.

## 2.02 TEST EQUIPMENT

Refer to Section 26 08 00– Electrical Systems Commissioning.

## PART 3 EXECUTION

### 3.01 PRE-FUNCTIONAL CHECKLIST PROCEDURES

#### A. Thermographic Scanning:

1. Contractor shall provide thermographic scanning on all switchgear and distribution boards. In general, the thermographic scanning shall be made when the equipment is energized and is operating at its normal capacity. It is intended that the scan be made after the equipment has been in full operation; however, the Contractor near the completion of the Project will determine the exact time of conducting the scan. Some scanning for occupant-created load shall be performed during the Warranty Period as a Deferred Test.
2. Test equipment, miscellaneous tools, and materials shall be transported properly, moved, and set up by trained personnel. Equipment used in testing shall be capable of performing all recommended procedures required by the apparatus and related equipment. All test equipment shall have certification of calibration and be in working order.
3. All hot spots shall be marked, identified, and an infrared thermographic scanning report prepared and furnished to the Owner.
4. The report shall contain infrared photos of trouble spots with temperature readings.
5. The Contractor shall promptly report all sources of heating problems to the Owner for corrective action.

#### B. Grounding Systems:

1. Perform three-point fall-of-potential test per Institute of Electrical and Electronics Engineers (IEEE) Standard 81 on the main grounding electrode or system. Resistance shall be no greater than 5 ohms.
2. Perform the two-point method test per IEEE Standard 81 to determine the ground resistance between the main ground system and all major electrical equipment frames, system neutral, and/or derived neutral points. Resistance shall be no greater than 5 ohms.

#### C. AC Motors – General Across Systems:

1. Verify proper alignment, installation, and rotation.
2. Measure the insulation resistance, phase balance, and resistance to ground. This measurement will generally be the responsibility of the electrical contractor who is connecting the motor. Correction of any deficiencies will be the responsibility of the motor supplier. Where the electrical contractor wires to a single point of a packaged device that is shipped with multiple motors, electrical contractor shall check all motors in the package, in the presence of the owner.

3. Verify that properly sized overloads are in place, per equipment manufacturer's recommendation.
  4. Measure voltage available to all phases at time of initial connection and again after motor has been placed in operation under load measure amps and RPM.
  5. Record all motor nameplate data.
- D. High Voltage Primary Service Feeders:
1. Start-up checklists: Perform the following final checks before Start-up:
    - a. Inspect underground duct banks.
    - b. Inspect cable and perform field testing on reels.
    - c. Inspect splicing and terminations.
  2. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
    - a. Visually and mechanically inspect to include the following: Exposed cable, compression type terminations, splices where approved by the Engineer and the Owner, and fire proofing in manholes, cable vaults, etc.
    - b. Correct color code identification and phasing arrangements.
    - c. Perform shield continuity test.
    - d. Perform insulation resistance test on new and existing cables.
    - e. Perform high potential test on new cables only.
- E. High Voltage Primary Disconnect and Grounding Switches:
1. General: Provide the services of a factory trained manufacturer's representative to assist the Contractor in the installation and start up service of the equipment and to train Owner's personnel as specified.
  2. Start-up checklists: Perform the following final checks before Start-up:
    - a. Inspect incoming power cable terminations.
    - b. Inspect transformer connections.
    - c. Inspect grounding.
    - d. Inspect electrical interlock wiring.
  3. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
    - a. Visually and mechanically inspect to include the following: anchoring, grounding, oil level, torque of bus and cable connections, and mechanical operation of switch and operating mechanisms.
    - b. Perform contact resistance test.
    - c. Conduct and review oil sample tests.
    - d. Perform insulation resistance tests on switch and control wiring.
    - e. Perform electrical and mechanical (key) interlock system operations.
- F. High Voltage Transformer:

1. Provide the services of a factory trained manufacturer's representative to assist the Contractor in the installation and start up service of the equipment and to train Owner's personnel as specified.
2. Start-up checklists: Perform the following final checks before Start-up:
  - a. Inspect primary and secondary power connections.
  - b. Inspect control interconnections.
  - c. Inspect grounding.
3. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
  - a. Visually and mechanically inspect to include the following: vibration isolation, anchoring, grounding, installation verification using manufacturer's checklist, flexible bus connections, torque of bus and cable connections, and tap changer operation.
  - b. Verify operation of temperature controls/alarms.
  - c. Perform winding insulation tests.
  - d. Conduct turns ratio test.
  - e. Perform power factor/dissipation test on windings and bushings.
  - f. Perform high voltage and low voltage winding and core resistance measurements.
  - g. Check and confirm percentage of impedance is identical for all three transformers comparing nameplates.

G. 600V Network Protectors/480V Secondary Distribution:

1. Provide the services of a factory trained manufacturer's representative to assist the Contractor in the installation and start up service of the equipment and to train Owner's personnel as specified.
2. Start-up checklists: Perform the following final checks before Start-up:
  - a. Inspect transformer connections.
  - b. Inspect 600V disconnect connections.
  - c. Inspect grounding.
  - d. Validate protector element installation (furnished loose).
  - e. Verify control interconnections.
  - f. Check calibration/setting of protective devices from system coordination study.
  - g. Verify calibration/setting of digital metering.
3. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
  - a. Visually and mechanically inspect to include the following: anchoring, grounding, torque of bus/cable connections, operational check of draw-out mechanism, manual/electrical trip/close operations, contact closure using slow closing method, arc chute inspection, and installation verification using manufacturer's checklist.
  - b. Correct current transformer ratios.

END OF SECTION

SECTION 26 05 19  
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install, complete and ready for operation, electrical conductor systems as shown on the drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit shop drawings and product data as per Division 1 - General Provisions, showing all details of materials.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviations shall also be clearly marked in a separate color in submittals.

1.03 CONDUCTOR COLOR CODING

- A. Color-coding of multi-conductor control and instrumentation cable is specified in the individual cable type specification.
- B. For power conductors, provide all single conductors power cables with integral insulation pigmentation of the designated colors, except conductors larger than No. 6 may be provided with color-coding by wrapping the conductor at each end and at all accessible locations with vinyl tape. Where this method of color-coding is used, wrap at least six full overlapping turns of tape around the conductor covering an area 1-1/2 to 2 inches wide at a visible location.
- C. Phase A, B, and C implies the direction of positive phase rotation.
- D. Use Owner's current color scheme. If Owner does not have a consistent color scheme use the following:

Use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts	Grounded Neutral	White
1-Phase, 3-Wire	One Hot Leg	Black
	Other Hot Leg	Red

208Y/120 Volts	Grounded Neutral	White
3-Phase, 4-Wire	Phase A	Black
	Phase B	Red
	Phase C	Blue
480Y/277 Volts	Grounded Neutral	Gray
3-Phase, 4-Wire	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow

## PART 2 PRODUCTS

### 2.01 GENERAL

- A. Use the manufacturer's name, model or catalog number, if for the purpose of establishing the standard of quality and general configuration desired only.
- B. Splices are not acceptable on this project, except at light fixtures and receptacles.

### 2.02 CONDUCTORS - 600 VOLTS

- A. Single Conductors 600 Volts and Below:
  - 1. Unless otherwise indicated, all conductors shall be copper and shall be stranded. Solid conductors shall not be used. All conductors with the exception of grounding conductors shall be standard copper.
  - 2. Utilize only conductors meeting applicable requirements of UL 44, UL 1685, IECA S-95-658 (NEMA WC70).
  - 3. Provide conductors with type XHHW-2 insulation.
  - 4. Unless noted otherwise, conductor sizes indicated are based on copper conductors. Do not provide conductors smaller than those indicated.
  - 5. Where flexible cords and cables are specified, provide Type STJO, 600 volt, with the number and size of copper conductors indicated.
  - 6. Single Pair (600 Volt No. 16 AWG Twisted, shielded Pair Instrumentation Cable, Type TC):
    - a. General: Single pair instrumentation cable designed for noise rejection for process control, computer, or data log applications. Suitable for installation in cable trays, conduit, or other approved raceways. Minimum cable temperature rating shall be 90° C dry locations, 75° C wet locations.

- b. Individual Conductors: Soft annealed copper, Class B, 7-strand concentric per ASTM B8, 22 AWG, 7-strand copper tinned drain wire.
  - c. Insulation and Jacket: Each conductor XHHW-2. Pair conductors pigmented black and white. Jacket flame-retardant and sunlight and oil resistant PVC with 45 mils nominal thickness. Shield aluminum/Mylar overlapped to provide 100 percent coverage.
  - d. Dimension: 0.30 inch nominal OD.
  - e. Manufacturers: Alpha Wire Corporation, Belden, General Cable, the Okonite Company.
- 7. Single Triad (600 Volt No. 16 Twisted, Shielded Triad Instrumentation Cable, Type TC):
  - a. General: Single triad instrumentation cable designed for noise rejection for process control, computer, or data log applications. Suitable for installation in cable tray, conduit, or other approved raceways. Minimum cable temperature rating shall be 90° C dry locations, 75° C wet locations.
  - b. Conductors: Soft annealed copper, Class B, 7-strand concentric per ASTM B8, 22 AWG, 7-strand copper tinned drain wire.
  - c. Insulation and Jacket: Each conductor, XHHW-2 insulation. Triad conductors pigmented black, red, and white. Jacket flame-retardant and sunlight and oil retardant PVC with 45 mils nominal thickness. Shield aluminum/Mylar, overlapped to provide 100 percent coverage.
  - d. Dimensions: 0.32-inch nominal OD.
  - e. Manufacturers: Alpha Wire Corporation, Belden, General Cable, the Okonite Company.
- 8. Equipment Grounding Conductors:
  - a. Provide stranded tin copper conductors, as indicated or as required by NEC, for equipment grounding. All grounding conductor shall be stranded copper.
  - b. Provide conductors with green Type XHHW insulation with a minimum thickness of 1/32-inch.

B. Multi-conductors, Multi-pairs, or Multi-triads not acceptable.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii. Pulling compound shall be used. Use only UL listed compound compatible with the cable outer jacket and with the raceway involved.
- B. Contractor is to provide and install all low voltage (120V, 208V, 480V, etc.) distribution equipment and hardware associated with this project as shown on the plan drawings.
- C. Tighten screws and terminal bolts using torque type wrenches, and/or drives, to tighten to the inch-pound requirements of the NEC and UL.
- D. Where single conductors and cables in manholes, handholes, vaults, and other indicated locations are not wrapped together by some other means such as arc and fireproofing tapes,

bundle throughout their exposed length conductors entering from each conduit with nylon, self-locking, releasable, cable ties placed at intervals not exceeding 12 inches on centers.

3.02 CONDUCTOR - 600 VOLTS AND BELOW

- A. Provide conductor sizes as indicated on the drawings with 600V rated insulation.
- B. Minimum size for control shall be #14 for individual wire and #16 TSP, TST. Minimum size for power cables shall be #12. Provide only single pair and triad, multi-pair and triad not acceptable.
- C. Use silicone filled pressure connectors. Place no more than one conductor in any single-barrel pressure connection.
- D. Motors connector shall be crimp connectors or kernys varnish carbonic C130.
- E. Soldered mechanical joints insulated with tape will not be acceptable.
- F. Vinyl plastic insulating tape for wire and cable splices and terminations shall be flame retardant, 8.5-mil thick minimum, rated for 105°C minimum meeting the requirements of UL 510. Acceptable product 3M-Scotch 88.
- G. Provide terminals and connectors acceptable for the type of material used.
- H. Arrange wiring in cabinets, panels, and motor control centers neatly cut to proper length. Remove surplus wire, and bundle and secure in an acceptable manner. Identify circuits entering motor control centers or other control cabinets in accordance with the conductor identification system specified herein.
- I. Terminate control and instrumentation wiring with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions. Where terminals provided will accept such lugs, terminate control and instrumentation wiring (except solid thermocouple leads) with insulated, locking-fork compression lugs, Thomas & Betts, Sta-Kon, or equal.
- J. For terminals designed to accept only bare wire compression terminations, use only stranded wire, and terminate only one wire per terminal. Tighten terminal screws with torque screwdriver to recommended torque values.
- K. Attach compression lugs with a tool specifically designed for that purpose which provides a complete, controlled, crimp where the tool will not release until the crimp is complete. Use of plier type crimpers is not acceptable.
- L. Cap spare conductors and conductors not terminated with UL listed end caps.
- M. Where conductors pass through holes or over edges in sheet metal, remove all burrs, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.
- N. For conductors that will be connected by others, provide at least 6 feet spare conductor in freestanding panels, and at least 2 feet spare in other assemblies. Provide more spare conductor



in any particular assembly where it is obvious that more conductor length will be needed to reach the termination point.

### 3.03 CABLES

- A. Do not splice without permission of the Engineer. Locate splices, when permitted, only in readily accessible cabinets or junction boxes using terminal strips.
- B. Where connections of cables installed under this section are to be made to instrumentation and controls, leave pigtails of adequate length for neat bundled type connections.
- C. Maintaining the integrity of shielding of instrumentation cables is essential to the operation of the control systems. Take special care in cable installation to ensure that grounds do not occur because of damage to the jacket over the shield.
- D. Cable Placement:
  - 1. Immediately prior to the placement of each cable or cable group, inspect the raceway to determine that installation is complete and that the interior is clean and free of all materials detrimental to the cable or its placement. Group all cable assigned to a particular conduit and pulled simultaneously, using cable grips and acceptable lubricants.
  - 2. Provide adequately sized raceways to accommodate the number and size of cable as specified, and in compliance with Article 300 of the National Electric Code. If at any time during the progress of the work raceways appear inadequate to accommodate the assigned cable, notify the Engineer/Owner at once and discontinue further work on the questionable raceway until advised by the Owner as to how to proceed.
  - 3. Carefully check all cable as to size and length before pulling into conduits. Remove and replace cable pulled into the wrong conduit or cut too short at no additional cost to the Engineer/Owner. Do not pull cable removed from one conduit or duct into another conduit or duct without permission of the Engineer/Owner.
  - 4. Fishing and pulling shall be performed with flexible round non-metallic tape, carbon dioxide, or forces air propelled. Polyethylene cord, nylon rope, or manifold rope. No metallic cable or material that may damage or scratch the inside surface shall be pulled into any conduit.
- E. Use woven wire cable grips to pull all low voltage single conductor cable, No. 2/0 and larger and all low voltage multi-conductor cable. Use pulling loops to pull single conductor cable smaller than No. 2/0. When a cable grip is used for pulling, the arc of the cable covered by the grip plus 6-inches shall be cut off and discarded.
- F. Insert a reliable non-freezing type of swivel or swivel connection between the pulling ropes and the cable eye, or grip to prevent twisting under strain.
- G. Do not exceed the maximum pulling tension recommended by the cable manufacturer. Pulling mechanisms of both the manual and power types shall have the rated capacity in tons clearly marked on the mechanism. Whenever the capacity of the pulling mechanism exceeds the recommended pulling tension of the cable as given by the cable manufacturer, a dynamometer

shall be used to show the tension on the cable, and the indicator shall be constantly watched. If any excessive strain develops, stop the pulling operation at once and determine and correct the difficulty.

3.04 CONDUCTOR ARC AND FIREPROOFING TAPES

- A. Use arc and fireproofing tapes on 600 volt single conductors and cables, except those rated Type TC, throughout their entire exposed length at splices in manholes, handholes, vaults, and other indicated locations.
- B. Wrap together as a single cable conductors entering from each conduit.
- C. Follow tape manufacturer's installation instructions. Secure the arc and fireproofing tape at frequent intervals with bands of the specified glass cloth electrical tape. Make each band of at least two wraps of tape directly over each other.
- D. Arc and Fireproofing tape shall be 3M Scotch #77 or equal.

3.05 FIELD TESTS

- A. Instrumentation Cables: After instrumentation cable installation and conductor termination by the instrumentation and control supplier, perform tests witnessed by the Engineer to ensure that instrumentation cable shields are isolated from ground, except at the grounding point. Remove improper grounds.
- B. Pulling tension shall be recorded for all cable runs longer than 200ft.

END OF SECTION

SECTION 26 05 26  
GROUNDING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install grounding and bonding equipment for the electrical system. It is the intention of this specification that all electrical equipment be grounded. Furnish labor, materials, equipment and incidentals necessary to install a complete grounding system in strict accordance with Article 250 of the National Electrical Code (NEC) as shown on the drawings or as specified herein. Electrical work shall be in accordance with Division 26, GENERAL ELECTRICAL REQUIREMENTS.

1.02 REFERENCE STANDARDS

- A. The following standards shall apply as if written here in their entirety:
  - 1. ANSI/IEEE Standard 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
  - 2. ANSI/UL 467 - Grounding and Bonding Equipment.
  - 3. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submittal shall be in accordance with Division 1 and shall include:
  - 1. Grounding materials, equipment and processes.
  - 2. Product Data: For each type of product supplied.
  - 3. Field quality-control test reports.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

1.05 JOB CONDITIONS

- A. Measure the ground grid resistance with the earth test megger and install additional ground rods and conductors as required until the resistance to the ground conforms to National Electrical Code requirements. Ground resistance measurement shall not exceed 5 ohms.

PART 2 PRODUCTS

2.01 GROUND RODS

- A. Material: GROUND RODS: 304 Stainless Steel, having a diameter of 3/4" and a minimum length of 10'.
- B. Listing: UL 467

2.02 GROUND CABLES

- A. Stranded, bare tinned copper of 98% conductivity and as specified in Section 26 05 19 600 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.

2.03 CONDUIT GROUND FITTINGS

- A. Fittings for bonding ground cable to the conduit shall be FCI Burndy Corp., type NE or Thomas & Betts No. 3951 series.

2.04 GROUND ROD BOXES

- A. Precast Box with cast iron lid. Lid shall read "ground rod" on lid. Brooks Precast Model. "3-RT" or approved equal. Ground rod boxes located in driveway areas shall have an AASHO H-20 rating.

2.05 GROUND PLATE ELECTRODES

- A. 20 gauge copper with terminated two (2) foot welded pigtail connection.

2.06 CONNECTIONS

- A. Type:
  - 1. Unless otherwise noted, provide exothermic weld typed for all non-accessible and below-grade connections.

2. For above grade connections provide bonds and clamps of a nonferrous material which will not cause electrolytic action between the conductor and the connector.

B. Listing: UL 467

C. Acceptable Manufacturers:

1. Below grade:
  - a. Cadweld
  - b. Thermoweld
2. Above grade:
  - a. Burndy
  - b. IlSCO
  - c. Erico
  - d. OZ/Gedney
  - e. T & B

## 2.07 CERTIFICATION

- A. Contractor shall receive from the manufacturer proper training prior to execute the exothermic weld connection.

## 2.08 WIRING

- A. Provide copper insulated conductors for bonding jumpers. All insulated grounding conductors shall be copper, stranded.
  1. Provide 600-volt insulated conductors having a green-colored XHHW insulation for equipment grounding conductors or green heat shrink over XHHW insulation in accordance with NFPA 70E.
  2. Ground conductors shall be protected in conduit where subject to physical damage.
  3. All exposed ground conductors shall be installed in conduits.

## 2.09 GROUND BUS

- A. Round-edge tin plated copper bar with 98 percent International Annealed Copper Standard (IACS) conductivity.
- B. Size the bus for not less than 25 percent of the cross-sectional area of the related feeder.
- C. A minimum ground bus size of 3-inch by 2 inches is required.

## 2.10 GROUNDING FOR INSTRUMENTATION SYSTEM

- A. Ground Loop for instrumentation system shall be grounded at only one point to the building ground system.

2.11 GROUND LOOP

- A. All ground loop conductor shall be tin plated bare copper minimum wire size shall be #4/0 unless otherwise noted.
- B. Any wire coming off the ground loop and exposed to the atmosphere/non-buried to be in accordance with paragraph 2.8.

PART 3 EXECUTION

3.01 SYSTEM GROUND

- A. System Neutral:
  - 1. Where a system neutral is used, ground the system neutral conductor as required by NEC Article 250.
  - 2. Ground the system neutral only at the point of service and isolate it from ground at all other points in the system.
- B. Separately Derived Systems: Ground neutrals of separately derived systems such as generators, transformers, etc., in accordance with NEC 250-30.
- C. Size: Size the system grounding conductors to comply with NEC Table 250-66, unless shown larger.

3.02 EQUIPMENT GROUND

- A. Raceway Systems and Equipment Enclosures:
  - 1. Ground cabinets, junction boxes, outlet boxes, motors, controllers, raceways, fittings, switchgear, transformer enclosures, handrail, stair, steel pipe and other equipment and metallic enclosures.
  - 2. Ground equipment and enclosures to the continuous-grounded, metallic raceway system in addition to any other specific grounding shown.
  - 3. Provide bonding jumpers and ground wire throughout to ensure electrical continuity of the grounding system.
  - 4. Provide grounding-type insulated bushings for metal conduits terminating in equipment enclosures containing a ground bus and connect the bushing to the ground bus.
  - 5. Provide green insulated equipment grounding conductor for each feeder, power branch circuit, receptacle branch circuit and lighting branch circuit.
  - 6. Raceways shall not be used for equipment ground. Provide individual equipment ground wires for all equipment even if not shown on plans.

7. Provide bonding jumper and bonding bushing on each metallic conduit entering or leaving the enclosure of the service equipment.
8. Where grounding conductors are shown, bond the wires to metallic enclosures at each end and to intermediate metallic enclosures. Connect grounding conductors to grounding bushings on raceway. Where any equipment contains a ground bus, extend and connect grounding conductors to that bus. Run ground conductor inside conduits enclosing the power conductors.
9. Make connections of any grounding conductors to all motors and equipment by solderless terminal and a 5/16-inch minimum bolt tapped to the motor frame or equipment housing. Grounding clips mounted directly on the box, or with 3/8-inch machine screws. Completely remove all paint, dirt, or other surface coverings at grounding conductor at connection points so that good metal-to-metal contact is made.
10. Ground metal sheathing and any exposed metal vertical structural elements of buildings. Ground metal fences enclosing electrical equipment. Bond any metal equipment platforms which support electrical equipment to that equipment. Provide good electrical contact between metal frames and railings supporting pushbutton stations, receptacles, instrument cabinets, etc., and raceways carrying circuits to these devices.
11. Bond neutrals of transformers to the system ground network, and to any additional indicated grounding electrodes.

**B. Size:**

1. When grounding and bonding conductors are not sized on drawings, size the grounding conductors in accordance with NEC Table 250-122.
2. Size bonding jumper so that minimum cross-sectional area is greater than or equal to that of the equivalent grounding conductor as determined from NEC Table 250-122.

- C.** Install sufficient ground rods in addition to those shown, or code required grounding so that resistance to ground as tested by standard methods does not exceed 1 ohm. Where more than one rod is required, install rods at least 6 feet apart.

**3.03 GROUND CONNECTIONS**

- A.** Unless shown otherwise, make connections of grounding conductors to ground rods at the upper end of the rod with the end of the rod and the connection point below finished grade.
- B.** Make connections of sections of outdoor ground mats (counterpoise) for substations or other equipment underground. Make connections of other grounding conductors generally accessible.
- C.** When making thermite welds, wire blush or file the point of contact to a bare metal surface. Use thermite welding cartridges and molds in accordance with the manufacturer's recommendations. After welds have been made and cooled, brush slag from the weld area and thoroughly clean the joint. For compression connectors, use homogeneous copper, anti-corrosion, surface treatment compound at connectors in accordance with connector manufacturer's recommendations. Use

connectors of proper size for conductors and ground rods specified. Use connector manufacturer's compression tool. Notify Engineer prior to backfilling any ground connections.

3.04 FIELD TEST

- A. The testing shall be performed in accordance with Division 16.

END OF SECTION



SECTION 26 05 29  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified Professional Engineer licensed in the state where the project shall be built, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension and shear force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of 3 times the applied force.

1.03 SUBMITTALS

- A. Product Data: 316 stainless steel slotted support systems.
- B. Record data: Signed and sealed by a qualified Professional Engineer Licensed in the state where the project is constructed. Show fabrication and installation details and include calculations The dead load, live load, wind and allowable capacity for the following:
  - 1. Trapeze hangers. Include Product Data for components.
  - 2. Type 316 stainless steel slotted channel system and all bolts to be type 316ss.
  - 3. Equipment supports and connections detail.
  - 4. Sealed drawings will be required upon Engineer request.
- C. Welding certificates.
- D. Field Test Report.
- E. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.

- F. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.

1.04 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Use only stainless steel 316 components for support, anchorage and attachment components.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  - 2. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported.
- E. Structural Steel for Fabricated Supports and Restraints: 316 Stainless Steel only.

- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Adhesive Anchor Systems: Wedge-type 316 Stainless Steel, for use in hardened portland cement concrete, with tension and shear capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Hilti Inc. only.
  2. Clamps for Attachment to Steel Structural Elements: 316 Stainless Steel, type suitable for attached structural element.
  3. Through Bolts: Structural type, hex head, and high strength. 316 Stainless Steel Toggle Bolts: 316 Stainless Steel.
  4. Hanger Rods: 316 Stainless Steel.
- G. Cast aluminum one-hole clam conduit supports are not acceptable.

## 2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 5 Section "Metals" for 316 Stainless Steel shapes and plates.
- C. All outdoor equipment rack shall be provided with canopy to protect the equipment for being overheated by the sun. Canopy shall extend at a minimum 1 foot in front of the equipment enclosure. Canopy shall be made of 1/2" thick aluminum plate minimum, unless otherwise noted in the contract drawing.

## PART 3 EXECUTION

### 3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for conduit as required by NECA 1 Table 1 when the maximum spacing is less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with 316 Stainless Steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
- D. Secure raceways and cables to these supports with two-bolt conduit clamps.

- E. 316 Stainless Steel clamps designed for supporting single conduits may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. All supports and fastening devices shall be stainless steel 316.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 300 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To New Concrete: Adhesive Anchor Bolt.
  - 2. To Masonry: Wedge type expansion anchors on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 3. To Existing Concrete: Adhesive Anchor System provided with lock washers and nuts shall be used in existing normal weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete slabs or wall less than 4 inches thick.
  - 4. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panel boards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint wind strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations to avoid reinforcing bars.

### 3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 5 Section "Metals" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 6 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 4000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
  - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 3. Install anchor bolts according to anchor-bolt manufacturers written instructions.

3.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 9 "Finishes" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

3.06 INSTALLATION

- A. Mounting Stands: Field mounted disconnects, pushbutton control stations, etc, shall be mounted on stainless steel or aluminum stands as shown on the Drawings. Where clearance requirements for stands may not be maintained, the Engineer may direct equipment to be wall-mounted adjacent to the drive, but in no case shall the distance from the drive motor to the control station exceed 3-ft.

END OF SECTION

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SECTION 26 05 33.13  
RACEWAYS

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section specifies the furnishing and installation of electrical raceway systems.

1. Conduit:
  - a. Rigid aluminum conduit.
  - b. PVC-coated rigid aluminum conduit.
  - c. Liquid-tight flexible metal conduit.
  - d. PVC Schedule 80 conduit.
2. Wireways.

1.02 REFERENCE STANDARDS

A. The following standards shall apply as if written here in their entirety:

1. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC)
2. UL 1 - Safety Standard for Flexible Metal Conduit
3. UL 5 - Safety Standard for Surface Metal Raceways and Fittings
4. UL 651 - Standard for Schedule 40 and Schedule 80 Rigid PVC Conduit and Fittings
5. UL 870 - Safety Standard for Wireways, Auxiliary Gutters, and Associated Fittings
6. NEMA RN 1 - PVC Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing
8. UL 6 and 614 - Electrical Rigid Metal Conduit
9. UL 360 - Liquid-tight Flexible Steel Conduit
10. UL 467 - Electrical Grounding and Bonding Equipment
11. NFPA 70 - National Electrical Code
12. NFPA 70E - Standard for Electrical Safety in the workplace.

1.03 SUBMITTALS

A. Submit to the Engineer, in accordance with Division 1, detailed catalog information or drawings describing electrical and physical characteristics of all equipment specified.

- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Rigid Aluminum Conduit:
  - 1. Conduit: Rigid copper free aluminum (alloy 6063-T1) conduit (RAC).
  - 2. Fittings: For RAC use threaded aluminum.
  - 3. Listing: UL 6A.
  - 4. Acceptable RAC Manufacturers: Allied Tube and Conduit, Consolidated Aluminum Corporation, Kaiser, V.A.W., Reynolds or SAPA Aluminum.
  - 5. Acceptable Fittings Manufacturers: Appleton, Crouse-Hinds, Midwest, OZ/Gedney, Raco and listed conduit manufacturers.
- B. PVC-Coated Rigid Aluminum Conduit:
  - 1. Conduit: Rigid aluminum conduit plus a factory-applied, 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal and 2 mil polyurethane coating on the inside.
  - 2. Fittings: Same as aluminum conduit fittings plus a factory-applied, 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal.
  - 3. Listing: UL 6.
  - 4. Acceptable Conduit and Fittings Manufacturers: Killark, KorKap, OCAL, Perma-cote, Plasti-bond and Robroy Industries.
- C. Liquid-tight Flexible Metal Conduit:
  - 1. Conduit: Spiral-wound, square-locked, aluminum plus a bonded outer jacket of PVC.
  - 2. Fittings: Compression sealed type aluminum.
  - 3. Listing: UL 467 for fittings.



4. Acceptable Conduit Manufacturers: Allied tube and Conduits, Anaconda, Anamet, Liquatite.
  5. Acceptable Fittings Manufacturers: Appleton, Crouse-Hinds, Midwest, OZ/Gedney, Raco, and listed conduit manufacturer.
- D. PVC Schedule 80 Conduit:
1. Non-metallic rigid conduit made of polyvinyl chloride (PVC) manufactured in accordance with the National Electrical Code UL 651 and NEMA TC-2.
  2. Fittings shall also be non-metallic.
  3. Acceptable conduit and fittings manufacturers: Allied Tube and Conduit, Carlon, CertainTeed Products, Electri-Flex, and Heritage Plastics Central.
- E. Explosion Proof Seal and Fitting
1. Conduit seal: Explosion proof, aluminium conduit filling with fiber and compound as defined by NEC Article 500 and as manufactured by Crouse -Hinds or Appleton.
  2. Explosion proof fittings: aluminium fittings; flexible coupling to match the hazard as defined by NEC Article 500 and as manufactured by Appleton or Crouse-Hinds.
- F. Bushing: High impact, thermosetting, phenolic insulation; 150 degrees C; as manufactured by Appleton "BBUH", Blackburn, or OZ Gedney type A.
- G. Ground bushings: Conduit grounding bushings shall consist of an insulated throat conduit bushing with an attached aluminum set screw lug. Grounding bushing shall comply with Fed. Spec. W-F-408, UL Standards 514B and 467, and shall be Crouse Hinds Lazy Lug, O-Z Gedney or approved equal.
- H. Locknuts: Stainless Steel as manufactured by Appleton.
- I. Hubs:
1. Cast aluminum, with broad flat surfaces with gripping teeth on both sides of conduit entry. Hub portion on exterior side of entry shall contain "O" ring for watertight seal of conduit entry. Hubs shall be Myers Hub, Appleton or Efcor.
- J. Conduit through-wall and floor seal: PVC coated malleable iron body with oversized sleeves, sealing ring, pressure clamp and rings and sealing grommet; hex head cap screw, as manufactured by OZ Gedney, type FSK.
- K. Smoke and fire seals: Material shall be intumescent, one (1) part (requiring no mixing) and capable of expanding up to a minimum of eight (8) times. Material shall be U.L. classified with a fire rating equal to or greater than the penetrated number. Products to be in caulk, putty, wrap strip, sheet, or access kit foam and shall be 3M "Fire Barrier".
- L. Conduit drains: Conduit drains shall be Crouse Hinds ECD Universal, or approved equal.

- M. Expansion Joints: Aluminum with internal grounding. Shall be provided with an external bonding jumper for conduits 4" and above. Expansion joint shall be SAXJG by Cooper Crouse-Hinds or equivalent by OZ Gedney.
- N. Threaded nipples: As manufactured by Allied, Triangle or Steel Duct. Conduit nipples shall have two (2) independent sets of threads. Running threads shall not be used. Utilize the conduit union when joining two (2) fixed conduits in a continuous aluminum run.
- O. Escutcheons: Chrome-plated, sectional floor and ceiling plates, as manufactured by Crane No. 10.
- P. Accessories: Reducers, washer, etc., shall be stainless steel.
- Q. End Bells: PVC as manufactured by Carlon or equal by Cantex.

### PART 3 EXECUTION

#### 3.01 CONDUIT AND FITTINGS

- A. Minimum Trade Size: 3/4 inch, except that 1/2-inch flexible metal conduit may be used in lengths not exceeding 72 inches for tap conductors supplying lighting fixtures and for switch legs. The minimum size for underground conduit shall be 1½" inch.
- B. Conduit sizes, where not indicated, shall be N.E.C. code-sized to accommodate the number and diameter of wires to be pulled into the conduit.
- C. Plastic coated metallic conduit lengths shall be joined with threaded metallic coupling that shall be each equipped with a 40 mil thickness sleeve that shall extend over the threads of the joined conduit. Each joint shall be watertight.
- D. Conduit runs made in concrete pours or surface-mounted runs that are attached to the structure, shall be equipped with an expansion/deflection fitting where they cross an expansion joint, and at every 100 feet.
- E. All conduit runs shall be watertight over their lengths of run. Slope conduits such that they drain, and install drain fitting as required to remove condensation from the conduit.
- F. Install a drain fitting for all conduits subject to condensation. Condensation water shall never enter electrical or instrumentation enclosure.
- G. Plastic jacketed flexible metal conduit shall be used to connect wiring to motors, limit switches, bearing thermostats, and other devices that may have to be removed for servicing. Unless otherwise indicated, maximum lengths of flex shall be thirty (30") inches.
- H. All raceways shall be swabbed clean after installation. There shall be no debris left inside. All interior surfaces shall be smooth and free from burrs and defects that would injure wire insulation. Coordinate approval of cleanliness with the Owner's Representative.
- I. Application of Conduit Types:

1. All underground conduit including conduits under a concrete slab shall be PVC and shall be concrete encased. Raceway shall be as specified under Section 16360 Underground Duct Banks.
  2. Provide PVC coated rigid aluminum conduit bends for all PVC conduits bends. Only factory bended long sweep elbow are acceptable.
  3. Exposed conduits inside dry ventilated areas, outdoors in non-corrosive atmosphere shall be rigid aluminum. Aluminum shall not come in contact with concrete at any point.
  4. Exposed conduits in areas where chemicals are stored, handled, or utilized the conduit shall be PVC coated aluminum.
  5. Exposed conduits in high humidity, non-ventilated areas, constant or frequency wet areas, corrosive atmosphere areas the conduit shall be PVC coated aluminum.
  6. At the transition from PVC to rigid aluminum conduit, provide a 12" section of PVC coated aluminum conduit with a minimum of 6-inches into the concrete. The PVC coated aluminum conduit shall be per the specification, field wrapping or applying by spray shall not be acceptable.
  7. PVC coated conduit and fittings shall be installed per Manufacturer's specifications, Contractor shall trained by the Manufacturer, and evidence of training shall be available at all times. Field bending of conduit not acceptable. All fittings shall be sealed by Manufacturer recommended PVC Compound.
- J. Holes for raceway penetration into sheet metal cabinets and boxes shall be accurately made with an approved tool. Cutting openings with a torch or other device that produces a jagged, rough cut will not be acceptable.
- K. Preparation:
1. Place conduit or sleeves in the forms of walls and floor slabs for the free passage of wire or conduits.
  2. Set conduit or sleeves in place a sufficient time ahead of concrete placement so as not to delay the work.
  3. Apply sealing methods for sleeves through floors and through exterior walls, per details shown on plans.
  4. Plugs or caps shall be installed before concrete placement begins.
- L. Installation Requirements:
1. Metallic Conduits:
    - a. Continuous between enclosures such as outlet, junction and pull boxes, panels, cabinets, motor control centers, etc.
    - b. The conduit must enter and be secured to enclosures so that each system is electrically continuous throughout.

- c. Where knockouts are used, provide hub.
  - d. At conduit terminations, provide insulated bushings for conductor protection.
  - e. Where conduits terminate in equipment having a ground bus, such as in switchgear, motor control centers and panelboards, terminate conduit with an insulated grounding bushing and extend a suitable grounding wire to the ground bus.
  - f. Hubs of the same material shall be used at conduit termination.
2. Run concealed conduit as directly and with the largest radius bends as possible.
  3. Run exposed conduit parallel or at right angles to building or other construction lines in a neat and orderly manner. Conceal conduit in finished areas. Unless otherwise shown, remaining conduit may be exposed.
  4. Select properly sized plates to fit the conduit when securely locked in place.

M. Installation Methods:

1. Install each entire conduit system complete before pulling in any conductors.
2. Clean the interior of every run of conduit before pulling in conductors to guard against obstructions and omissions.
3. Cut all joints square, then thread and ream smooth.
4. Bends:
  - a. Make bends with standard elbows or conduit benders in accordance with the NEC.
  - b. Make field bends using equipment designed for the particular conduit material and size involved.
  - c. PVC coated field bend not acceptable.
  - d. Bends must be free from dents or flattening.
  - e. Use no more than the equivalent of three 90-degree bends in any run between terminals and cabinets, or between outlets and junction boxes or pull boxes.
5. Conduit bodies may be used in lieu of conduit elbows where ease of installation and appearance warrants their use. Conduit bodies larger than 1-inch may be used only where approved.
6. Fastenings: Securely fasten and support exposed conduit to framing using stainless steel unistrut and straps of same material as unistrut with 316 stainless steel fastening hardware.
7. Provide a No. 30 nylon pulling line in conduits in which wiring is not installed under this work, such as telephone, signal, and similar systems. Identify both ends of the line by means of labels or tags reading "Pulling Line." Also, state the panel the conduit originated from. Apply write-on identification to empty conduits to identify each conduit as to terminus of other end and also to identify trade size of conduit.
8. Suitably cap conduit during construction to avoid water, dirt and trash entrance.
9. Use expansion-deflection fittings on conduit crossing structural expansion joints and on exposed conduit runs of more than 100 feet or where necessary. Provide bonding jumpers

across fittings in metal raceway systems. Conduit runs made in concrete pours or surface-mounted runs that are attached to the structure, shall be equipped with an expansion/deflection fitting where they cross an expansion joint, and at every 100 feet.

10. Use expansion-deflection fittings on all conduit runs that transition from underground to above ground within 12" of grade level.
11. With a coupling, terminate concealed conduit for future use at structural surfaces. Install a pipe plug flush with the surface.
12. Openings around electrical penetrations of fire-resistance rated walls, partitions, floors or ceilings shall maintain the fire resistance rating using approved methods. See NEC 300-21. Fire barrier shall be 3M 2001 RW silicone RTV foam or approved equal.
13. Conduits shall be installed with uniform slope which will permit drainage toward manholes, pull boxes, or building walls. Utilize conduit drain as require to remove condensate in the conduits.
14. Seal all conduits with pliable sealant such as Tyco type RDSS-CLIP-100 where entering boxes, manholes, switchgear, motor control centers, panelboards, enclosures, etc.
15. PVC coated conduit shall be installed by certified installer. PVC coated conduit installation shall follow manufacturer recommendation.
16. All termination at an enclosure shall be made from the bottom of the enclosure, no overhead penetrations are allowed. When conduits are located above the enclosure route the conduit at the same height as the bottom of the enclosure, install a drip lane at the end of the conduit and use flexible conduit to terminate at the bottom of the enclosure.

N. Hazardous Areas

1. Install conduit seals at all penetrations to hazardous area, as define by the NEC. Install additional seal-type fittings within the hazardous area in accordance with the requirements of the NEC Article 500.
2. Install dam and sealing compound per the Seal Manufacturer's instructions.
3. Provide flexible conduit which is listed for use in hazardous areas. Conduit, flexible conduit fittings and all other materials shall be listed for use in Class 1, Division 1 or 2 Group D atmosphere.

3.02 WIREWAYS

A. Installation

1. Install wireways, where shown, according to NEC Articles, 376 and 378.
2. Limit capacity to a maximum of thirty (30) current carrying conductors including neutrals at any cross section of the wireway with 20% conductor fill at any cross sectional area.

END OF SECTION

SECTION 26 05 33.16  
BOXES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install outlet boxes, floor boxes, junction boxes, pull boxes and terminal boxes.
- B. All boxes located outdoors containing heat sensitive equipment shall be factory painted white.

1.02 REFERENCE STANDARDS

- A. ANSI/NEMA Publication No. OS 1 - Cast Aluminum Outlet Boxes, Device Boxes, Covers and Box Supports, and Steel Covers.
- B. ANSI/UL 514 - Electrical Outlet Boxes and Fittings.
- C. National Electric Code.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Division 1, detailed catalog information or drawings describing electrical and physical characteristics of all equipment specified.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.
- D. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.

PART 2 PRODUCTS

2.01 OUTLET BOXES

- A. Flush Device Boxes:
  - 1. Provide cast aluminum boxes of sufficient size to accommodate wiring devices to be installed at outlet.
  - 2. Extension rings shall not be acceptable.
  - 3. Square or rectangular boxes may be supplied.
  - 4. Unless otherwise noted, provide boxes 3-1/2-inches deep by 4 inches wide.

5. Boxes in hazardous locations shall be NEMA rated 7D.
6. Boxes in contact with masonry or concrete shall be gray steel.
- B. Exposed Device Boxes: Provide FD aluminum boxes for surface mounting in areas having exposed conduit systems. Provide PVC coated aluminum boxes in areas in contact with masonry or concrete. Coordinate box cover for proper use.
- C. Boxes for Lighting Fixtures:
  1. Provide aluminum octagonal boxes with fixture stud supports and attachments as required to properly support ceiling and bracket-type lighting fixtures.
  2. Unless otherwise noted, provide boxes 2 inches deep by 4 inches wide.
  3. Boxes in contact with masonry or concrete shall be PVC coated aluminum boxes.
- D. Masonry Boxes:
  1. Provide stamp metal masonry boxes.
  2. Use boxes with 1-gang capacity in excess of the number of devices to be installed.
  3. Extension ring covers shall not be acceptable.
- E. Listing: UL 514.
- F. Acceptable Manufacturers: Appleton, Bowers, Crouse-Hinds, Efcor, Midwest, OZ/Gedney, RACO, Steel City, T & B.

## 2.02 JUNCTION, PULL AND SPLICE BOXES

- A. Construction: Provide boxes conforming to NEC Article 314.
- B. Interior Spaces: Provide surface mounted stainless steel type 316 boxes at least 4 inches deep.
- C. Exterior Spaces: NEMA 4X stainless steel type 316 boxes at least 4 inches deep.
- D. Embedded: Provide stainless steel 316 type with external recessed flanged cover when cast in concrete.
- E. Listing: UL 514.
- F. Acceptable Manufacturers: Hoffman, Keystone, OZ, Stahlin, Crouse-Hinds.
- G. Hazardous location: Box shall be NEMA rated 7D.

## 2.03 TERMINATION CABINETS & BOXES

- A. Termination cabinets shall be NEMA 4X 316 stainless steel gasketed. Cabinets shall be of sufficient size to adequately contain all terminals, wire-duct, and cables as determined by the



Contractor. Cabinets shall have removable doors (lift-off) not more than 30 inches wide, and shall be equipped with a three-point locking latch handle.

- B. Wire terminal blocks shall be Square D Type M Barrier Block System, or equal.
  - 1. M 4/6 or B 22014 AWG 6MM (0.234 inch) wide, grey, blue, single level, 600 volt, 250MP.
  - 2. M6-8G or B22-8 AWG 8MM (0.315 inch) wide, grey blue, single level 600 volt, 55 amp.
- C. The wire terminal block system shall be for DIN rail mounting, and shall include fuse/switch blocks, circuit breaker block, and isolation.
- D. Acceptable Manufacturers: Hoffman.

#### 2.04 MEDIUM VOLTAGE GENERATOR TERMINATION CABINETS

- A. Termination cabinets shall be built to NEMA 4X 316 stainless steel gasketed standards but shall bare the NEMA 3R listing. Cabinets shall be configured for 4160V buses connection cabinet shall be rated for 500A. Bus shall be tin plated copper space adequately for the voltage and the ampacity. Provide sufficient connecting holes in the buses to connect conductors from the generator to the termination and from the Switchgear to the termination cabinet. Busses and wires shall be color coded. Enclosure shall be per ANSI standard for the application. Cabinets shall have removable doors (lift-off) not more than 30 inches wide, and shall be equipped with a three-point locking latch handle. Enclosure permanent and temporary cable entry shall be from the bottom. Cable entry shall be watertight at all times. Enclosure shall be wall mounted; bottom of the enclosure shall be 2 feet from the grade level.
- B. Acceptable Manufacturers: ES&S.
- C. Provide shop drawing showing proposed cabinet.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Coordinate location of all boxes with all other work.
- B. Verify location of floor boxes with Engineer before installation.

#### 3.02 OUTLET BOXES

- A. Flush Boxes:
  - 1. Unless otherwise indicated, mount all outlet boxes flush within 1/4-inch of the finished wall or ceiling line.
  - 2. Securely fasten outlet boxes in position using clips or other suitable means.
  - 3. Provide plaster covers for all boxes in plastered walls and ceilings.

- B. Fixture Boxes: Where boxes for suspended lighting fixtures are attached to and supported from suspended ceilings, adequately distribute the load over the ceiling support members.
- C. Mounting Height:
  - 1. Mounting height of a wall-mounted outlet box means the height from finished floor to horizontal center line of the cover plate.
  - 2. Where outlets are indicated adjacent to each other, mount these outlets in a symmetrical pattern with all tops at the same elevation.
  - 3. Where outlets are indicated adjacent, but with different mounting heights, line up outlets to form a symmetrical vertical pattern on the wall.
  - 4. Verify the final location of each outlet with Engineer before rough-in.
  - 5. Remove and relocate any outlet box placed in an unsuitable location.
- D. Back-to-Back Boxes:
  - 1. Do not connect outlet boxes back to back unless approval is obtained.
  - 2. Where such a connection is necessary to complete a particular installation, fill the voids around the wire between the boxes with sound insulating material.
- E. Box Openings: Provide only the conduit openings necessary to accommodate the conduits at the individual location.

### 3.03 FLOOR BOXES

- A. Completely envelop floor boxes in concrete except at the top. Increase slab thickness at boxes if required for bottom covering. Adjust covers flush with finished floor.

### 3.04 JUNCTION AND PULL BOXES

- A. Pull boxes and junction boxes shall be provided to facilitate the installation of cable and wires. "Condulet" type fittings shall not be used in lieu of boxes when the conduit contains wire #4 AWG or larger.
- B. Installation:
  - 1. Install boxes as required to facilitate cable installation in raceway systems.
  - 2. Generally, provide boxes in conduit runs of more than 100 feet.
  - 3. Locate boxes strategically and make them of such shape and size to permit easy pulling of wire or cables. Size boxes in accordance to NEC Article 314.28 requirements.
- C. Covers:

1. Provide boxes so that covers are readily accessible and easily removable after completion of the installation.
2. Include suitable access doors for boxes above suspended ceilings.
3. Select a practical size for each box and cover.

END OF SECTION

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SECTION 26 05 43  
UNDERGROUND DUCT BANKS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide underground electrical duct banks as shown on the Drawings.

1.02 REFERENCE STANDARDS

- A. The following standards shall apply as if written here in their entirety:
  - 1. ANSI C80.1, Specifications for Zinc-Coated Rigid Steel Conduit.
  - 2. ANSI/ACI 301, Specifications for Structural Concrete for Buildings.
  - 3. ANSI/ASTM A 615, Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 4. ANSI/NEMA TC6, PVC and ABS Plastic Utilities Duct for Underground Installation.
  - 5. ANSI/NEMA TC9, Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

PART 2 PRODUCTS

2.01 DUCTS AND FITTINGS

- A. Unless otherwise noted, provide Schedule 80 PVC conduit encased in concrete. Provide fittings of the same type material as the conduit.

2.02 CONDUIT AND FITTINGS

- A. Provide PVC conduit to PVC coated aluminum adapter fitting in order to convert to aluminum conduit before surfacing from the underground duct bank.
- B. Expansion/deflection fillings to be installed on all stub-up above grade from duct banks.

2.03 CONCRETE

- A. Provide concrete conforming to the following.
  - 1. Compressive strength: 4,000 psi at 28 days.
  - 2. Slump: Not exceeding six inches.
  - 3. Aggregate size: Use pea gravel.

4. Additive: Red ferrous oxide concrete coloring pigment mixed at the rate of 1-1/2 pounds per sack of cement additive to be mixed at the plant. Sprinkle color on the top of the duct bank will be unacceptable.

- B. Duct Banks shall tie into structure for existing structures and into rebar for new structures or pads. Duct Banks between two permanent structures shall be connected via a manhole.

## 2.04 REINFORCING BARS

- A. Provide Grade 40 steel reinforcing bars, for all duct banks.

## 2.05 IDENTIFYING TAPE

- A. Refer to specification 16012 Identifications for identifying tape characteristics.

## PART 3 EXECUTION

### 3.01 CONSTRUCTION

- A. Duct bank configurations are detailed on the drawings. A minimum of 3-inch concrete cover shall be required on all sides of the conduits. Conduits shall be spaced with 3-inch clearance on all sides.
- B. Duct banks shall be caged.
- C. All duct banks shall be concrete encased, whether under slab or not.

### 3.02 LOCATION AND INSPECTION

- A. Before beginning trenching operations stake out the proposed duct bank routing and obtain approval of the Owner. After trenching has begun and before any ducts or conduits are placed, notify the Owner so that the trenching and installation may be inspected. Also notify the Owner prior to any placement of concrete for duct banks, so that he may observe the placing. Placing concrete on muddy trench bottoms will not be acceptable.

### 3.03 EXCAVATION AND BACKFILL

- A. Excavation: Excavate trenches for installation of duct banks. Form the trench bottom to follow closely the specified grade and depth for the duct banks.
- B. Backfill: Trenches may be backfilled with excavated soil and supplemented as necessary with select materials. Compact the backfill and mound slightly above natural grade, compact to 95%.
- C. Restoration: Restore adjacent areas disturbed by trenching or backfilling to a condition equal to the original.

### 3.04 PLACING OF DUCT BANKS

- A. Cover: Unless otherwise shown, provide a minimum 18" of earth and select materials cover. Coordinate grade with other work, if in conflict, rework grade at no cost to Owner.

- B. Grade: Place duct banks with a minimum grade of four inches per 100 feet. Grade between manholes may be from one manhole to the next manhole or from a high point between manholes. Where terminating ducts inside of buildings, always slope the grade away from building to the nearest manhole.
- C. Changes in Direction: Make changes in direction of runs exceeding a total of 10 degrees, either horizontal or vertical, by using long sweep bends. Long sweep bends must have a minimum radius of curvature of 3 feet and may be made up of one or more curved or straight sections. Manufactured bends having a minimum radius of curvature of three feet may be used at the ends of duct runs which are less than 100 feet in length.
- D. Joints: Make joints in ducts and conduits watertight, in accordance with manufacturers recommendations. Stagger joints in adjacent ducts and conduits a minimum of six inches. Make joints between ducts and conduit with appropriate no-thread-to-threaded adapters. Use appropriate sealant.
- E. Spacing: Unless otherwise shown, space ducts and conduits with 3" spacers. Place spacers or separators on not greater than five-foot centers. Use spacers or separators made of plastic, concrete or a suitable nonmetallic, nondecaying material.
- F. Drainage: All conduit duct banks shall be sloped sufficiently to drain into manholes, pull boxes or sumps.

### 3.05 PLACING OF CONCRETE

- A. Place concrete using chutes and tremies as necessary to limit the free drop of the mix to a maximum of two feet. Carefully rod or vibrate the concrete to aid uniform encasement of the ducts. Smooth the top of the pour with a float. Encase the conduits in concrete, a minimum thickness of three inches, on all sides.

### 3.06 CLEANING

- A. Thoroughly clean all ducts and conduits before placing. During construction and after the duct line is completed; plug open ends of ducts and conduits to prevent the entrance of foreign matter. After the duct line has been completed, pull a flexible mandrel through each duct and conduit. The mandrel must not be less than 12 inches long with a diameter approximately 1/4 inch less than the inside diameter of the duct or conduit. After cleaning, place in each duct and conduit a No. 30 nylon line with a plastic tag on each end reading "Pulling Line", and a tag identifying the location of the other end.

### 3.07 SPECIAL PROJECT REQUIREMENTS

- A. Contractor shall employ hand trenching at locations where existing underground utilities are present.
- B. All damaged utilities should be repaired immediately in manner acceptable to the Owner at Contractor's expense. Any damaged cables shall be replaced in full. Splices shall not be acceptable. Damaged conduits shall be replaced between the two closest manholes and cables repulled.

- C. Install a #4/0 tin plated copper grounding conductor, centered over the ductbank and located 3" above the ductbank in the backfill. Bond ductbank grounding conductor to building or transformer ground loop at one end and to the manhole ground electrode at the other end. From point of exothermic connection to termination, all exposed grounding conductors shall have XHHW insulation.

END OF SECTION



SECTION 26 05 53  
IDENTIFICATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install tags/nameplate on all equipment, devices, instruments, conduit and conductor marking as indicated on the drawings and specified herein. Major equipment shall be furnished with nameplates in accordance with their individual specifications.
- B. Identifications for equipment pre-purchased from Aqua Aerobics shall be provided by Contractor. This includes, but is not limited, to the following: wire markers, conduit markers, nameplates, nameplate fasteners and anything else described in this specification.

1.02 SUBMITTALS

- A. Submit to the Engineer, in accordance with Division 1, detailed catalog information or drawings describing electrical and physical characteristics of all equipment specified.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Submit a letter showing all the exceptions to the specification. If no exceptions are taken the letter shall indicate no exception. Submittal will be rejected without preliminary review if the letter is not submitted.

PART 2 PRODUCTS

2.01 WIRE MARKERS

- A. Provide heat shrinkable sleeves and machine printed legends at every conductor. Sleeves and legends shall be high resistant to abrasion, solvents and chemicals. Provide Tyco TMS, Brady Perma Sleeve XPS, or as approved by ENGINEER. Markers shall be white with black lettering.
- B. Markers shall have conductor origin, termination and circuit number, terminal number whichever applies.
- C. Large conductors and multi-conductor cable to be identified with placards held on with wire ties and of the same quality as markers for smaller single conductors.
- D. All control wiring in electrical equipment or manufactured supplied panel shall have wire markers.

2.02 CONDUIT MARKERS

- A. Exposed Conduit

1. Conduit markers to be stainless steel type permitting embossing on the job and attached to conduit with banding made of same material. Markers to be installed lengthwise and wrapped with clear adhesive tape.
2. Conduits to be marked at the point of origin, the point of termination, upon crossing wall, each side of junction boxes and at 20-foot internals for all exposed and accessible conduits. Identify all exposed conduits by their panel, MCC, circuit numbers or loop numbers.
3. Provide labels for high voltage conduit. Labels shall be vinyl for indoor exposed conduit or polyester for outdoor exposed conduit. Label shall be black letters on red/orange background. Labels shall be as manufactured by Thomas and Betts or Brady.

## 2.03 NAMEPLATES

### A. Nameplates:

1. Externally mark electrical equipment by means of suitable nameplates identifying each and the equipment served.
2. Provide each piece of equipment with a white phenolic nameplate with 3/16-inch-high black lettering secured to front of equipment.
3. Supply blank nameplates for spare units and used spaces.
4. Actual nameplate legend, which may consist of up to three lines, will be provided to the Engineer on submittals.

### B. Nameplate Fasteners: Fasten nameplates to equipment only by means of appropriate 316 SS screws and gasket. Stick-ons or adhesives will not be allowed.

### C. Nameplate Information: In general, the following information is to be provided for the types of electrical equipment as listed.

1. Switchgear, Motor Control Centers and Distribution Panelboards: On the mains, identify the piece of equipment, the source, and voltage characteristics, i.e., 480V, 3PH, 3W, etc. For each branch circuit protective device, identify the load served and the primary side circuit number.
2. Transformers: Identify the service source and load served.
3. Panelboards: Identify the service source, panelboard designation and voltage characteristics.

### D. Panelboards:

1. Prepare a neatly typed circuit directory behind clear heat-resistant plastic for each panelboard.
2. Identify circuits by equipment served and by room numbers, where room numbers exist.

3. Use equipment names and room numbers selected by the Engineer; names and numbers may be different from those shown on plans.
4. Indicate spares and spaces with light, erasable pencil markings.
5. Provide a final set of the panel schedule in the O&M manuals.
6. Provide a CD with the file for each Panel to the Owner with the O&M manual.

E. Boxes, Small Equipment:

1. Pull boxes and similar items shall be marked with Nameplates.
2. Provide identification labels for high voltage equipment and raceways with the legend "DANGER HIGH VOLTAGE". Mark all exposed high voltage raceways every 25 feet. Safety labels shall be self-sticking polyester and as manufactured by Thomas and Betts (Panduit) or Brady.

F. Power Receptacles: Use nameplate or engraved plate to identify power receptacles where the nominal voltage between a pair of contacts is greater than 150 volts with circuit number, voltage, and phases.

G. Wall Switches: Engrave the switch plate of the switch with the function of the switch.

H. Instrumentation and instrument wire identification shall be in accordance with the division 17 and the latest TRA Design and Construction Standards.

2.04 POWER OUTLETS, SWITCHES, AND PILOT DEVICES

- A. Mark power outlets with voltage, phase, panel name, and circuit number.
- B. Identify all wall switches, disconnect switches, etc. with nametags, circuits served, and panel origin, list to be approved by ENGINEER/OWNER.
- C. Identify all push-button stations with their functions and equipment served.

2.05 DETECTABLE WARNING TAPE

- A. Shall be red metal detectable polyester with a subsurface graphics to seal the legend from acid, alkalis and other soil substances.
- B. Minimum width shall be 2".
- C. Warning tape shall meet OSHA regulation for covering location of underground utility lines.
- D. The legend shall show CAUTION: BURIED ELECTRIC LINE BELOW
- E. The warning tape shall be Red with black lettering.
- F. Acceptable manufacturer shall be Brady 91601 or approved equal.

**PART 3 EXECUTION**

**3.01 FURNISH AND INSTALL NAMEPLATES/TAGS**

- A. Furnish and install nameplates for all panelboards, motor starters, motor control center cubicles, disconnect switches, instrument panels, dry type transformers and control stations.
- B. Engrave the equipment designation, (e.g., "Starter Pump P1"), on nameplates in 3/16-inch black letters on white background of laminated phenolic. Securely fasten nameplates using stainless steel 316 sheet metal screws or rivets; or contact cement if enclosure is sealed. All switches, indicating lights, pushbuttons, meters and parameter indicators on panels shall be clearly identified with its function or tag, as required. Identification list to be approved by Owner Representative through the ENGINEER.
- C. Stainless Steel tags shall be used on instrument, motors and other devices, as applicable. The tags shall be affixed to the instrument with drive pins or stainless steel chain in such a manner that it does not need to be removed to install the instrument. Motors shall carry the tag assigned to its driven equipment, (e.g., P-101).

END OF SECTION

SECTION 26 08 00  
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions in Division 01 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

- A. The purpose of this Section is to define Sub- contractor responsibilities in the commissioning process, which are being directed by the General Contractor. Other electrical system testing is required under other Division 26 Specification Sections. National Electrical Installation Standards (NEIS) NECA 90-2004, "Recommended Practice for Commissioning Building Electrical Systems", 27<sup>th</sup> Volume of the NEIS Series, provides additional guidance for the commissioning of electrical systems.
- B. Commissioning requires the participation of the Contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. General Commissioning requirements and coordination are detailed in Division 01. "Division 26 Sub-contractor" shall be familiar with all parts of Commissioning requirements in Division 01 and the Commissioning Plan issued by the General Contractor and shall execute all Commissioning responsibilities assigned to them in the Contract Documents and include the cost of Commissioning in the Contract price.
- C. Electrical systems to be commissioned include the following:
  - 1. Secondary Service Electrical Systems
  - 2. Motor Control Centers
  - 3. Distribution and Branch Circuit Panel boards
  - 4. Lighting Fixtures and Controls
  - 5. Lightning Protection Equipment and Lightning Protection Systems
  - 6. Control Systems
  - 7. Fire Alarm Equipment/Fire Alarm Equipment Monitoring System
  - 8. AC Motors
  - 9. Grounding Equipment and Building Grounding System

- 10. Security System
- 11. Emergency Generators and Distribution System
- 12. Uninterruptible Power Systems
- 13. Pumping Systems
- 14. HVAC Systems

1.03 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards.

1.04 DEFINITIONS

- A. **Commissioning:** A systematic process confirming that systems have been installed, properly started, and consistently operated in strict accordance with the Contract Documents, that all systems are complete and functioning in accordance with the Contract Documents at Substantial Completion, and that Contractor has provided Owner adequate system documentation and training. Commissioning includes deferred and/or seasonal tests as approved by Owner.
- B. **Commissioning Plan:** Document prepared by the General Contractor and approved by Owner that provides the structure, schedule, and coordination plan for the Commissioning process from the construction phase through the warranty period. The Commissioning Plan must satisfy the Owner's test requirements.
- C. **Commissioning Team:** Working group made up of representatives from the Owner, General Contractor, Control Systems Integrator (CSI), specialty manufacturers and suppliers. The General Contractor will provide ad-hoc representation of Subcontractors on the Commissioning Team as required for implementation of the Commissioning Plan.
- D. **Deferred Tests:** Functional Performance or Integrated System Tests performed after Substantial Completion due to partial equipment acceptance, seasonal requirements, design, or other Site conditions that prohibit the test from being performed prior to Substantial Completion.
- E. **Deficiency:** Condition of a component, piece of equipment or system that is not in compliance with Contract Documents.
- F. **Factory Acceptance Testing:** Testing of equipment at the factory, by factory personnel with an Owner's representative present.

- G. **Operation Readiness Test Procedures:** Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configuration and steps required to determine if the system is performing and functioning properly. Contractor prepares these procedures to document Operational Readiness.
- H. **Functional Performance Test (FPT):** Test of dynamic function and operation of equipment and systems executed by Contractor. Systems are tested under various modes and conditions to test functionality. Component failure, power failure, and other system failure will be simulated to test system response. Systems are run through all specified sequences of operation. Components are verified to be responding in accordance with Contract Documents. Tests are executed after start-ups and Pre-functional Checklists are complete.
- I. **Integrated System Test:** Test of dynamic function and operation of multiple systems; Integrated System Tests are tested under various modes, such as fire alarm and emergency situations, life safety conditions, power failure, etc. Systems are integrally operated through all specified sequences of operation. Components are verified to be responding in accordance with Contract Documents. Integrated System Tests are executed after Functional Performance Tests are complete and prior to Substantial Completion. Integrated System Tests provide verification that the integrated systems will properly function according to the Contract Documents.
- J. **Integrated System Test Procedures:** Commissioning protocols and detailed test procedures and instructions in tabular and script-type format that fully describe system configurations and steps required to determine if the interacting systems are performing and functioning properly. Contractor prepares these procedures to document Integrated System Tests.
- K. **Pre-functional Checklist:** A list of static inspections and material or component tests that verify proper installation of equipment (e.g., belt tension, oil levels, labels affixed, gages in place, sensors calibrated, etc.). The word Pre-functional refers to before Functional tests. Pre-functional Checklists must include the manufacturer's Start-up checklist(s). Contractor shall sign Pre-functional Checklists as complete and submit with the Request for Start-up/Functional Performance Test Form.
- L. **Start-up:** The activities where equipment is initially energized, tested, and operated. Start-up is completed prior to Functional Performance Tests. Approved Operating and Maintenance (O&M) manuals must be submitted prior to Start-Up.
- M. **Test Requirements:** Requirements specifying what systems, modes and functions, etc. must be tested. Test requirements are not detailed test procedures. Test requirements and acceptance criteria are specified in the Contract Documents.

1.05 SUBMITTALS

- A. Contractor shall prepare Pre-functional Checklists and Functional Performance Test (FPT) procedures and execute and document results. All Pre-functional Checklists and tests must be documented using specific, procedural forms in Microsoft Word or Excel software developed for that purpose. Prior to testing, Contractor shall submit those forms to the Owner for review and approval.
- B. Contractor shall provide Owner with documentation required for Commissioning work. At minimum, documentation shall include: Detailed Start-up procedures, Full sequences of

operation, Operating and Maintenance data, Performance data, Functional Performance Test Procedures, Control Drawings, and details of Owner-Contracted tests.

- C. Contractor shall submit to Owner installation and checkout materials actually shipped inside equipment and actual field checkout sheet forms used by factory or field technicians.
- D. Contractor shall review and approve other relative documentation for impact on FPT's of the systems:
  - 1. Shop Drawings and product submittal data related to systems or equipment to be commissioned. The Subcontractor responsible for the FPT shall review and incorporate comments from the Owner and CSI via the Contractor.
  - 2. Incorporate manufacturer's Start-up procedures with Pre-functional checklists.
  - 3. Draft Electrical Testing Agency (ETA) Reports: Review and provide comments to Owner.
  - 4. Factory Performance Test Reports: Review and compile all factory performance data to assure that the data is complete prior to executing the FPT's.
  - 5. Completed equipment Start-up certification forms along with the manufacturer's field or factory performance and Start-up test documentation: Subcontractor performing the test will review the documentation prior to commencing with the scheduled FPT's.
  - 6. Final ETA Reports: Subcontractor performing the test will review the documentation prior to commencing with the scheduled FPT's.
  - 7. Operating and Maintenance (O&M) information per requirements of the Technical Specifications and Division 01 requirements: To validate adequacy and completeness of the FPT, the Contractor shall ensure that the O&M manual content, marked-up record Drawings and Specifications, component submittal drawings, and other pertinent documents are available at the Project Site for review.

## PART 2 PRODUCTS

### 2.01 GENERAL

All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

### 2.02 TEST EQUIPMENT

- A. Provide all specialized tools, test equipment and instruments required to execute Start-up, checkout, and testing of equipment.
- B. All specialized tools, test equipment, and instruments required to execute Start-up, checkout, and testing of equipment shall be of sufficient quality and accuracy to test and/or measure system performance within specified tolerances. A testing laboratory must have calibrated test equipment within the previous twelve (12) months. Calibration shall be NIST traceable. Contractor must calibrate test equipment and instruments according to manufacturer's



recommended intervals and whenever the test equipment is dropped or damaged. Calibration tags must be affixed to the test equipment or certificates readily available.

C. Infrared Thermo-graphic Scanner:

1. Infrared scanning equipment shall be an utilized capable of viewing an entire bus or equipment assembly at one time and have a sensitivity of 0.2 degrees C with a liquid nitrogen reference.
2. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified.
3. A copy of the results from the thermo-graphic scan shall be submitted to the Owner in order to create baseline information of the equipment.

PART 3 EXECUTION

3.01 PREPARATION

A. Construction Phase:

1. In each purchase order or subcontract that is written for changes in scope, include the following requirements for submittal data, Commissioning documentation, testing assistance, Operating and Maintenance (O&M) data, and training, as a minimum.
2. Attend Pre-Commissioning Meeting(s), Pre-Installation Meeting(s), and other Project meetings scheduled by the Contractor to facilitate the Commissioning process.
3. Provide manufacturer's data sheets and shop drawing submittals of equipment.
4. Provide additional requested documentation to the Contractor, prior to O&M manual submittals, for development of Pre-functional Checklist and Functional Performance Tests procedures.
  - a. Typically, this will include detailed manufacturer's installation and Start-up, operating, troubleshooting and maintenance procedures, full details of any Owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified.
  - b. In addition, the installation, Start-up, and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Contractor.
  - c. This information and data request may be made prior to normal submittals.
5. With input from the Control Systems Integrator (CSI) and Owner, Clarify the operation and control of commissioned equipment in areas where the Specifications, CSI control drawings, or equipment documentation are not sufficient for writing detailed test procedures.
6. Prepare specific Functional Performance Test procedures as specified in other sections. Ensure that Functional Performance Test procedures address feasibility, safety, and

equipment protection and provide necessary written alarm limits to be used during the tests.

7. Develop the Commissioning Plan using manufacturer's Start-up procedures and the Pre-functional Checklists. Submit manufacturer's detailed Start-up procedures and the Commissioning Plan and procedures and other requested equipment documentation to Owner for review.
  8. During the Start-up and initial checkout process, execute and document related portions of the Pre-functional Checklists for all commissioned equipment.
  9. Perform and clearly document all completed Pre-functional Checklists and Start-up procedures. Provide a copy to the Owner prior to the Functional Performance Test.
  10. Address current Owner punch list items before Functional Performance Tests. Air and water test, adjust and balance shall be completed with discrepancies and problems remedied before Functional Performance Tests of the respective air or water related systems are executed.
  11. Provide qualified technicians to execute starting of equipment and to assist in execution of Functional Performance Tests. Ensure that they are available and present during the agreed-upon schedules and for a sufficient duration to complete the necessary tests, adjustments, and problem solving.
  12. Correct deficiencies (differences between specified and observed performance) as interpreted by the Owner and retest the system and equipment.
  13. Compile all Commissioning records and documentation to be included in a Commissioning and Closeout Manual.
  14. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions. These manuals shall be available during Start-up.
  15. During construction, maintain as-built marked-up Drawings and Specifications of all Contract Documents and Contractor-generated coordination Drawings. Update after completion of Commissioning activities (include deferred tests). The as-built drawings and specifications shall be delivered to the Owner both in electronic format and hard copies as required by the Owner.
  16. Provide training of the Owner's operating personnel as specified.
  17. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
- B. Warranty Phase:
1. Execute seasonal or deferred tests, witnessed by the Owner, according to the Specifications.

- a. Complete deferred tests as part of this Contract during the Warranty Period. Schedule this activity with Owner. Perform tests and document and correct deficiencies. Owner may observe the tests and review and approve test documentation and deficiency corrections.
  - b. If any check or test cannot be completed prior to Substantial Completion due to the building structure, required occupancy condition, or other condition, execution of such test may be delayed to later in the Warranty Period, upon approval of the Owner. Contractor shall reschedule and conduct these unforeseen deferred tests in the same manner as deferred tests.
2. Correct deficiencies and make necessary adjustments to O&M manuals, Commissioning documentation, and as-built drawings for applicable issues identified in any seasonal testing.

C. Electrical Testing Agency (ETA):

1. The Contractor shall retain an independent Electrical Testing Agency (ETA). Their specific testing responsibilities are delineated in Division 26. This generally requires checking and testing of the electrical power distribution equipment by a National Electrical Testing Association (NETA) certified ETA .
2. Attend Pre-Commissioning Meeting(s), Pre-Installation Meeting(s), and other Project meetings scheduled by the Contractor to facilitate the Commissioning process.
3. Obtain all required manufacturer's data to facilitate tests.
4. Provide assistance to the Contractor in preparation of the specific Pre-functional Checklist and Functional Performance Test procedures specified in Division 26. Generally ETA shall provide their standard forms to document the NETA tests to be incorporated into the Pre-functional Checklist and Functional Performance Tests record.
5. During related tests, execute and document the tests in the approved forms and/or test record.
6. Perform and clearly document all completed Start-up and system operational checkout procedures, providing a copy to the Contractor.
7. Clearly indicate any deficiencies identified during testing and add to an action list for resolution and tracking. The field technicians shall keep a running log of events and issues. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, Contract interpretation requests and lists of completed tests to the Contractor at least twice a week and provide technical assistance in the resolution of deficiencies.
8. Provide skilled technicians to execute testing. Ensure that they are available and present during the agreed-upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem solving.
9. Warranty Phase: Perform thermo-graphic imaging of loaded panel at time designated by Electrical Subcontractor or Contractor.

3.02 INSTALLATION

- A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.
- B. All installation shall be in accordance with manufacturer's published recommendations.

3.03 TESTING

- A. Pre-functional Checklists and Start-up:
  - 1. Follow the Start-up and initial checkout procedures listed in this Section and in Division 01. Start-up and complete systems and sub-systems so they are fully functional, meeting the requirements of the Contract Documents.
  - 2. Pre-functional Checklists shall be complete prior to commencement of a Functional Performance test.
  - 3. Refer to Section 26 00 40 System Pre-functional Checklists for specific details on required Pre-functional Checklists.
- B. Functional Performance Tests:
  - 1. Functional Performance Tests are conducted after system Start-up and checkout is satisfactorily completed.
  - 2. Refer to equipment specification for specific details on the required Functional Performance Tests.
- C. Coordination Between Testing Parties:
  - 1. Factory Start-ups: Factory Start-ups are specified for certain equipment. Factory Start-ups generally are Start-up related activities that will be reviewed and checked prior to Functional Performance Tests. All costs associated with factory Start-ups shall be included with the contract price unless otherwise noted. Notify the Commissioning Team of the factory Start-up schedule and coordinate these factory Start-ups with witnessing parties. The Commissioning Team members may witness these Start-ups at their discretion.
  - 2. Independent Testing Agencies: For systems that specify testing by an independent testing agency, the cost of the test shall be included in the Contract price unless otherwise noted. Testing performed by independent agencies may cover aspects required in the Pre-functional Checklists, Start-ups, and Functional Performance Tests. Coordinate with the independent testing agency so that Owner Representative(s) can witness the test to ensure that applicable aspects of the test meet requirements.

END OF SECTION

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SECTION 26 09 16  
ELECTRICAL PROTECTION RELAYS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section of the Specifications describes the requirements for protective relays to be furnished under other Sections of the Specifications as listed in the Related Work paragraph of this Section.
- B. All equipment described herein shall be submitted and furnished as an integral part of equipment specified elsewhere in these Specifications.

1.02 RELATED WORK

- A. Section 26 00 00 Electrical – General Provisions

1.03 SUBMITTALS

- A. Submittals for equipment specified herein shall be made as a part of equipment furnished under other Sections. Individual submittals for equipment specified herein will not be accepted and will be returned unreviewed.
- B. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc., sufficient to confirm that the meter or relay provides every specified requirement. Any options or exceptions shall be clearly indicated.
- C. Operation and Maintenance Manuals.
  - 1. Operation and Maintenance manuals shall include the following information:
    - a. Manufacturer's contact address and telephone number for parts and service.
    - b. Instruction books and/or leaflets
    - c. Recommended renewal parts list
    - d. Record Documents for the information required by the Submittals above.

1.04 REFERENCE CODES AND STANDARDS

- A. The equipment in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
  - 1. NEMA/ISCI – 109 Transient Overvoltage Withstand Test
  - 2. IEEE Std. 472/ANSI C37.90A Surge Withstand Capability Tests
  - 3. IEC 255.4 Surge Withstand Capability Tests
- B. All meters, relays and associated equipment shall comply with the requirements of the National Electric Code (NEC) and Underwriters Laboratories (UL) where applicable.

- C. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.05 QUALITY ASSURANCE

- A. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Owner/Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- B. Equipment submitted shall fit within the space or location shown on the Drawings. Equipment which does not fit within the space or location is not acceptable.
- C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.06 WARRANTY

- A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for 1 year from date of acceptance of the equipment containing the items specified in this Section. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Contractor at no expense to the Owner.

PART 2 PRODUCTS

2.01 GENERAL

- A. Protective Relay Enclosures.
  - 1. Enclosures for protective relays located within the associated equipment shall have the same Enclosure Types as specified for the associated equipment. When replacing existing relays use adapter kits to minimize existing enclosure modification.

2.02 FEEDER OVERCURRENT RELAY

- A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
  - 1. Schweitzer model SEL-751
  - 2. Approved equal.
- B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
- C. General

1. Digital relay for primary circuit protection of feeders and distribution networks, with backup protection for transformers and transmission lines.
2. The unit shall provide protection, control, and monitoring functions with both local and remote human interfaces.
3. All components, except terminating hardware, shall be mounted inside the relay.
4. The unit shall be suitable for semi-flush mounting in a panel.
5. It shall be equipped with a front panel display for monitoring and control.
6. The relay shall comply with surge withstand capability standards ANSI C37.90 and IEC 255.4.

D. Protection and Control

1. Phase Undervoltage (27P)
2. Auxiliary Undervoltage (27x)
3. Cable Thermal Model (49)
4. Breaker Failure (50BF)
5. Phase Instantaneous Overcurrent (50P)
6. Neutral Instantaneous Overcurrent (50N)
7. Ground Instantaneous Overcurrent (50G)
8. Negative Sequence Instantaneous Overcurrent (50\_2)
9. Phase Time Overcurrent (51P)
10. Neutral Time Overcurrent (51N)
11. Ground Time Overcurrent (51G)
12. Phase Overvoltage (59P)
13. Auxiliary Overvoltage (59x)
14. Neutral Overvoltage (59N)
15. Negative Sequence Overvoltage (59\_2)
16. Neutral Direction Overcurrent (67N)
17. Ground Direction Overcurrent (67G)



18. Four Shot Auto reclose (79)
19. Underfrequency (81U)
20. Over frequency (81O)
21. Cold Load Pickup (CLP)

E. Monitoring and Metering

1. Current: Phasors, RMS Values of per Phase, Neutral Current, Negative Sequence Current
2. Voltage: Phase-to-Phase and Phase-to-Ground, Neutral Voltage, Negative Sequence Voltage, Zero Sequence Voltage, Auxiliary Voltage
3. Power: Active, Reactive, Apparent and Power Factor
4. Frequency
5. An event recorder with a record of the last 256 events, time tagged with a resolution of 1ms.
6. The waveform capture (oscillography) feature similar to a transient/fault recorder. The oscillography shall capture 32 samples per cycle and the digital states.

F. Communication

1. For remote monitoring, the following communication ports shall be provided:
  - a. One (1) Industry Standard port for meter and relay programming using a laptop computer.
  - b. One (1) RS-485 port.
  - c. One (1) integral 10/100BaseT Ethernet port . The connection shall support Modbus TCP, SNMP. Where an integral port is not available, provide a media protocol converter as specified herein.
  - d. The manufacturer shall factory enter the proper IP Address for such connection. Upon request by the Contractor, the Owner/Engineer will provide the proper Internet Protocol Address (IP Address), to be configured by the equipment manufacturer.
2. The protocol interface shall implement the following:
  - a. All data shall be available and/or mirrored within the Modbus 4x or "Holding Register" memory area.
  - b. Register 4x00001 shall exist and be readable to allow simple, predictable "comm tests".
3. The media protocol converter shall meet the following criteria:
  - a. The converter shall support 10/100Base-T Ethernet. The serial port speed (baud rate) shall support 230kbps. The protocol shall support Modbus TCP, Ethernet IP, DF1, and Modbus RTU/ASCII. Protocol shall be Web Browser configurable.

- b. Operating limits shall be 0-60 degrees C, with humidity range minimum of 5-90 percent. Shock capability on the serial port shall be ESD +15 kV air GAP meeting IEC 1000-4-2. Power requirements shall be 9-30VDC at 0.5A minimum.
- c. The converter shall have LED status for serial, signals, power, and Ethernet.
- d. The converter housing shall be UL 1604, Class 1 Div 2, DIN Rail mountable. The converter shall have DB-9M port connection, with screw terminals, to the input.
- e. Converter shall be Digi One IAP, or approved equal.

G. Control Power:

- 1. Range of available control power: 90-250 VDC/VAC , 48 to 62 Hz.

2.03 MOTOR PROTECTION SYSTEM

A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:

- 1. Schweitzer model SEL 710-5
- 2. Approved Equal

B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Minimum ANSI Functions

- 1. 14 Speed Switch
- 2. 27P Undervoltage
- 3. 37 Undercurrent/Underpower
- 4. 38 Bearing RTD
- 5. 46 Current Unbalance
- 6. 47 Phase Reversal
- 7. 49 Stator RTD
- 8. 49 Overload
- 9. 50 Short Circuit and Short Circuit Backup
- 10. 50G Ground Overcurrent
- 11. 51G Ground Overcurrent Backup
- 12. 51R Mechanical Jam

13. 55 Power Factor
14. 59P Overvoltage
15. 66 Starts/Hour and Time Between Starts
16. 81 O/U Frequency
17. 86 Overload Lockout
18. 87M Differential

D. General

1. All circuit boards shall have a harsh environment conformal coating to resist H<sub>2</sub>S gas and other corrosive agents, including humidity.

E. Protection and Control

1. Thermal model biased with RTD and negative sequence current feedback
2. Phase short circuit
3. Undervoltage, overvoltage
4. Underfrequency
5. Thermal overload
6. Undercurrent for load loss
7. Locked rotor / mechanical jam
  - a. The relay shall protect the rotor during stall and acceleration. The stall/acceleration curve shall be voltage compensated and a speed switch input shall be available. The stator protective thermal model shall combine inputs from positive and negative sequence currents and RTD winding feedback. The model shall be dynamic in nature in order to follow the loading and temperature of the motor.
8. Variable lockout time
9. Current unbalance
10. Ground fault O/C
11. Phase reversal
12. Starts/hour, time between starts
13. Overtemperature 12 RTD's
14. Back-Spin detection

F. Monitoring and Metering

1. Metering Functions
  - a. A, V, W, Var, VA, PF, Hz, Wh ,varh, demand
  - b. The system shall include complete power metering. An event record shall store the last 40 events. Sixteen cycles of waveform data shall be stored each time a trip occurs. A simulation feature shall be available for testing the function.
2. Fault diagnosis
3. Event record
4. Statistical information and learned motor data
5. Voltage/ frequency/power display
6. Four analog outputs
7. Oscillography and data logger

G. Inputs and Outputs

1. 10 RTD's, programmable
2. Three assignable digital inputs
3. Four output relays
4. One programmable analog outputs

H. Memory

1. Memory shall be non-volatile and programming shall remain intact upon power failure.

I. User Interface

1. A 40 character LCD display and associated keypad to provide access to actual values and set points.

J. Control Power:

1. Range of available control power: 90 – 250 VDC/VAC, 48 to 62 Hz.

K. Communication

1. For remote monitoring, the following communication ports shall be provided:
  - a. One (1) Industry Standard port for meter and relay programming using a laptop computer.
  - b. One (1) RS-485 port.

- c. One (1) integral 10/100BaseT Ethernet port . The connection shall support Modbus TCP. Where an integral port is not available, provide a media protocol converter as specified herein.
  - d. The manufacturer shall factory enter the proper IP Address for such connection. Upon request by the Contractor, the Owner/Engineer will provide the proper Internet Protocol Address (IP Address), to be configured by the equipment manufacturer.
- 2. The protocol interface shall implement the following:
  - a. All data shall be available and/or mirrored within the Modbus 4x or "Holding Register" memory area.
  - b. Register 4x00001 shall exist and be readable to allow simple, predictable "comm tests".
- 3. The media protocol converter shall meet the following criteria:
  - a. The converter shall support 10/100Base-T Ethernet. The serial port speed (baud rate) shall support 230kbps. The protocol shall support Modbus TCP, Ethernet IP, DF1, and Modbus RTU/ASCII. Protocol shall be Web Browser configurable.
  - b. Operating limits shall be 0-60 degrees C, with humidity range minimum of 5-90 percent. Shock capability on the serial port shall be ESD +15 kV air GAP meeting IEC 1000-4-2. Power requirements shall be 9-30VDC at 0.5A minimum.
  - c. The converter shall have LED status for serial, signals, power, and Ethernet.
  - d. The converter housing shall be UL 1604, Class 1 Div 2, DIN Rail mountable. The converter shall have DB-9M port connection, with screw terminals, to the input.

## 2.04 ACCESSORIES

- A. Furnish nameplates for each device as indicated on drawings. Color schemes shall be as indicated on Drawings.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. All equipment specified herein shall be factory installed, field adjusted, tested and cleaned as an integral part of equipment specified elsewhere in these Specifications.

END OF SECTION

SECTION 26 18 39  
MEDIUM VOLTAGE RVSS MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish and install assemblies of Medium Voltage RVSS Motor Controllers together with appurtenances, complete and operable, as specified herein and as shown on the Contract Drawings.
- B. Motor controllers shall be sized to include all equipment, spares and spaces shown on the Drawings.
- C. The RVSS manufacturer shall coordinate with the motor manufacturer for the motor being furnished and shall provide a certification that the motor controller is suitable for the application.

1.02 RELATED WORK

- A. Section 26 00 00 Electrical – General Provisions
- B. Section 26 05 29 Hangers and Supports for Electrical Systems
- C. Section 26 05 13 Medium Voltage Cables
- D. Section 26 09 13 Power Metering and Protective Relays

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with the requirements of Division 01, Section 26 00 00 Electrical – General Provisions and as specified herein.
- B. Submittals shall also contain information on related equipment to be furnished under this Specification but described in the related Sections listed in the Related Work paragraph above. Incomplete submittals not containing the required information on the related equipment will also be returned unreviewed.
- C. The submittals shall include the Quality Assurance information required by Paragraph 1.05A and 1.05B.
- D. The original RVSS equipment manufacturer shall create all RVSS shop drawings, including all wiring diagrams, in the manufacturer's engineering department. All RVSS shop drawings shall bear the original equipment manufacturer's RVSS logo, drawing file numbers, and shall be maintained on file in the manufacturer's RVSS archive file system.
- E. Submit to the Owner/Engineer, shop drawings and product data, for the following:
  - 1. Bus arrangement drawings.

2. Unit summary tables showing detailed equipment description and nameplate data for each compartment.
  3. Product data sheets and catalog numbers for overcurrent protective devices, motor starters, control relays, control stations, meters, pilot lights, etc. List all options, trip adjustments and accessories furnished specifically for this project. Clearly mark each sheet to indicate which items apply and/or those items that do not apply.
  4. Provide control systems engineering to produce custom unit elementary drawings showing internal wiring and interlocking between units and to remotely mounted devices. Show wire and terminal numbers. Indicate special identifications for electrical devices per the Drawings.
  5. Schematic diagram
  6. Nameplate schedule
  7. UL Listing of the completed assembly
  8. Major component ratings including:
    - a. Voltage
    - b. Continuous current
    - c. Interrupting ratings
  9. Itemized list of spare parts furnished specifically for this project, including quantities, description and part numbers.
- F. Factory Tests. Submittals shall be made for factory tests specified herein.
- G. Field Test Reports. Submittals shall be made for field tests specified herein.
- H. Operation and Maintenance Manuals.
1. Operation and maintenance manuals shall include the following information:
    - a. Manufacturer's contact address and telephone number for parts and service.
    - b. Instruction books and/or leaflets
    - c. Recommended renewal parts list
    - d. Record Documents for the information required by Paragraph D above.
- I. The manufacturer shall submit for approval, a training agenda for all training specified herein. Training agenda shall not be submitted until final approval of the Operation and Maintenance Manual.

#### 1.04 REFERENCE CODES AND STANDARDS

- A. The medium voltage motor control centers and all components in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):
1. ANSI/IEEE C57.13, Standard Requirements for Instrument Transformers.

2. IEEE C37.90, Standard for Relays and Relay Systems Associated with Electric Power Apparatus
  3. NEMA SG 2, High Voltage Fuses
  4. ANSI/NEMA ICS 6 – Enclosures for Industrial Controls and Systems
  5. NEMA ICS 1 – General Standard for Industrial Control Systems
  6. NEMA ICS 3, Part 2
  7. NFPA 70 – National Electrical Code (NEC)
  8. NFPA 70E – Standard for Electrical Safety in the Workplace
- B. All equipment specified in this Section of the Specifications shall bear the appropriate label of Underwriters Laboratories.

1.05 QUALITY ASSURANCE

- A. The manufacturer of this equipment shall have produced similar equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- B. All components and material shall be new and of the latest field proven design and in current production. Obsolete components or components scheduled for immediate discontinuation shall not be used.
- C. Equipment submitted shall fit within the space shown on the Drawings. Equipment which does not fit within the space is not acceptable.
- D. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.
- E. Equipment submitted shall fit within the space shown on the Drawings. Equipment which does not fit within the space is not acceptable.

1.06 JOBSITE DELIVERY, STORAGE AND HANDLING

- A. Prior to jobsite delivery, the Contractor shall have successfully completed all submittal requirements, and present to the Owner/Engineer upon delivery of the equipment, an approved copy of all such submittals. Delivery of incomplete constructed equipment, onsite factory work, or failed factory tests will not be permitted.
- B. Equipment shall be handled and stored in accordance with manufacturer's instructions. Two copies of these instructions shall be included with the equipment at time of shipment and shall be made available to the Contractor and Owner/Engineer.
- C. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Breakers and accessories shall be packaged and shipped separately.



- D. Equipment shall be equipped with lifting eyes to be handled by crane. Where cranes are not available, equipment shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.
- E. Equipment shall be installed in its permanent finished location shown on the Drawings within seven calendar days of arriving onsite. If the equipment cannot be installed within seven calendar days, the equipment shall not be delivered to the site, but stored offsite, at the Contractor's expense, until such time that the site is ready for permanent installation of the equipment.
- F. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during jobsite storage, and after equipment is installed in permanent location, until equipment is placed in service.

#### 1.07 WARRANTY

- A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for 1 years from date of final acceptance of the equipment. Within such period of warranty, the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the Manufacturer, at no expense to the Owner.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following Manufacturers are acceptable:
  - 1. Benshaw
  - 2. WEG
- B. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

#### 2.02 RATINGS

- A. Ambient Conditions
  - 1. Temperature: As a standard of unit design quality, starter shall be documented to show the design has been tested for 0 – 50° C (-32 to 122° F) operation, and Overload Capacity shall be rated at this temperature.
  - 2. Altitude: 1000 ft (305 m) maximum without derating
  - 3. Humidity: 0 – 95% RH, non-condensing.
- B. Controller Power Ratings

1. Input: 4.6 kV+10% to -15%, 3- phase, 60Hz  $\pm$  6Hz. Units shall operate with any incoming phase sequence.
2. Output: Reduced voltage 3- phase AC derived from phase-angle fired inverse-parallel thyristors, ramped to full voltage for the motor controlled.
3. Current Ratings: Current ratings shall be as shown on the Drawings.
4. Control Power: 120VAC, 60Hz, derived from an integral transformer sized to be adequate to operate all associated devices in each starter.
5. Entire controller assembly shall have a BIL rating of 60 kV minimum.
6. Controller Interrupting Ratings, as a NEMA Class E2 controller per UL 347, shall be 200 MVA at up to 2.3 kV and 350 MVA at up to 4.6 kV.
7. Standard insulation design shall be for 5 kV. Insulation shall be tested for dielectric voltage withstands of 2.25XL-L Voltage + ZKV for 60 seconds.

C. Buses

1. All bus ratings shall be as per UL Standard 347, tin plated copper, with insulating cover or insulating wrap.
2. Bus bars shall have a minimum fault current rating of 78,000 Amps.
3. Bus ratings shall be as shown on the Drawings. Ground busses shall have a minimum rating of 200 amperes.

D. For additional ratings and construction notes, refer to the Drawings.

2.03 CONSTRUCTION

A. General

1. This specification describes assemblies of Class E2 medium voltage motor controllers as specified herein and as shown on the Contract Drawings.
2. Refer to Drawings for: actual layout and location of equipment and components; current ratings of devices, bus bars, components; protective relays, voltage ratings of devices, components and assemblies; and other required details.
3. Nameplates
  - a. External
    - 1) Furnish nameplates for each device as specified herein and as indicated on the Drawings. All nameplates shall be laminated plastic, black lettering on a white background, attached with stainless steel screws. There shall be a master nameplate that indicates equipment ratings, manufacturer's name, shop order number and general information. Cubicle nameplates shall be mounted on the front face.

- b. Internal
    - 1) Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification, corresponding to appropriate designations on manufacturer's wiring diagrams.
  - c. Special
    - 1) Identification nameplates shall be white with black letters, caution nameplates shall be yellow with black letters and warning nameplates shall be red with white letters.
4. Control Devices and Indicators
- a. All operating control devices, indicators, and instruments shall be securely mounted on the panel door. All controls and indicators shall be 30mm, corrosion resistant, NEMA 4X/13. Auxiliary contacts shall be provided for remote run indication and indication of each status and alarm condition. Additional controls shall be provided as specified herein and as required by the detailed mechanical and electrical equipment requirements.
  - b. Indicator lamps shall be LED type. For all control applications, indicator lamps shall incorporate a push-to-test feature. Lens colors shall be as follows:
    - 1) Red for ON, Valve OPEN and Breaker CLOSED.
    - 2) Green for OFF, Valve CLOSED and Breaker OPEN.
    - 3) Amber for FAIL.
    - 4) Blue for READY
    - 5) White for POWER ON.
  - c. Mode selector switches (HAND-OFF-AUTO, LOCAL-OFF-REMOTE, etc.) shall be as shown on the Drawings. Units shall have the number of positions and contact arrangements, as required. Each switch shall have an extra dry contact for remote monitoring.
  - d. Pushbuttons shall be as follows:
    - 1) Red for STOP, Valve OPEN, Breaker OPEN and mushroom Red for EMERGENCY STOP.
    - 2) Green for START, Valve CLOSE and Breaker CLOSE.
    - 3) Black for RESET.
  - e. Furnish nameplates for each device. All nameplates shall be laminated plastic, black lettering on a white background, attached with stainless steel screws. Device mounted nameplates are not acceptable.
  - f. The manufacturer shall not remove, reuse, alter, or replace original equipment nameplates or equipment tags associated with equipment or components supplied by the manufacturer's suppliers and sub-suppliers.
5. Control and Instrument Power Transformers
- a. Control power transformers, encapsulated, shall be provided where shown on the Drawings. Transformer shall be sized for the entire load, including space heaters, plus 25% spare capacity, and shall be not less than 100VA.
  - b. Control power transformers shall be 120 volt grounded secondary. Primary side of the transformer shall be fused in both legs. One leg of the transformer secondary shall be solidly grounded while the other leg shall be fused.
6. Each controller shall have a print pocket containing a laminated copy of all schematics related to the controller.

2.04 REMOTE MONITORING AND CONTROL INTERFACE

- A. General: All control and interconnection points from the equipment to the plant control and monitoring system shall be brought to a separate connection box. No field connections shall be made directly to the equipment control devices. Functions to be brought out shall be as specified in the Instrumentation Division.
- B. Discrete control or status functions shall be from C relays with contacts rated at 120 volts AC. Analog signals shall be isolated from each other.
- C. Equipment functions to be directly interfaced to the Plant Control and Monitoring System, shall be designed for operation with an Ethernet Connection.

2.05 SPARE PARTS

- A. Provide the following spare parts:
  - 1. 3 – Control fuses of each type used.
  - 2. 3 – Power fuses of each type used.
- B. Spare parts shall be boxed or packaged for long term storage and clearly identified on the exterior of package. Identify each item with manufacturers name, description, and part number.

PART 3 EXECUTION

3.01 MANUFACTURER’S REPRESENTATIVE

- A. Provide the services of a qualified factory-trained manufacturer's field engineer to assist the Contractor in installation and start-up of the equipment specified under this Section for a period of not less than 2 working days, with not less than one working day per motor controller. The manufacturer's field engineer shall provide technical direction and assistance to the Contractor in general assembly of the equipment, connections and adjustments, and testing of the assembly and components contained therein.
- B. The Contractor shall provide three (3) copies of the manufacturer's field-testing report.

3.02 INSTALLER’S QUALIFICATIONS

- A. Installer shall be specialized in installing medium voltage motor controllers with minimum 5 years documented experience. Experience documentation shall be submitted for approval prior to beginning work on this project.

3.03 EXAMINATION

- A. Examine installation area to assure there is enough clearance to install the equipment.
- B. Verify that the equipment is ready to install.
- C. Verify field measurements are as instructed by manufacturer.

3.04 INSTALLATION

- A. The Contractor shall install all equipment per the manufacturer's recommendations and Contract Drawings.
- B. Install required safety labels.

3.05 FIELD QUALITY CONTROL

- A. Inspect installed equipment for anchoring, alignment, grounding and physical damage.
- B. Check tightness of all accessible electrical connections. Minimum acceptable values are specified in manufacturer's instructions.

3.06 FIELD ADJUSTING

- A. Adjust all circuit breakers, switches, access doors, operating handles for free mechanical and electrical operation as described in manufacturer's instructions.
- B. The Power Monitoring and Protective Relays shall be set in the field by a qualified representative of the manufacturer, retained by the Contractor.

3.07 FIELD TESTING

- A. The manufacturer's field engineer shall make all electrical field tests recommended by the manufacturer and including the following tests.
- B. Verify tightness of all bolted connections by calibrated torque-wrench in accordance with manufacturer's published data.
- C. The tests shall adhere to manufacturer's testing recommendations for the proper testing methods and test voltage levels for each piece of equipment. Readings that fall below manufacturer's recommended values will not be acceptable and the Contractor shall be required to perform any necessary remedial action before the busing is energized. A data sheet shall be submitted to the Owner/Engineer for the RVSS. The test report shall include the following equipment information:
  - 1. RVSS Name and Number:
  - 2. RVSS Manufacturer:
  - 3. RVSS Nameplate Data:
    - a. Volts:
    - b. Horizontal Bus Amps:
    - c. Main Switch Amps:
    - d. Insulation Test (measured):
      - 1) Phase A-B:
      - 2) Phase B-C:
      - 3) Phase C-A:
      - 4) Phase A-G:

- 5) Phase B-G:
- 6) Phase C-G:
- e. Equipment disconnected during test:
- f. Date of Test:
- g. Tested by:

- D. Where test reports show unsatisfactory results, the Owner/Engineer may require the removal of all defective or suspected materials, equipment and/or apparatus, and their replacement with new items, all at no cost to the Owner. The Contractor shall bear all cost for any retesting.

### 3.08 CLEANING

- A. Remove all rubbish and debris from inside and around the equipment. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air.

### 3.09 EQUIPMENT PROTECTION AND RESTORATION

- A. Touch-up and restore damaged surfaces to factory finish, as approved by the manufacturer. If the damaged surface cannot be returned to factory specification, the surface shall be replaced.

### 3.10 MANUFACTURER'S CERTIFICATION

- A. A qualified factory-trained manufacturer's representative shall personally inspect the equipment at the jobsite and shall certify in writing that the equipment has been installed, adjusted, and tested, in accordance with the manufacturer's recommendations, including all settings designated in the Power System Study.
- B. The Contractor shall provide three copies of the manufacturer's representative's certification.

### 3.11 TRAINING

- A. Provide manufacturer's services for training of plant personnel in operation and maintenance of the equipment furnished under this Section.
- B. The training shall be for a period of four hours.
- C. The cost of training program to be conducted with Owner's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.
- D. Provide detailed O&M manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.
- E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.
- F. The Owner reserves the right to videotape the training sessions for the Owner's use.

END OF SECTION

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SECTION 26 24 16  
PANELBOARDS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install distribution and branch circuit panel boards.

1.02 REFERENCED STANDARDS

- A. The following standards shall apply as if written here in their entirety:
  - 1. UL 50 - Cabinets and Boxes.
  - 2. UL 67 - Electric Panelboards.
  - 3. NEMA AB 1 - Molded Case Circuit Breakers.
  - 4. NEMA AB 2 - Procedures for Verifying the Performance of Molded Case Circuit Breakers.
  - 5. NEMA KS 1 - Enclosed Switches.
  - 6. NEMA PB 1 - Panelboards.

1.03 SUBMITTALS

- A. The following information shall be submitted to the Engineer:
  - 1. Breaker layout drawing with dimensions indicated and nameplate designation
  - 2. Component list
  - 3. Conduit entry/exit locations
  - 4. Assembly ratings including:
    - a. Short-circuit rating
    - b. Voltage
    - c. Continuous current
  - 5. Cable terminal sizes
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Submit a letter certifying full and complete compliance with the Specifications, Drawings and other project requirements. The letter shall list any exceptions or deviations from specified



requirements, if any and reasons for same. Exceptions or deviation shall also be clearly marked in a separate color in submittals.

## PART 2 PRODUCTS

### 2.01 ENCLOSURE

#### A. Cabinet:

1. Construct cabinets in accordance with UL 50. Use painted galvanized sheet steel 16-gauge or more.
2. Provide a minimum 4-inch gutter wiring space on each side.
3. Reinforce cabinets and securely support bus bars and over-current devices to prevent vibration and breakage in handling.
4. Provide standard conduit knockouts in cabinet ends.
5. Finish cabinets of surface-mounted panelboards to match doors and trim as specified below.
6. Panelboards mounted outdoors shall be weatherproof, and shall have a door behind door type construction.
7. Panelboards mounted outdoor in wet or corrosive areas shall have NEMA 4X stainless steel 316 enclosures.
8. Panelboards mounted indoor shall be NEMA 12 enclosures for areas classified as NEMA 12, except for panelboards in the GBT Building shall have NEMA 4X stainless steel 316 enclosures.

#### B. Doors and Trim:

1. Fabricate doors and trim from cold-rolled sheet steel.
2. Equip doors with flush-type combination catch and key lock.
3. Key all locks alike. Fasten trim for flush-mounted panelboards to cabinets by an approved means which permits both horizontal and vertical adjustment.
4. Trim for surface-mounted panelboards must fit the cabinet with no overhang.
5. Apply a finish to trim and doors consisting of two coats of enamel over a rust-inhibiting prime coat.

### 2.02 BUS

#### A. Material:

1. Provide tin plated, copper bus bars, 98 percent IACS conductivity, full-sized throughout their length.
  2. Use buses with tin-plated contact surfaces.
  3. Include a tin-plated copper bus bar ground bus in panelboard rated, not less than 25% of the main capacity.
  4. Full size (100% rated) insulated neutral bus shall be included in the panel board, shown with neutral. 200% rated neutral bus shall be supplied for panels designated on the drawings.
  5. The ground and neutral bus shall be at least one terminal screw for each circuit.
  6. Provide through feed or sub feed lugs where indicated.
  7. Provide lugs and connection points on phase, neutral and ground bus suitable for copper conductors.
  8. Spaces for future circuit breakers shall be bussed for the maximum devices that can be fitted.
- B. Size bars as indicated and brace them to withstand the available symmetrical short circuit current.
- C. Installation:
1. Install buses in allotted spaces so that devices can be added without additional machining, drilling or tapping.
  2. Mount neutral bars, as required, on the opposite end of the main lugs.

## 2.03 PROTECTIVE DEVICES

- A. Circuit Breakers: Provide circuit breakers for the specified service with the number of poles and ampere ratings indicated. All breakers 250A and above shall be 100% rated.
1. Provide breakers which are quick-make and quick-break on both manual and automatic operation.
  2. Use a trip-free trip indicating breaker.
  3. Incorporate inverse time characteristic by bimetallic overload elements and instantaneous characteristic by magnetic trip. Where indicated, provide ground fault circuit breakers (GFCB).
  4. For 2-pole and 3-pole breakers, use the common-trip type so that an overload or fault on one pole will trip all poles simultaneously. Handle ties are not acceptable.
  5. Unless otherwise indicated, provide circuit breakers with the following interrupting ratings:

- a. Each circuit breaker used in 120/208 Volt panelboards shall have an interrupting capacity of not less than 10,000 Amps, RMS symmetrical.
  - b. Each circuit breaker used in 277/480 Volt and 480 Volt panelboards shall have an interrupting capacity of not less than 22,000 Amps, RMS symmetrical.
  - c. GFCI (ground fault circuit interrupter) shall be provided for circuits where shown on the drawings. GFCI units shall be 1 Pole, 120 Volt, molded case, bolt-on breakers, incorporating a solid-state ground fault interrupter circuit insulated and isolated from the breaker mechanism. The unit shall be UL listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time) and an interrupting capacity of 10,000 Amps, RMS.
  - d. Circuit breakers shall be as manufactured by the panelboard manufacturer.
6. Connect breakers to the main bus by means of a solidly bolted connection.
  7. Use breakers which are interchangeable, capable of being operated in any position within the panel.
  8. Independently mount breakers so that a single unit can be removed from the front of the panel without disturbing or removing main bus, other units or other branch circuit connections.
  9. Provide individual breaker handle lock for all circuits that supply exit signs, emergency lights, and fire alarm panels.
  10. Provide GFI circuit breakers for heat trace circuit. The rating shall be as per NEC.

**B. Surge Suppressor**

1. All the 480V panelboard shall be provided with a surge protective device in accordance with Division 26.

**C. Service Entrance**

1. The panelboard shall have a connection for housing and grounding neutral conductor.
2. Provide a UL label for the panelboard.

**2.04 CIRCUIT IDENTIFICATION**

**A. Directory:**

1. For each panelboard, provide a directory frame mounted inside the door with a heat-resistant transparent face and a directory card for identifying the load served.
2. Type directory as specified in Section 26 00 00.

**B. Nameplate:**

1. Provide a black on white nameplate on the face of the panelboard using the following as an example:

Panel HA  
277/480V, 30, 4W  
Feeder from MCC-B/Section

2. The nameplate shall have a minimum thickness of 1/8".

2.05 LISTING

- A. UL 67 - Electric Panelboards.

2.06 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers are General Electric, Siemens, and Square D.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards in the locations as shown and as recommended in NEMA PB1.1.
- B. In wet and corrosive areas, including outdoor locations, install stainless steel 316 panelboard enclosures on Type 316 stainless steel unistrut support to provide clearance behind the mounting surface.
- C. In wet and corrosive areas, including outdoor locations, connect conduits to the bottom of the enclosure and to the lower 30 percent of the sides.
- D. All conduit connections shall be by use of Myers hub.

3.02 MOUNTING HEIGHT

- A. Install the panelboards such that the center of the switch or circuit breaker in the highest position will not be more than 6-1/2 feet above the floor or working platform.

3.03 SPECIAL REQUIREMENTS

- A. All copper items, including wiring, terminal blocks, lugs, connectors, bus, etc., shall be tin plated copper.
- B. All steel shall be primed and painted as specified. Galvanized items shall also be painted.
- C. All hardware, including nuts, bolts, washers, screws, anchor bolts, door hinges, etc., shall be made of 316 stainless steel.

- D. The panelboard steel parts shall be cleaned and sprayed in control cleaning solutions by a multi-stage spray washer. The operation shall produce a coating of a minimum of 150milligrams per square foot to meet MIL Specification TT-C490. The primed metal parts shall be electrostatically coated with power paint to a thickness of 2.5mils. The paint finish shall withstand a minimum of 1000hours salt spray test.

END OF SECTION

SECTION 26 32 13.13  
DIESEL ENGINE DRIVEN GENERATOR SETS

PART 1 GENERAL TECHNICAL REQUIREMENTS

1.01 COMPOSITION

- A. The Diesel Generator Units (GENSET) shall consist of the following:
- Diesel Generator Set
  - Integral/Subbase Fuel Tank
  - Exhaust System
  - Outdoor Weather Protective and Sound Attenuating (where indicated) Enclosure
- B. The GENSET shall be supplied as a complete pre-integrated and pre-assembled unit.

1.02 MANUFACTURE

- A. The GENSET shall be internationally reputed make. GENSET shall be supplied from original suppliers and locally assembled units are not acceptable.

1.03 SERVICE CONDITIONS

- A. The GENSET shall be designed to be operated at following worse case conditions:

Altitude	Up to 300 meters above sea-level
Maximum outdoor	+45° C
Maximum outdoor daily average	+30° C
Minimum outdoor	-10° C
Highest one day variation	+25° C
Relative Humidity: Maximum Minimum	100%/25%

1.04 SYSTEM CONDITIONS

- A. The GENSET sets shall be designed to be operated under following system parameters:

Nominal System Voltage	480 V / 277 V
Highest System Voltage	528 V / 306 V
Number of Phases	3 ph, 4 wire
Frequency	60Hz
Neutral Point	Solidly Earthed

## PART 2 PARTICULAR TECHNICAL REQUIREMENTS

### 2.01 STANDARDS

- A. The GENSET shall be designed, manufactured, and tested in compliance with the latest versions of the following standards:
  - 1. IEC 60034 Rotating Electrical Machines
  - 2. IEC 60085 Thermal Evaluation and Classification of Electrical Insulation
  - 3. IEC 60529 Degrees of Protection provided by Enclosures (IP Code)
  - 4. ISO 10816 Specification for Mechanical Performance Vibration
  - 5. ISO 3046 Specification for Reciprocating Internal Combustion Engines
  - 6. ISO 9000 Quality Assurance

### 2.02 RATINGS

- A. The GENSET shall be rated for: 480 V AC, 3 phase, 60 Hz.
- B. Required rated emergency standby capacities (kW) at an outdoor operating temperature of 40 deg is as indicated on drawings with a .85 power factor.

### 2.03 PERFORMANCE

- A. The GENSET sets shall be capable of delivering rated kVA indicated under 2.02 B emergency standby service conditions.
- B. Voltage regulation:  $\pm 0.5\%$
- C. Frequency regulation: Random frequency variation with any steady load from no load to full load shall not exceed  $\pm 0.25\%$ .

### 2.04 DIESEL ENGINE

- A. The diesel engine shall comply with the specified International IEC Standards or an equivalent international standard and shall be of the four-stroke, multi-cylinder, water-cooled, cold start, direct fuel injection, compression ignition, and preferably turbo-charged type. The crankshaft speed shall not exceed 1800 RPM.
  - 1. Speed Governor - The diesel engine shall be fitted with a speed governor capable of accuracy to Class A2 of ISO 3046/IV. The governor is to be fitted with speed control facilities to enable the engine speed to be adjusted from the local control panel.
  - 2. Shutdown System - The engine shall be fitted with a mechanically operated device which will shut off the fuel supply to engine when any of the specified alarm conditions occur.

3. Cooling System - The cooling system shall be filled with chemically treated water mixture by the equipment supplier. Rotating parts shall be guarded against accidental contact in accordance with standard requirements.
- B. A vertical fan cooled sectional radiator, rated for the tropical site conditions shall be mounted at the end of the combined under base and driven from the diesel engine. The radiator shall be arranged to cool the engine jacket water and lubricating oil. The radiator must be generously sized to permit operation at full load and overload in the specified ambient conditions. The radiator shall be integral with the generating set. The radiator shall be provided complete with fan claw and guards.
  1. Pumps - Cooling water, lubricating and fuel oil pressurizing pumps shall be provided and mounted on the engine and shall be gear driven from the crankshaft.
  2. Lubrication - Lubrication shall be by means of an engine-driven gear pump and the system shall include full flow oil filters with replaceable elements.
  3. Safety Guards - All moving parts shall be adequately guarded, in order to prevent danger to personnel.
  4. Fuel - The engine shall be designed for operation on diesel fuel.
  5. Lubricating and Fuel Oil Filters - The lubricating and fuel oil filters shall be of the fuel flow type.
  6. Air Filters - Air filters shall be suitable for use in the environmental conditions which are likely to arise locally and the service conditions described in Part 1.
  7. Starting System - The set shall be supplied with a completely self-contained starting system consisting of an engine driven dynamo, a lead acid battery and battery charger.
- C. The starting system shall be designed such that at engine speeds in excess of the minimum firing speed it shall be impossible to complete the starting circuit. The starting system shall preclude excessive consecutive starting attempts.
  1. Exhaust System - The engine shall be efficiently silenced and be complete with primary and terminal silencer arrangements.

## 2.05 ALTERNATOR

- A. The alternator shall be synchronous, four pole and brushless excitation type and shall comply with the relevant requirements of Specification IEC 60034 or an equivalent international standard.
- B. The alternator shall be designed for operation of 10% engine overload at any power factor between unity and rated power factor for a maximum period of one hour in any 12 hour period as permitted by ISO 3046/II.



- C. The alternator shall be rated for IP-23 protection. The insulation of the winding shall be class H. All winding shall be tropicalized and suitably impregnated to withstand the site ambient conditions.
- D. The alternator shall be complete with all necessary cooling fans, excitation and voltage regulating equipment. The alternator shall be capable of maintaining its continuous maximum rated output when operating within + 5% of rated voltage and at rated power factor.
- E. The alternator shall be brushless rotating field, self-exciting and self-regulating type complete with permanent magnets and fully connected damper windings. The stator winding shall be star-connected and shall be brought out together with the neutral point to terminals located in a sheet steel box mounted on top of the generator to facilitate connection of a power cable of suitable capacity.
- F. The following protection shall be provided for the alternator:
  - 1. Over Current Protection
  - 2. Earth Fault Protection

## 2.06 MOUNTING

- A. Complete unit to be mounted on robust skid frame. Vibration mountings to be used where required.
- B. Skid frame to be dimensioned to accommodate generator/alternator assembly, all accessories, soundproof canopy. Skid frame to be of rigid construction suitable for locating on level ground surfaces ranging from compacted earth, crushed rock or a concrete pad.

## 2.07 FUEL TANKS

- A. Built-in Fuel Tank: A minimum capacity of not less than 24 hours full running time built in fuel tank shall be provided. Design shall be capable of preventing accidental spilling of fuel and hand pump feeding on emergencies is possible.
- B. Tank Construction
  - 1. Provide a double wall secondary containment type integral/sub base fuel storage tank. The tank shall be constructed of corrosion resistant steel and shall be type UL listed (UL-2085, UL-142) as indicated per location on drawings and shall include the following features:
  - 2. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure.
  - 3. Windows for bottom entry electrical stub up(s)
  - 4. Normal & emergency vents
  - 5. Lockable fuel fill

6. Mechanical fuel level gauge
7. Low level switches to indicate fuel level
8. Leak detector switch - Rupture switch
9. Tank shall include a welded steel containment basin to prevent escape of fuel into the environment in the event of a tank rupture. For UL 142 listed tanks size of the containment shall be a minimum of 10% of the tank capacity.
10. The tank shall be externally coated with 2 layers of coatings. The prime layer using Red Oxide paint and the top layer using waterproof plastic layer.
11. Tank shall comply with the normal and emergency venting requirements NFPA 30. Tank shall carry a two (2) years warranty including materials and workmanship.
12. Fuel tank to have, lowest point drain facility for water and sludge, fuel level gauge direct mounted or remote electric, filler pipe and locking cap.

C. Accessories

1. The tank shall be manufactured to support the following accessory equipment and shall be provided with suitably located lifting lugs:
  - a. Direct Level Indicator: A steel pipe of suitable size shall protect the level indicating, the level indicator shall be made of plastic pipe connected through suitable valves and approved by the supervising engineer.
  - b. Inspection Port Adapter Cap: Tank shall be equipped with a not less than 300 mm adapter and lockable cap for inspection and manual gauging of fuel level. Gauge port shall be accessible from steps or ladder.
  - c. Tank Fill Opening: The tank shall be provided with a suitable sized filling opening that will minimize the oil spilling during tank filling operation.
  - d. Vent Opening: The tank shall be provided with a suitable sized venting pipe to prevent the increase of gas pressure inside the tank. The vent opening should be covered with a wire mesh to prevent anything from entering and blocking the vent.
  - e. Supply Pipe Connection: The tank shall be provided with a suitable sized ASME B36.10, Schedule 40 Black steel supply pipe connection with a stainless steel two – piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union Ball Valve.
2. Drainpipe Connection: The tank shall be provided with a suitable sized ASME B 36.10, Schedule 40 Black Steel Drain pipe connection with a Carbon Steel, Stainless ball, with Viton seals Spill Sump Drain Valve.
3. Access Steps and Ladders: The Tank shall be equipped with access steps or ladder. Steps and ladder shall be of welded steel construction with prime and finish paint of industrial enamel or aluminum and shall be designed to conform to OSHA requirements. If breaker handle height is above 6'8" then please provide platforms to conform to NEC requirements.

D. Fuel Distribution Pipe and Pipe Fittings

1. The design criteria shall conform to the following minimum requirements: Steel Pipe: ASME B36.10, Schedule 40 Black Steel Fittings:
  - a. ASTM B16.3, 300 lb. Threaded malleable iron, or ASTM A234, forged steel welding type. Finish: Prime and finish paint with industrial enamel.

E. Drawings

1. The contractor should submit design (shop) drawings for the tank and fuel pipe distribution, location of fittings and accessories with specific dimensions, for approval by UNDP prior to product fabrication.

F. Test

1. The tank shall withstand an internal air pressure test of 3-5 psi.

G. Welding

1. Welding shall be carried out in accordance with an approved standard or code of practice. The welding plants and processes used shall be suitable to the materials, configurations and purposes of the welded parts.
2. Only qualified welders, certified for the type of welding required, shall be employed. The Contractor shall exercise strict control over the welding conditions and parameters and shall continuously monitor the standard of welding achieved in accordance with the requirements of the Clause on Quality Control and Quality Assurance.

2.08 CONCRETE FOUNDATION / PAD DRAWINGS

- A. Detailed drawings of the concrete/pad foundations required for mounting/installation of generators shall be provided with all necessary details within three (03) weeks of award of contract.

2.09 OUTDOOR WEATHER PROTECTIVE SOUND ATTENUATING ENCLOSURE

- A. The generator set shall be provided with a sound attenuated housing which allows the generator set to operate at full rated load in the ambient conditions. The enclosure shall reduce the sound level of the generator set while operating at full rated load to below 65 dBA at 7 meters from the generator set. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustic materials used shall be oil and water resistant. No foam materials shall be used.
- B. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. A panel viewing window shall be provided. Key locking door latches shall be provided for all doors. Door hinges shall be stainless steel.
- C. The enclosure shall be provided with an exhaust silencer, which is mounted outside of the enclosure, and allows the generator set package to meet specified sound level requirements. Silencer and exhaust shall include a rain cap and rain shield. Muffler location: within the enclosure.

2.10 TYPE TESTS

- A. Type test reports/certificates of generators need to be submitted with the bid.
- B. Type tests shall be carried out at an independent laboratory or witnessed by a representative of such laboratory.
- C. Testing at manufacture's works:

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components, and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
  - 2. Full load run.
  - 3. Maximum power.
  - 4. Voltage regulation.
  - 5. Steady-state governing.
  - 6. Single-step load pickup.
  - 7. Simulated safety shutdowns.
  - 8. The supplier shall submit full details of the methods of testing including connection diagrams for approval at least one (1) month before testing.
  - 9. The supplier shall give a minimum of two (2) weeks' notice that the generators are ready for testing.
  - 10. All costs in connection with the testing shall be borne by the supplier who shall provide OWNER with all the facilities free of charge.

2.12 OTHER REQUIREMENTS

- A. Generator set shall have the following facility. Forklift Pockets within Base Frame.
- B. The control panel shall have the following provisions for the control of GENSET:
  - 1. Master engine control which for OFF/AUTO/MANUAL/TEST with a facility for starting and stopping of the set.
  - 2. Selectable Multifunction meter
  - 3. Engine control monitor.
  - 4. Alternator voltage monitor.
  - 5. Engine hours run counter.
  - 6. Voltmeter and Ammeter
  - 7. Combined frequency and tachometer
- C. The diesel generator shall automatically shut down under following conditions.
  - 1. Low Oil Pressure
  - 2. High Engine Temperature
  - 3. Low Fuel Level
  - 4. Over/Under Speed
- D. Earthing studs need to be provided.

2.13 WARRANTY-

- A. Warranty period shall be two year /1000 hours operation whichever occurs first.

2.14 SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
  - 1. Thermal damage curve for generator.
  - 2. Time-current characteristic curves for generator protective device.
  - 3. Sound test data, based on a free field requirement.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.
  - 1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
  - 2. Wiring Diagrams: Control interconnection, Customer connections.
- C. Certifications:
  - 1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location for EPA, stationary emergency application.

## 2.15 INFORMATIONAL SUBMITTALS

- A. Source quality-control test reports.
  - 1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.
  - 2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.
  - 3. List of factory tests to be performed on units to be shipped for this Project.
  - 4. Report of exhaust emissions and compliance statement certifying compliance with applicable regulations.
- B. Warranty:
  - 1. Submit manufacturer's warranty statement to be provided for this Project.

## 2.16 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001. Maintain, within 100 miles of the project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. Comply with NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).

- E. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).
- F. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.
- G. Comply with UL 2200.

END OF SECTION

SECTION 26 36 23  
AUTOMATIC TRANSFER SWITCHES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
  - 1. Automatic transfer switches, X-series
  - 2. Remote annunciation systems
- B. Related Sections include the following:

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
  - 1. Technical data on all major components of all transfer switches and other products described in this section. Data is required for the transfer switch mechanism, control system, cabinet, and protective devices specifically listed for use with each transfer switch. Include steady state and fault current ratings, weights, operating characteristics, and furnished specialties and accessories.
  - 2. Single Line Diagram: Show connections between transfer switch, power sources and load
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
  - 1. Dimensioned outline drawings of assembly, including elevations, sections, and details including minimal clearances, conductor entry provisions, gutter space, installed features and devices and material lists for each switch specified.
  - 2. Internal electrical wiring and control drawings.
  - 3. Interconnection wiring diagrams, showing recommended conduit runs and point-to-point terminal connections to generator set.
  - 4. Installation and mounting instructions, including information for proper installation of equipment to meet seismic requirements.
- C. Manufacturer and Supplier Qualification Data



1. The transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.
  2. The manufacturer of this equipment shall have produced similar equipment for a minimum period of 10 years. When requested, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Features and operating sequences, both automatic and manual.
  2. List of all factory settings of relays, timers and protective devices; provide setting and calibration instructions where applicable.
- E. Warranty documents demonstrating compliance with the project's contract requirements.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The equipment supplier shall maintain a service center capable of providing training, parts, maintenance and emergency repairs to equipment, including transfer switch generator sets at the site within a response period of less than 24 hours from time of notification.
1. The transfer switch shall be serviced by technicians employed by, and specially trained and factory certified. The service organization shall be on call 24 hours per day, 365 days per year.
  2. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 10 years.
- B. Source Limitations: All transfer switches are to be obtained through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked as suitable for use in emergency, legally required or optional standby use as appropriate for the connected load.
- D. The automatic transfer switch installation and application shall conform to the requirements of the following codes and standards:
1. Transfer switches and enclosures shall be UL 1008 listed and labeled as suitable for use in emergency, legally required, and optional standby applications.
  2. CSA 282, Emergency Electrical Power Supply for Buildings, and CSA C22.2, No. 14-M91 Industrial Control Equipment

3. NFPA 70, National Electrical Code. Equipment shall be suitable for use in systems in compliance with Articles 700, 701 and 702.
4. Comply with NEMA ICS 10-1993 AC Automatic Transfer Switches
5. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
6. EN55011, Class B Radiated Emissions and Class B Conducted Emissions
7. IEC 1000-4-5 (EN 61000-4-5); AC Surge Immunity
8. IEC 1000-4-4 (EN 61000-4-4) Fast Transients Immunity
9. IEC 1000-4-2 (EN 61000-4-2) Electrostatic Discharge Immunity
10. IEC 1000-4-3 (EN 61000-4-3) Radiated Field Immunity
11. IEC 1000-4-6 Conducted Field Immunity
12. IEC 1000-4-11 Voltage Dip Immunity
13. IEEE 62.41, AC Voltage Surge Immunity
14. IEEE 62.45, AC Voltage Surge Testing
- E. Comply with NFPA 99 – Essential Electrical Systems for Healthcare Facilities
- F. Comply with NFPA 110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems, regardless of the actual circuit level.
- G. The manufacturer shall warrant the material and workmanship of the transfer switch equipment for a minimum of five (5) year from the warranty start date. The warranty start date is the date of registered commissioning and start up or eighteen (18) months from date of shipment, whichever is sooner.
- H. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, and etc. during the minimum noted warranty period described above.

#### 1.05 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
  1. Notify (Architect/Construction Manager/Owner) no fewer than (insert appropriate number) days in advance of proposed interruption of electrical service.
  2. Do not proceed with interruption of electrical service without (Architect/Construction Manager/Owner's) written permission.

3. Do not energize any new service or distribution equipment without notification and permission of the (Architect/Construction Manager/Owner).

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Cummins
  2. Kohler
  3. ASCO
  4. Approved equal
- B. Equipment specifications for this Project are based on automatic transfer switches manufactured by Kohler. Switches manufactured by other manufacturers that meet the requirement of this specification are acceptable if approved by Engineer. Proposals for equal must include a line-by-line compliance statement based on this specification.
- C. Transfer switches utilizing molded case circuit breakers do not meet the requirements of this specification and will not be accepted.

### 2.02 AUTO TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Provide transfer switches in the number and ratings that are shown on the drawings.
- B. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer.
- C. Fault-Current Closing and Withstand Ratings: UL 1008 WCR ratings must be specifically listed as meeting the requirements for use with protective devices at installation locations, under specified fault conditions. Withstand and closing ratings shall be based on use of the same set of contacts for the withstand test and the closing test.
- D. Solid-State Controls: All settings should be accurate to +/- 2% or better over an operating temperature range of - 40 to + 60 degrees C (- 40 to + 140 degrees F).
- E. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- F. Electrical Operation: Accomplished by a non-fused, momentarily energized solenoid or electric motor operator mechanism, mechanically and electrically interlocked in both directions (except that mechanical interlock is not required for closed transition switches).

- G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
  - 1. Switches using molded-case switches or circuit breakers, or insulated case circuit breaker components are not acceptable.
  - 2. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the Source 1 and Source 2 positions.
  - 3. Main switch contacts shall be high pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.
  - 4. Contacts shall be operated by a high-speed electrical mechanism that causes contacts to open or close within six electrical cycles from signal.
  - 5. The transfer switch operation shall include the ability to switch to an open position (both sources disconnected) for the purpose of load shedding from the generator set.
  - 6. Transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with components that could be operating at line voltage levels.
  - 7. Transfer switches designated on the drawings as “4-pole” shall be provided with a switched neutral pole switched which is switched simultaneously with phase poles.
- H. Control: Transfer switch control shall be capable of communicating with remote programming devices over a high-speed network interface.
- I. Factory wiring: Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism
- J. Terminals: Terminals shall be pressure type and appropriate for all field wiring. Control wiring shall be equipped with suitable lugs, for connection to terminal strips.
- K. Enclosures: All enclosures shall be third-party certified for compliance to NEMA ICS 6 and UL 508 and rated as indicated on drawings
- L. Control Functions: Functions managed by the control shall include:
  - 1. Software adjustable time delays:
    - a. Engine start (prevents nuisance genset starts in the event of momentary power fluctuation): 0 to 120 seconds
    - b. Transfer normal to emergency (allows genset to stabilize before load is transferred): 0 to 120 seconds
    - c. Re-transfer emergency to normal (allows utility to stabilize before load is transferred from genset): 0 to 30 minutes

- d. Engine cooldown: 0 to 30 minutes
    - e. Programmed transition: 0 to 60 seconds
  - 2. Undervoltage sensing: three-phase normal, three-phase emergency source.
  - 3. Over-voltage sensing: three-phase normal, three-phase emergency source.
  - 4. Over/under frequency sensing:
    - a. Pickup: +/- 5 to +/-20% of nominal frequency (default 10%)
    - b. Dropout: +/-1% beyond pickup (default 1%)
    - c. Dropout time delay: 0.1 to 15.0 seconds (default 5 sec)
    - d. Accurate to within +/- 0.05 Hz
  - 5. Voltage imbalance sensing:
    - a. Dropout: 2 to 10%
    - b. Pickup: 90% of dropout
    - c. Time delay: 2.0 to 20 seconds
  - 6. Phase rotation sensing:
    - a. Time delay: 100 msec
  - 7. Loss of single-phase detection:
    - a. Time delay: 100 msec
- M. Control features shall include:
- 1. Programmable genset exerciser: A field-programmable control shall periodically start and run the generator with or without transferring the load for a preset time period, then re-transfer and shut down the generator after a preset cool-down period.
  - 2. In event of a loss of power to the control, all control settings, real-time clock setting and the engine start-time delay setting will be retained.
  - 3. The system continuously logs information including the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. An event recorder stores information, including time and date-stamp, for up to 50 events.
  - 4. Re-Transfer Inhibit Switch: Inhibits automatic re-transfer control so automatic transfer switch will remain connected to emergency power source as long as it is available regardless of condition of normal source.
  - 5. Transfer Inhibit Switch: Inhibits automatic transfer control so automatic transfer switch will remain connected to normal power source regardless of condition of emergency source.
- N. Control Interface
- 1. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.

2. The transfer switch shall be provided with a network communication card, and configured to allow network-based communication with the transfer switch and other network system components, including the generator set(s) provided for the Project.
3. Unassigned Auxiliary Contacts: Two normally open, 1-pole, double-throw contacts for each switch position, rated 10A at 240 VAC.

O. Engine Starting Contacts

1. One isolated and normally closed pair of contacts rated 10A at 32 VDC minimum.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Design each fastener and support to carry load indicated.
- B. Rack Mounting shall be with stainless steel hardware
- C. Identify components according to Division 26 Section "Identification for Electrical Systems."
- D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

**3.02 CONNECTIONS**

- A. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
- B. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.
- C. Ground equipment according to Division 26 Section "Grounding."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

**3.03 SOURCE QUALITY CONTROL**

- A. Prior to shipping, factory shall test and inspect components, assembled switches, and associated equipment to ensure proper operation.
- B. Factory shall check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements.
- C. Factory shall perform dielectric strength test complying with NEMA ICS 1.

**3.04 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: The supplier of the transfer switch(es) and associated equipment shall inspect, test, and adjust components, assemblies, and equipment installations, including connections, and report results in writing.
- B. Manufacturer's representative shall perform tests and inspections and prepare test reports.
- C. After installing equipment and after electrical circuitry has been energized, installer shall test for compliance with requirements.
  - 1. Perform recommended installation tests as recommended in manufacturer's installation and service manuals.
  - 2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch.
    - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
    - b. Verify time-delay settings.
    - c. Verify that the transfer switch is accurately metering AC voltage and current.
    - d. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

### 3.05 DEMONSTRATION

- A. After generator set installation, the generator and transfer switch supplier shall conduct a complete operation, basic maintenance, and emergency service seminar covering generator set and transfer switch equipment, for up to 4 people employed by the Owner.
  - 1. The seminar shall include instruction on operation of the transfer equipment, normal testing and exercise, adjustments to the control system, use of the PC based service and maintenance tools provided under this contract, and emergency operation procedures.
  - 2. The class duration shall be at least 4 hours in length and include practical operation with the installed equipment.

END OF SECTION

SECTION 31 23 33.14  
TRENCH SAFETY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Trench Safety System for the construction of trench excavations.
- B. Trench Safety System for structural excavations that fall under provisions of State and Federal trench safety laws.
- C. American Society for Testing and Materials (ASTM):
  - 1. A 307, Carbon Steel Bolts and Studs 60,000 psi Tensile Strength
  - 2. A 328, Steel Sheet Piling
  - 3. A 36, Structural Steel
  - 4. A 572, High Strength Low Alloy Columbium Vanadium Steels of Structural Quality
  - 5. A 588, High Strength Low Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-In. (100 mm) Thick
  - 6. A 690, High Strength Low Alloy Steel H Piles and Sheet Piling for Use in Marine Environments
- D. American Welding Society, Inc. (AWS):
  - 1. D1.1, Structural Welding Code Steel
- E. Code of Federal Regulations (CFR):
  - 1. 29CFR1926, Safety and Health Regulations for Construction; Subpart P Excavations, Trenching, and Shoring

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices
  - 1. Measurement for trench safety systems used on trench excavations is on a linear foot basis measured along the centerline of the trench, including manholes and other line structures.
  - 2. No payment will be made for trench safety systems for structural excavations under this section. Include payment for trench safety system in applicable structure installation sections.
  - 3. Refer to Section 01 20 22 – Price and Payment Procedures.



- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DESCRIPTION

- A. Trench excavation safety systems shall be employed to accomplish safety from trench collapses where trench excavation is more than 5 ft. in depth and trench material is other than solid rock.
- B. A trench shall be defined as a narrow excavation (in relation to its depth) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.
- C. The trench safety system requirements will apply to larger open excavations if the erection of structures or other installations limits the space between the excavation slope and these installation to dimensions equivalent of a trench as defined.
- D. Trench Safety Systems include but are not limited to sloping, sheeting, trench boxes or trench shields, sheet piling, cribbing, bracing, shoring, dewatering or diversion of water to provide adequate drainage.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01 33 00 – Submittal Procedures.
- B. Submit a safety program specifically for the construction of trench excavation. Design the trench safety program to be in accordance with OSHA 29CFR standards governing the presence and activities of individuals working in and around trench excavations.
- C. Construction and shop drawings containing deviations from OSHA standards or special designs shall be sealed by a licensed Engineer retained and paid by Contractor.
- D. Review of the safety program by the Engineer will only be in regard to compliance with this specification and will not constitute approval by the Engineer nor relieve Contractor of obligations under State and Federal trench safety laws.
- E. If portable trench box other than specified is used, submit certification of design by registered professional engineer, licensed in State of Texas, prior to use on project.
- F. When trench jacks are used for crossbracing or stringers, provide certification by registered professional engineer, licensed in State of Texas, that trench jacks provide necessary protection.

1.05 REGULATORY REQUIREMENTS

- A. Install and maintain trench safety systems in accordance with the detail specifications set out in the provision of Excavations, Trenching, and Shoring, Federal Occupation Safety and Health Administration (OSHA) Standards, 29CFR, Part 1926, Subpart P, as amended, including Final Rule, published in the Federal Register Vol. 54, No. 209 on Tuesday, October 31, 1989. The sections that are incorporated into these specifications by reference include Sections 1926-650 through 1926-652.

- B. A reproduction of the OSHA standards included in "Subpart P - Excavations" from the Federal Register Vol. 54, No. 209 is available upon request to Contractors bidding on District projects. The District assumes no responsibility for the accuracy of the reproduction. The Contractor is responsible for obtaining a copy of this section of the Federal Register.
- C. Legislation that has been enacted by the Texas Legislature with regard to Trench Safety Systems, is hereby incorporated, by reference, into these specifications. Refer to Texas Health and Safety Code Ann., §756.021 (Vernon 1991).

#### 1.06 QUALITY ASSURANCE

- A. Supervision: Provide competent supervisory personnel at each trench while work is in progress to ensure that Contractor's means, methods, techniques, sequences, procedures, equipment, and materials pertaining to trench safety systems are sufficient to meet State of Texas' and OSHA Standards and Regulations requirements and to determine which systems shown on Drawings or prepared by Contractor's registered professional engineer should be used for site soil conditions, including any ground water.

#### 1.07 INDEMNIFICATION

- A. Contractor shall indemnify and hold harmless the District, its employees and agents, from any and all damages, costs (including, without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this Contract.
- B. Contractor acknowledges and agrees that this indemnity provision provides indemnity for the District in case the District is negligent either by act or omission in providing for trench safety, including, but not limited to safety program and design reviews, inspections, failures to issue stop work orders, and the hiring of the Contractor.

### PART 2 PRODUCTS

#### 2.01 STEEL

- A. Sheet Piling
  - 1. ASTM A 328.
  - 2. ASTM A 572, Grade 50.
  - 3. ASTM A 690.
- B. Stringers and Crossbracing: ASTM A 588.
- C. Portable Trench Boxes:
  - 1. ASTM A 36.
  - 2. Acceptable product: "LHD Series Trench Box", Griswold Machine and Engineering, Inc., M 60 East, Union City, Michigan (800 248 2054).

D. Connecting Bolts: ASTM A 307.

E. Welds: AWS D1.1.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install and maintain trench safety systems in accordance with provisions of OSHA 29CFR.
- B. Install specially designed trench safety systems in accordance with the Contractor's trench excavation safety program for the locations and conditions identified in the program.
- C. A competent person, as identified in the Contractor's Trench Safety Program, shall verify that trench boxes and other premanufactured systems are certified for the actual installation conditions.

#### 3.02 INSPECTION

- A. Contractor, or Contractor's independently retained consultant, shall make daily inspections of the trench safety systems to ensure that the installed systems and operations meet OSHA 29CFR and other personnel protection regulations requirements.
- B. If evidence of possible cave-ins or slides is apparent, Contractor shall immediately stop work in the trench and move personnel to safe locations until the necessary precautions have been taken by Contractor to safeguard personnel entering the trench.
- C. Maintain a permanent record of daily inspections.
- D. Observations or inspections by Owner or A-E are for benefit of Owner only and are not to be relied upon for purposes of construction operations.

#### 3.03 CONSTRUCTION

- A. Construct, install, and maintain trench excavation safety system in accordance with Contract Documents or design prepared by Contractor's registered professional engineer.
- B. Portable Trench Boxes:
  - 1. In cases where top of portable trench box will be below top of trench, trench sides above top of trench box shall be sloped outward at angle of repose of material being excavated.
  - 2. Portable trench box shall be operated on bottom of trench at all times.
- C. Sloping is prohibited in areas where sloped trench will affect integrity of existing structures.

#### 3.04 FIELD QUALITY CONTROL

- A. Contractor shall verify specific applicability of the selected or specially designed trench safety systems to each field condition encountered on the project.

3.05 MAINTENANCE

- A. Maintain trench safety system in safe working condition.
- B. Take necessary precautions to ensure that trench safety system is not damaged during use.
- C. If trench safety system is damaged during use, remove personnel from trench or excavated area immediately and repair trench safety system.
- D. Take necessary precautions to ensure that no loads, except those included in trench safety system design, are imposed on excavation.

3.06 REMOVAL

- A. Bed and backfill pipe or box culvert to be installed in trench to point at least 1 ft. above top of pipe or box culvert prior to removal of any portion of trench safety system.
- B. Bedding and Backfill: As specified or as shown on Drawings.
- C. Backfilling and removal of trench supports shall progress together from bottom of trench upwards.
- D. Do not remove braces or trench supports or trench safety system until all personnel have evacuated trench.
- E. Backfill trench to within 5 ft. of natural ground prior to removal of entire trench safety system.
- F. None of trench safety system shall remain in place after backfilling.

END OF SECTION

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SECTION 31 25 14  
STABILIZATION MEASURES FOR EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Descriptions of measures and practices, in response to TPDES General Permit TXR 150000, which shall be used on the Work to eliminate or significantly minimize pollutants in discharges into Surface Water in the State by controlling erosion and sediments at their source.
- B. Definitions:
  - 1. Potential Water Pollutant - any substance that could potentially alter the physical, thermal, chemical, or biological quality of the Surface Water in the State, rendering the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to public health, safety or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Item.

1.03 RELATED WORK

- A. Section 01 50 00 – Temporary Facilities and Controls
- B. Section 01 74 19 – Construction Waste Management and Disposal

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION AND INSTALLATION

- A. Contractor shall conduct all construction operations under this Contract in conformance with the erosion control practices described in the Plans and this Technical Specification.
- B. Erosion and sediment control measures shall be in place prior to the start of any Work that exposes the soil, other than as specifically directed by the Owner's Representative to allow soil testing and surveying.
- C. The Contractor shall install, maintain, and inspect erosion and sediment control measures and practices that operate effectively and as specified in the Drawings and in this or other Technical Specifications.
- D. Equipment and vehicles shall be prohibited by the Contractor from maneuvering on areas outside of the limits of construction or dedicated rights-of-way and easements. Damage caused

by construction traffic to erosion and sediment control systems shall be repaired immediately by the Contractor.

- E. The Contractor shall be responsible for collecting, storing, hauling, and disposing of spoil, silt, waste materials, and contaminated material resulting from erosion and sediment control measures as specified in this or other Technical Specifications and in compliance with applicable federal, state, and local rules and regulations.

### 3.02 EXPOSED SOIL

- A. When soil is exposed as a result of clearing, grading, excavating, stockpiling, or other soil disturbing activities, the Contractor shall implement measures to effectively control erosion and prevent the escape of sediments from the Project Site.
- B. Control measures may include the following practices:
  - 1. Preserve existing vegetation to the extent possible.
  - 2. Construct drainage swales, berms, or sediment basins.
  - 3. Maintain grades to minimize the velocity of sheet flow over disturbed areas and promote evaporation and infiltration of storm water directly into the ground.
  - 4. Install filter fabric fences or barriers, sediment traps, seepage basins, gabions, or storm drain inlet protection devices.
  - 5. Utilize vegetative buffer strips, mulching, or riprap
- C. When the placement of topsoil, bank sand, or other soil material is specified, after an area has been brought to grade and immediately prior to placement, loosen the subgrade by discing or by scarifying to a depth of at least 2 inches to permit bonding to the subsoil.
- D. When all soil disturbing activities have been completed, establish a perennial vegetative cover on all areas that are not paved, covered by permanent structures, or otherwise permanently stabilized.

### 3.03 DUST CONTROL

- A. Implement control measures to minimize dust creation and movement on construction sites and roads and to prevent airborne sediment from reaching receiving streams or storm water conveyance systems, to reduce on-site and off-site damage, to prevent health hazards, and to improve traffic safety.
- B. Control blowing dust by using one or more of the following measures:
  - 1. Mulches bound with chemical binders.
  - 2. Temporary vegetative cover.
  - 3. Tillage to roughen surface and bring clods to the surface.

4. Irrigation by water sprinkling.
  5. Barriers using solid board fences, burlap fences, crate walls, bales of hay, or similar materials.
- C. Implement dust control measures immediately whenever dust can be observed blowing on the Project Site.

3.04 DEMOLITION AREAS

- A. Demolition activities which create large amounts of dust with significant concentrations of heavy metals or other potential water pollutants shall use methods described in this Section, 3.03 “Dust Control”, to limit transport of airborne pollutants. However, water or slurry used to control dust contaminated with heavy metals or potential water pollutants shall be retained on the Project Site and shall not be allowed to run directly into watercourses or storm water conveyance systems by the appropriate use of control measures described in this Section. Methods of ultimate disposal of these materials shall be carried out in accordance with applicable local, state, and federal health and safety regulations.

3.05 SEDIMENT TRACKING

- A. Minimize off-site tracking of sediments and the generation of dust by construction vehicles, keeping the streets clean or construction debris and mud, by implementing one or more of the following control measures:
1. Restrict all ingress and egress to stabilized construction exits.
  2. Stabilize areas used for staging, parking, storage or disposal.
  3. Stabilize on-site vehicle transportation routes.
  4. Remove mud and other debris, washing if necessary, from vehicles prior to entrance onto public roadways from the Project Site.
  5. Maintain grade to minimize the occurrence of mud on the Project Site.
- B. Construct stabilized construction areas.
- C. In addition to Stabilized Construction Exits shovel or sweep the pavement to the extent necessary to keep the street clean. Water-hosing or sweeping of debris and mud off of the street into adjacent areas is not allowed.

3.06 EQUIPMENT MAINTENANCE AND REPAIR

- A. Control equipment maintenance and repair so that oils, gasoline, grease, solvents, and other potential water pollutants cannot be washed directly into receiving streams or storm water conveyance systems.



- B. Control measures may include the following practices:
1. Confine maintenance and repair of construction machinery and equipment to areas specifically designated for that purpose.
  2. Provide these areas with adequate waste disposal receptacles for liquid as well as solid waste.
  3. Clean and inspect maintenance and repair areas daily.
  4. Stabilize the area with coarse aggregate.
  5. Maintain grade to prevent surface water from flowing over the area.
  6. Place plastic matting, packed clay, tar paper, or other impervious material to prevent contamination of soil in the area.
  7. Isolate areas of contaminated soil or other materials to facilitate proper removal and disposal.
- C. Where effective control measures are not feasible, equipment shall be taken off-site for maintenance and repair.

### 3.07 WASTE COLLECTION AND DISPOSAL

- A. Conduct operations in conformance with the plan provided in Section 01 74 19 – Construction Waste Management and Disposal and utilize such control measures, described in this Section, as may be necessary to eliminate or significantly reduce the discharge of possible water pollutants from the Project Site as a result of waste collection and disposal.
- B. Keep receptacles and waste collection areas neat and orderly to the extent possible. Waste shall not be allowed to overflow its container or accumulate from day-to-day. Locate trash collection points where they will least likely be affected by concentrated storm water runoff.

### 3.08 WASHING AREAS

- A. Vehicles such as concrete delivery trucks or dump trucks and other construction equipment shall not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Preventative measures may include the following practices:
1. Designate special areas for washing vehicles.
  2. Locate these areas where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin.
  3. Beneath wash areas construct a gravel or rock base to minimize mud production.
- B. Construct washing areas.

3.09 STORAGE AND USAGE OF POTENTIAL WATER POLLUTANTS

- A. Store and use potential water pollutants such as pesticides, fertilizers, distillate fuels, lubricants, solvents, cements, paints, acids, caustics, and other toxic substances in accordance with manufacturers' guidelines, Material Safety Data Sheets, and with local, state, and federal regulations.
- B. Isolate these substances in areas where they are to be stored, opened or used such that they will not cause pollution of runoff from the Project Site. Preventative measures may include the following practices:
  - 1. Stabilize the area with coarse aggregate.
  - 2. Store containers on raised platforms.
  - 3. Place plastic matting, packed clay, tar paper, or other impervious material to prevent contamination of soil in the area.
  - 4. Provide protective cover or weather proof enclosure.
  - 5. Minimize accidental spillage.
  - 6. Keep containers tightly closed.
  - 7. Periodically inspect containers for leakage.
  - 8. Maintain grade to prevent surface water from flowing over the area.
  - 9. Provide berms, filter fabric fences or barriers, or sediment basins.
  - 10. Designate washing areas for containers and other items that have come in contact with potential water pollutants.
- C. Avoid overuse of substances such as pesticides and fertilizers which could produce contaminated runoff.

3.10 SANITARY FACILITIES

- A. Provide the Project Site with adequate portable toilets for workers in accordance with Section 01 50 00 – Temporary Facilities and Controls, and applicable health regulations.
- B. Control areas where sanitary facilities are located so that sewage or chemicals will not be washed directly into receiving streams or storm water conveyance systems by using one or more of the following measures.
  - 1. Inspect the facilities daily.
  - 2. Service the facilities as often as necessary to maintain cleanliness and prevent overflows.
  - 3. Stabilize the area with coarse aggregate

4. Maintain grade to prevent surface water from flowing over the area

END OF SECTION

SECTION 40 05 53  
IDENTIFICATION FOR PROCESS PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Summary description of work:

1. This section describes piping, valve, duct and equipment identification and the associated color code system to be used.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this Section. Include the cost for this work in the lump sum Base Bid Price.

1.03 RELATED WORK:

- A. General requirements: Division 1.

1.04 REFERENCE STANDARDS

A. Piping system identification:

1. ANSI-A13.1, "Scheme for the Identification of Piping Systems".

1.05 SUBMITTALS

- A. Shop drawings: Submit all shop drawings with all information required per Sections 01300, to the Engineer for review. Submit also the following additional information for Engineer review:

1. Product data.
2. Samples of each type.
3. Valve chart and schedule showing valve numbers, type, location, function, and valve manufacturer's name and model number.
4. Manufacturer's installation instructions.

1.06 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 PRODUCTS

### 2.01 GENERAL

#### A. Acceptable manufacturers:

##### 1. Pipe, valve and equipment markers:

###### a. Base:

- 1) Seton Name Plate Corp.
- 2) W H Brady Co.
- 3) Kolbi Industries, Inc.
- 4) 3M Co.
- 5) Craftmark Identification Systems.
- 6) Marking Services, Inc.
- 7) Carlton Industries, Inc.

##### 2. Underground marking tape:

###### a. Base:

- 1) Reef Industries, Inc.
- 2) Seton Name Plate Corp.
- 3) Other manufacturers desiring approval comply with Document 00440.

#### B. Color

1. Prior to ordering materials, obtain list of Owners Standard colors for identification of mechanical equipment, piping and devices and conform to this listing. Unless specified otherwise or identified in the Owners Standards, conform to ANSI/ASME A13.1.

#### C. Application

1. Identification shall be suitable for indoor or outdoor application, for area temperature and other ambient conditions, as required per use. Outdoor identification systems shall be UV rated.

### 2.02 PIPE MARKERS

- A. Pipe markers: Provide color-coded pipe markers conforming to ANSI-A13.1. Pipe markers shall be pressure sensitive vinyl (self-adhesive) material. Marker shall be of color (Legend and Background) per Table at the end of this specification, and of the approved Legend Letter Size and Marker Length as listed below. For dirty, greasy, or oily pipe where pressure sensitive markers may not perform satisfactorily, provide semi-rigid plastic pipe markers performed to fit around pipe or pipe covering which snap into place around pipe.

- B. The system for preparation and application of letters shall be Type B a.s.i./2 by ASI Sign Systems; Architectural Graphics Inc. or equal. Letter type shall be Optima Bold, upper case. Grid 2 spacing shall be employed. Arrow shall match as approved, letter type and size. The instructions of the manufacturer shall be followed in respect to storage, surface preparation and applications of letters.

1. Each color-coded marker shall contain:

- a. Legend (letters, numbers)
  - b. Nominal Pipe Size of the identified pipe
  - c. Direction of Flow Arrows
2. For piping with external diameters less than 6-inches (including insulation), provide full-band pipe markers, extending 360-degrees around pipe at each location.
  3. Size of letters legend:

Outside Diameter of Pipe or Pipe Covering	Length of Color Field	Size of Letters and Arrows
3/4 -to 1-1/4 IN	8 IN	1/2 IN
1-1/2 to 2 IN	8 IN	3/4 IN
2-1/2 to 6 IN	12 IN	1-1/4 IN
8 to 10 IN	24 IN	2-1/2 IN
Over 10 IN	32 IN	3-1/2 IN

4. For base pipes smaller than 3/4 in. O.D. provide Seton, or an approved equal, Style 2070 color coded aluminum tags not less than 2 in. diameter with engraved natural aluminum numbers not less than 1/2 in. high and engraved natural aluminum letters not less than 1/2 in. high. Background colors of tags shall conform to ANSI A13.1 and as specified herein. Fasteners shall be approved metal seals with 4 ply .018 monel wire.

## 2.03 VALVE TAGS

- A. Brass: Seton, or an approved equal, Style 250 BL 19 gauge polished brass, 1 1/2 in. diameter. Each tag shall designate appropriate service with 1/4 in. stamped black filled letters and valve number with 1/2 in. stamped black filled numbers. Identifying letters for various systems shall be, for example: LPS, PA, etc. Provide each valve tag with approved metal seals with 4 ply .018 copper smooth wire; brass "S" nooks, or No. 16 brass jack chain.
- B. Aluminum: Seton, or an approved equal, Style 250 BL 0.032 in. thick polished aluminum, 2 in. diameter. Each tag shall designate appropriate service with 1/4 in. engraved letters and valve number with 1/2 in. engraved letters. Identifying letters for various systems shall be, for example: LPS, PA, etc.

## 2.04 VALVE CHARTS

- A. Provide charts of all valves in duplicate. Charts shall include the following:
  1. Valve Identification Number
  2. Location
  3. Purpose
- B. Provide one chart mounted in aluminum with plexiglass frame mounted in wall where directed by Engineer.

## 2.05 EQUIPMENT IDENTIFICATION

### A. Equipment Data Plate:

1. Provide manufacturer's standard permanent nameplate constructed of stainless steel, with data engraved or stamped, permanently attached to the equipment.
2. Data shall include, as a minimum, Engineer's equipment tag number as shown on Drawings; Manufacturer name, product name, model number, and serial number; equipment capacity, operating and power characteristics; and labels of testing agencies.

### B. Equipment Tag Nameplate:

1. Provide 1/16 inch thick, engraved laminated phenolic markers for each piece of equipment equal to Setonply or Emedolite.
2. Nameplates shall have black exterior and white core, neatly beveled edges, and shall show white letters or numbers (letter/number height minimum 1/2 inches) on a black background.
3. Unit numbers indicated in equipment schedules shall be provided in vinyl film as specified above on all equipment using 1-in high Optima Bold, upper case, Grid 2 spacing, white or black in color as approved depending on substrate. Unit numbers shall be mounted at eye level on machines where possible or at the upper most broad vertical surface of low equipment.
4. Inscribe on the nameplate the Engineer equipment tag number as used on the Drawings. (Example: EF-02 or MAU-01)

### C. Where specific equipment is described elsewhere herein, it shall take precedence over this paragraph.

## 2.06 HVAC DUCT MARKERS

### A. Provide pressure sensitive vinyl (self-adhesive), color-coded marker:

### B. For plastic or FRP duct where self-adhesive markers may not perform satisfactorily, provide semi-rigid plastic markers to fit on or around duct, and which snaps into place around duct.

### C. Each color-coded marker shall contain:

1. Legend indicating service type (i.e., Supply Air, Return Air, General Exhaust, Emergency Scrubber Exhaust)
2. Corresponding Equipment Tag Number (i.e., MAU-01, EF-01, etc.)
3. Air Flow Direction
  - a. Border (background) color determined by component function per Table 15190-2 Duct Marker Legend.

D. Size of Legend Lettering

1. Block style lettering, 2 inches height minimum.

2.07 ACCESS PANEL MARKERS

A. Access panel markers:

1. Metal tack style: Use on acoustical tile ceilings.
  - a. Seton style BCM or ECM.
2. Engraved plastic style.
  - a. 3/4 IN square with center hole for small screw.
  - b. Seton style CM75.

2.08 CHART AND DIAGRAM FRAMES

A. Chart and diagram frames:

1. Extruded aluminum with plexiglass or glass windows.

2.09 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches (32 mm) for ducts; and minimum letter height of 3/4 inch (19 mm) for access panel and door markers, equipment markers, equipment signs, and similar operational instructions.

1. Stencil Material: Metal or fiberboard.
2. Stencil Paint: Exterior, gloss, alkyd enamel black, unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.

2.10 WARNING TAGS

A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches (75 by 133 mm) minimum
2. Fasteners: Brass grommet and wire
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
4. Color: Yellow background with black lettering.



## PART 3 EXECUTION

### 3.01 GENERAL

- A. Plan the locations of markers, tags, and nameplates to insure good visibility of such markers, tags, and nameplates in conformance with ANSI A13.1.
- B. Clean the area to which said markers, tags, and nameplates shall be applied.
- C. Where adhesive markers are used, degrease and clean surface prior to applying marker.
- D. Install markers, tags, and nameplates in accordance with manufacturer's instructions.

### 3.02 VALVE IDENTIFICATION

- A. Identify all valves, with appropriate service designation and valve number designation on valve tags. Tagging of valves within factory-fabricated equipment and valves, at unit heaters, fan coil units, air terminal unit reheat coils and plumbing fixture stops are not required. Install tags on valves using valve tag fasteners in manner for easy reading.
- B. Furnish 4 charts including valve identification number, location (room number, department) and purpose.
  - 1. Mount 1 chart in frame and secure on wall in location directed by Owner.
  - 2. Include remaining 3 sets in "Operation and Maintenance Manuals".

### 3.03 PIPE IDENTIFICATION

- A. Pipe markers and line tags of the colors indicated on the following pages; locate and size per ANSI A13.1. Comply with manufacturer's directions. Install line tags with metal seal fasteners.
- B. Markers shall be in clear view aligned with axis of piping, readable from access panels (where applicable), and shall not be obscured by other work. Label should be clearly visible from operating positions especially those adjacent to control valves. Markers shall be applied to exposed and concealed piping. Locate pipe markers as follows:
  - 1. Next to each valve and fitting, except on plumbing fixtures and equipment.
  - 2. At each branch or riser take off.
  - 3. At each passage through walls, floors and ceilings (both sides).
  - 4. At each pipe passage to underground.
  - 5. On horizontal pipe runs every 20 FT, at least once in each room and each story traversed by piping system.
  - 6. All access doors, manholes, or equivalents that permit view of concealed piping.
  - 7. Near major equipment and other points of origin and termination.

- C. Install markers with tape color bands over each end of marker, extending around pipe and overlapping a minimum of 30 degrees.
- D. Install flow direction arrow tape to extend full circumference of pipe.
- E. Seal markers with clear lacquer.
- F. See Drawings for Symbols. Markers shall include line size, service designation, area code and line number, where applicable; see Table 15190-1 for pipe service designations and abbreviations.
- G. Soil, waste and vent piping does not require identification.

#### 3.04 DUCTWORK IDENTIFICATION

- A. Locate duct markers at each branch or riser take-off next to equipment, at each side of penetration walls, floors, and ceilings and at each obstruction and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system. Align markers with axis of duct. Seal markers with clear lacquer.
- B. Identify ductwork access doors serving fire dampers, smoke dampers, and combination smoke/fire dampers.
- C. Stenciled Duct Marker Option: Stenciled markers, showing service and direction of flow, may be provided instead of laminated-plastic duct markers at Contractor's option, if lettering larger than 1 inch (25 mm) high is needed for proper identification because of distance from normal location of required identification.

#### 3.05 EQUIPMENT IDENTIFICATION

- A. Permanently attach equipment nameplates in conspicuous, accessible, and visible location, directly on equipment. Provide for all mechanical equipment such as starters, pumps, fans, unit heaters, duct heaters, condensing units, air-handling units, heat transfer equipment, and control panels. Secure nameplates with adhesive and pop-rivet in place with 316 stainless steel rivets or use self-tapping screws, or nuts and bolts. Small devices, such as in-line pumps, may be identified with metal tags. Verify with equipment manufacturer if NEMA ratings will be violated if mechanical fasteners are used, in which adhesive alone to attach nameplate shall be allowed.
- B. For unsuitable surfaces, such as high temperature or lack of space, use 316 stainless steel copper or brass rings or chains to attach tags.
- C. Stenciled Duct Marker Option: Stenciled markers, showing service and direction of flow, may be provided instead of laminated-plastic duct markers at Contractor's option, if lettering larger than 1 inch (25 mm) high is needed for proper identification because of distance from normal location of required identification.
- D. Identify devices located above ceilings with additional identification.

1. Use access panel markers (metal tack style) for acoustical tile ceilings, or engraved plastic style, 3/4 IN square, for mounting on panel door; or equipment nameplates.
2. Coordinate with Owner on identification method and color codes.
3. Provide markers on all removable ceilings and ceiling access panels to indicate locations of valves, dampers, smoke detectors, etc., and other mechanical items that may need servicing or adjustment. Glue marking tacks in place to prevent their falling out.
4. Where fire protection devices are located inside ductwork, provide an additional tag on the duct access door identifying device inside.
  - a. Identification letter size: 1-1/2 IN high minimum.
5. Color code access panel markers as follows:
  - a. Red: Fire dampers, smoke detectors, sprinkler shutoff valves and duct type smoke detectors.
    - 1) Notation:
      - a) D-Damper
      - b) V-Valve
      - c) S-Smoke Detector
  - b. Gold: Automatic and balancing dampers:
    - 1) Notation:
      - a) V-Valve
      - b) D-Damper

### 3.06 CONTROL DIAGRAMS AND INSTRUCTIONS

- A. Provide HVAC control and systems instructions and diagrams in wall mounted frames.
  1. Mount framed diagrams in conspicuous, easily accessible places in equipment rooms housing appropriate HVAC system.
- B. Diagrams and instructions may be reduced in size provided they are easily readable and lettering is not smaller than "elite" type of standard typewriter.

### 3.07 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

### 3.08 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

### 3.09 CLEANING

- A. Clean faces of mechanical identification devices.

Table 40 05 53-1

**PIPE MARKER LEGEND**

CODING COLORS		
G - Green		
B - Blue		
O - Orange		
R - Red		
Y - Yellow		
W - White		

Symbol	Pipe Label Wording
BW	Blended Raw Water Line
CW	Coagulated Raw Water Line
ER	Return Water from Process Building
SA	Sample Line
FC	Ferric Chloride Feed Line
AHP	Air Supply to Pneumatic Actuator

Table 40 05 53-2

**PIPE AND EQUIPMENT SYSTEMS IDENTIFICATION COLOR SCHEDULE**

<b><i>WATER TREATMENT PLANT (WTP)/FACILITY SYSTEMS</i></b>	<b><i>COLOR</i></b>
Plant Potable Water	Light Blue
Plant Process Water	Light Blue with Dark Blue Bands
Filter or Membrane Effluent	Light Blue
Filter or Membrane Backwash Supply	Light Blue
Filter or Membrane Backwash Waste	Dark Grey
Settled Water	Green
Raw Water	Tan
Filter Backwash Air	Dark Green
Hydrogen Vent	Dark Green
Raw Sludge	Yellow Brown
Thickened Sludge	Brown
Centrifuge Centrate	Light Brown
<b><i>CHEMICAL SYSTEMS</i></b>	<b><i>COLOR</i></b>
Chlorine (gas liquid, or vent)	Yellow
Chlorine (solution) or Sodium Hypochlorite	Yellow with Red Bands
Chlorine Dioxide	Yellow with Blue Bands
Ammonia (Gas, Aqueous, or Liquid Ammonium Sulfate)	Yellow with Brown Bands
Ozone	Stainless Steel with White Bands
Liquid Alum or PACl	Yellow with Orange Bands
Alum or PACl Solution	Yellow with Green Bands
Ferric Chloride	Brown with Red Bands

Ferric Sulfate	Brown with Yellow Bands
Polymers	White with Green Bands
Liquid Caustic	White with Red Bands
Caustic (solution)	White with Orange Bands
Fluoride	White with Yellow Bands
Oxygen	Orange
Sulphur Dioxide Gas	Lime Green with Yellow Bands
Sodium BiSulfite	Lime Green with Brown Bands
Brine Solution	Light Brown
<b>WASTEWATER TREATMENT PLANT (WWTP) SYSTEMS</b>	<b>COLOR</b>
Raw Sewage	Gray
Grit	Dark Gray
Cyclone Return	Gray
Classifier Return	Gray
Heavy Solids	Dark Brown
Return Sludge	Brown
Waste Sludge	Yellow-Brown
Scum	Light Brown
Non-Potable Water	Purple with "Non-Potable Water"
Plant Air (from blowers to process basins)	Dark Green
Effluent after clarification	Dark Green
<b>OTHER SYSTEMS</b>	<b>COLOR</b>
Fire Mains	Red
Diesel Fuel	Orange
Natural Gas	Red
Heating Water	Pink
Domestic Hot	Blue with Red Bands spaced 30 in apart
Reclaimed Water	Purple with Black lettering
Chilled Water Supply (CWS)	Blue-Green
Chilled Water Return (CWR)	Blue-Green
Condensing Water Supply (Cond-WS)	Light Pastel Green
Condensing Water Return (Cond-WS)	Light Pastel Green
Vent	Light Gray
Compressed Air (typically 100 psig service)	Light Green
Instrument Air	Light Green with Dark Green Bands
Drain	Dark Grey
Vacuum (Vac)	Off-White
Deionized water (DW)	Light Blue
Power Conduit	In compliance with the National Electric Code

Note: Refer to Drawings for symbols, use above symbols where not indicated on indicated drawings.  
Symbols on Drawings take precedence over the table.

END OF SECTION

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SECTION 40 41 13.13  
PROCESS PIPING ELECTROCAL RESISTANCE HEAT TRACING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnish and install, complete and ready for operation, electrical heat tracing systems as shown on the drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit shop drawings and product data as per Division 1 - General Provisions, showing all details of materials.
- B. Submittal shall be clearly marked showing only equipment provided. Mark through equipment option not provided.

1.03 CODES, APPROVALS, AND STANDARDS

The electric heat-tracing system shall conform to the specification. It shall be designed, manufactured, and tested in accordance with the applicable requirements of the latest edition of the following codes and standards.

FM	FM Approvals LLC
IEEE 515	Institute of Electrical and Electronics Engineers
NEC	U.S. National Electric Code (NFPA 70)
NECA 202-2013	Installing and Maintaining Industrial heat Trace Systems
NEMA	National Electrical Manufacturers Association
UL 746B	Underwriters' Laboratories, Inc.
ANSI	American National Standards Institute

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Thermon
- B. nVent Raychem
- C. Chromalox
- D. Approved equal.



## 2.02 MATERIALS

### Self-Regulating Heating Cables

Heating Cable	T-rating	Maximum Temperature
3 W/ft	T6	185°F (85°C)
5 W/ft	T6	185°F (85°C)
8 W/ft	T5	212°F (100°C)
10 W/ft	T4A	248°F (120°C)

- A. The heating cable shall have a tinned copper braid with a resistance less than 8 m $\Omega$ /ft as determined by metallic covering conductivity test (IEEE 515-1997 test 4.1.13). The braid may be protected from chemical attack and mechanical abuse by an optional polyolefin or fluoropolymer outer jacket.
- B. In order to provide rapid heat-up, and to prevent overheating of fluids and plastic pipe, the heating cable shall have the following minimum self-regulating indices:

Heating Cable	S.R. Index (W/°F)	S.R. Index (W/°C)
3 W/ft	-0.020	-0.036
5 W/ft	-0.045	-0.080
8 W/ft	-0.058	-0.104
10 W/ft	-0.071	-0.127

- C. The self-regulating index is the rate of change of power output in watts per degree Fahrenheit or watts per degree Celsius, as measured between the temperatures of 50°F (10°C) and 100°F (38°C) and confirmed by the type test and published data sheets.
- D. In order to facilitate longer circuit lengths and smaller breaker sizing. The heating cable shall have the following maximum inrush current at 50°F (10°C).

Heating Cable	Maximum Inrush @ time = 1 sec	Maximum Inrush @ time = 10 sec	Maximum Inrush @ time = 300 sec
3 W/ft, 120V	58 mA/ft	54 mA/ft	41 mA/ft
5 W/ft, 120V	155 mA/ft	128 mA/ft	66 mA/ft
8 W/ft, 120V	210 mA/ft	180 mA/ft	83 mA/ft
10 W/ft, 120V	432 mA/ft	319 mA/ft	123 mA/ft
3 W/ft, 240V	38 mA/ft	36 mA/ft	20 mA/ft
5 W/ft, 240V	92 mA/ft	80 mA/ft	33 mA/ft
8 W/ft, 240V	127 mA/ft	106 mA/ft	41 mA/ft
10 W/ft, 240V	281 mA/ft	205 mA/ft	62 mA/ft

- E. In order to ensure that the self-regulating heating cable does not increase power output when accidentally exposed to high temperatures, resulting in thermal runaway and self-ignition, the cable shall produce less than 10 percent of rated power when energized and heated to 302°F (150°C) for 30 minutes. After this test, if the cable is allowed to cool to 50°F (10°C) and is reenergized, it must not have an increasing power output leading to thermal runaway.
- F. In order to confirm 3.1B, the self-regulating heating cable shall maintain between 75 and 110 percent of its original power output after having been cycled 500 times between 50°F (10°C) and 150°F (65°C), allowing no more than 12 minutes of dwell time at each temperature.

G. The heating cable shall have the following third party approvals:

UL listed        Ordinary areas  
CSA certified   Ordinary areas  
FM approved   Ordinary areas

H. The heating cable shall be type SRL with continuous exposure (maintain) capability up to 150°F (65°C) and continuous exposure capability up to 185°F (85°C) with power off, as manufactured by Chromalox, Thermon, nVent Raychem or Engineer approved equal.

## 2.03 THERMOSTATS AND CONTRACTORS

A. Freeze protection systems shall operate using self-regulating control using a thermostat controlled contactor. Thermostat shall have the following features:

1. UL 94 V-0 certification
2. Thermostatic bimetal sensor element with mechanical linkage to contact
3. Switching differential 7°F ±1°F
4. Switching tolerance of ±6°F
5. Contact resistance ≤10mΩ
6. Switching capacity 15/10A @ 120V/240Vac resistive
7. Minimum 2.5 mm terminals
8. Thumbwheel adjustable switching range 32 to 140°F
9. Operating range -20 to 130°F
10. CE and RoHS 2 approval

B. Contactors shall have the following features:

1. IEC rated for 400V
2. 4 poles normally open Coil voltage 110/120Vac 50/60 Hz
3. Electrically Held
4. Full Load AC Amps-Resistive/Inductive 63/40
5. Coil load: ≤60VA Inrush; Sealed ≤12VA
6. Operating range -20 to 130°F
7. Contactor terminal size ≥16mm<sup>2</sup>

8. IEC 60947-2 Compliant
9. UL 508 Compliant
- C. Thermostat and Contactor(s) shall be housed in same enclosure with the following features:
  1. NEMA 3R or 4 rating conductive.
  2. Components subpanel mounting
  3. Grounding terminal bar accommodating minimum of (6) 10awg conductors.

PART 3 ?

3.01 INSTALLATION

- A. The system shall be installed per manufacturers engineering details, isometric drawings, line lists and other pertinent data.
- B. The installing contractor shall have a minimum of 5 years' experience installing industrial electric heat trace systems.

3.02 SYSTEM COMMISSIONING

- A. System commissioning testing and documentation shall conform to manufacturers standard procedures and at a minimum confirm.
  1. Correct cable model number installed on each circuit per circuit isometric drawings.
  2. Circuit electrical data conforms to heat trace isometric data including
    - Circuit current
    - Circuit insulation resistance
    - Circuit voltage
  3. Location and coordinates of power connection kits, end seals, splice/tee kits for each circuit

END OF SECTION

SECTION 40 42 13  
PROCESS PIPING INSULATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the basic materials and methods of installation for insulation for piping and ductwork systems. Specific uses and applications are specified in other Sections of Division 40 and on the Drawings.

1.02 RELATED WORK

- A. System applications for insulation are specified in other Sections of Division 40.
- B. Process Piping Electrical Resistance Heat Tracing is specified in Section 40 41 13.13.

1.03 SUBMITTALS

- A. Submit to the Engineer, in accordance with Division 01, the following for each insulation by System: manufacturer's product data showing conformance with this Section for all required insulation, jackets, covers, coatings, adhesives, fasteners, supports and appurtenances; complete manufacturer's instructions for installation of all required items. The submittal will be considered incomplete without all information provided. The insulation shall include but is not limited to the following system as shown on the Drawings and specified herein: piping, fittings, valves, piping supports, instruments and etc.
- B. All submittals shall contain a statement that Sections defining specific insulation types and thickness and all other referenced Sections have been read and complied with. The certification statement shall specify the specific Sections and be made by all of the following that are applicable; the Contractor, sub-contractor and the vendor. The statement shall be an individual statement for each party involved, and shall be included with every submittal and resubmittal.
- C. All materials deliveries must have accompanying manufacturer's certifications attesting to satisfactory results of product testing showing conformance with this Section.
- D. For materials that will be shipped exposed, provide a description of the protective packaging that will be used during transit.
- E. In general, corrections or comments or lack thereof, made relative to submittals during review shall not relieve the contractor from compliance with the requirements of the drawings and specifications. Submittals are for review of general conformance with the design concepts of the project and general compliance with the contract documents. The contractor is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating the work of all trades, and performing the work in a safe and satisfactory manner.

1.04 REFERENCE STANDARDS

- A. National Fire Protection Association (NFPA)

- B. Occupational Safety and Health Administration (OSHA)
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

- A. The insulation materials to be furnished under this section shall be essentially the standard products of manufacturers regularly engaged in the manufacture of insulation systems.
- B. Several manufacturers are indicated as acceptable for each type of insulation in these specifications. The Insulation Sub-contractor shall be responsible for determining that all insulation supplied for the project is suitable for installation in the spaces indicated. The Insulation Sub-contractor shall also ensure that all materials used are compatible and in compliance with applicable codes and standards.
- C. The Owner and Engineer reserve the right to sample and test any materials after delivery and to reject all components represented by a sample that fails to comply with the specified requirements.

1.06 DELIVERY, STORAGE AND HANDLING

- A. All materials shall be inspected for size, quality and quantity against approved shop drawings upon delivery.
- B. Delivery schedule of all equipment and material shall be coordinated with the Contractor. Equipment and material ready for shipment prior to the agreed on shipping date shall be stored without cost to the Owner by the manufacturer.
- C. All material shipped that is exposed such as on a flatbed truck shall be protected during transit. The equipment shall be protected from moisture, road salt, dirt and stones or other materials thrown up from other vehicles. Material shall be protected as above, but with special attention to moisture. The method of shipment protection shall be defined in the submittals.
- D. All materials shall be suitably packed for shipment and long term storage. Each package shall be labeled to indicate the project and the contents of each package. Material identification and/or material name and part numbers shall be marked on the container.
- E. All materials shall be stored in a covered dry location off of the ground. When required to protect the materials they shall be stored in a temperature-controlled location.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and integrated insulation assemblies furnished shall have flame spread ratings of not over 25 (fire resistive), smoke developed rating of not over 50 and fuel contributed rating of not over 50, as established by tests conducted in accordance with ASTM E 84, Interior Federal Standard No. 00136B, entitled 'Interior Federal Standard Flame-Spread Properties for Materials' and the National Fire Code of the NFPA. The treatment of jackets or facings to impart flame

and smoke safety must be permanent. (The use of water-soluble treatment is prohibited.)  
Exception allowed for closed cell foam insulation and PVC fitting covers.

- B. The toxicity of the solvents used shall not exceed a maximum allowable concentration of 200 ppm or the latest value published by the American Conference of Governmental Industrial Hygienists and OSHA.
- C. Adhesives, coatings and vapor barrier materials shall be compatible with the insulation as recommended by the insulation manufacturer. Submit a certified statement attesting to the approval of the materials by the insulation manufacturer. Adhesives and coatings shall be manufactured by Armacell; Foster Div.; H.B. Fuller Co.; Childers Products Co. or equal. H.P. Fuller and Childers Products Nos are listed below by adhesive/coating types.

Lagging adhesive: 30 36, CP50, AMV-1.

Vapor barrier coating: 30 35, CP30.

Vapor seal adhesive: 85 75, CP82.

Sealing compound adhesive: 30 45, CP70.

Weatherproof mastic: 35 01, CP10.

2.02 INSULATION FOR ALL SIZES OF ABOVE-GROUND PIPING – CLOSED CELL (TYPE PI-3)

- A. Insulation Material - Molded flexible closed cell sectional pipe insulation, density of 3 to 6 lbs/cu ft and a maximum thermal conductivity "K" factor of 0.28 BTU-in/(hr-sq.ft.-deg.F) at 75 degrees F mean temperature up to 1-inch thickness. Paint all surfaces with two coats of WB finish if no jacket is installed.
- B. Acceptable manufacturers shall be Armacell (HT Armaflex Industrial); or Engineer approved equal.

2.03 INSULATION FOR ABOVE-GROUND PIPING >2-IN ONLY (TYPE PI-5)

- A. Insulation Material - Molded cellular glass sectional pipe insulation rated from -450 to 900 degrees F. The insulation shall have a minimum density of 7.3 lbs/cu ft and a maximum thermal conductivity "K" factor of 0.18 BTU-in/(hr-sq.ft.-deg.F) at 75 degrees F mean temperature.
- B. Acceptable manufacturers shall be Pittsburgh Corning Foamglas; Certain-Teed; Owens-Corning or equal.

2.04 INSULATION FOR BELOW-GROUND PIPING ONLY (TYPE PI-6)

- A. Insulation Material - Molded flexible closed cell sectional pipe insulation, density of 3 to 6 lbs/cu ft and a maximum thermal conductivity "K" factor of 0.28 BTU-in/(hr-sq.ft.-deg.F) at 75 degrees F mean temperature up to 1-inch thickness.

- B. Acceptable manufacturers shall be Armacell (HT Armaflex Industrial); or Engineer approved equal.

## 2.05 FIELD APPLIED JACKETS AND FITTING COVERS

- A. General – Fittings shall be provided with preformed covers of the material type as specified below.
- B. Aluminum (ALU) jackets shall be 0.016 -in. thickness minimum, Type 3003-H-14 aluminum covers with 3/16-in corrugations. Longitudinal joint shall be warranted to provide a positive seal without screws, rivets, etc. and secured with 1/2-inch aluminum bands with wing seals. Aluminum covers shall be provided with a baked-on acrylic exterior finish and internal moisture barrier coating for resistance to water and corrosion. Finish shall be chalk and fade resistant. Fittings shall be pre-molded, same material and thickness as jacket. Aluminum jacket shall be as manufactured by ITW Insulation systems.
- C. UV resistant flexible weather proofing (FWP) jacket. Elastomeric rubber composite membrane 55 mil (1.5 mm) minimum thickness. Install per manufacturer's installation instructions. Acceptable manufacturers shall be Armacell (Arma-Chek R); or Polyguard (Alumaguard); or equal.
- D. Polyvinylchloride (PVC) jacket. White, low pressure rated, seamless, ASTM D-1784, Class 1, Type 1. Able to withstand H-20 highway loading. Thickness shall be 0.08-in thickness minimum.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Do not apply insulation prior to testing and acceptance of piping and/or equipment. Insulation shall not be applied to damp or frosty surface. Clean dust, dirt, grease and moisture from surfaces of pipe before applying insulation or insulation adhesives. Nameplates and equipment certification and data tags affixed to any piece of apparatus shall not be covered. Where two layers of insulation are used, stagger all joints both ways. Secure each layer independently. Continue insulation and jacketing through walls, partitions, floors and pipe sleeves.
- B. The Contractor shall not install any equipment or materials until the Owner and Engineer have approved all submittals. If any equipment or materials are installed prior to approval of the submittals, it shall be at the Contractor's risk.
- C. Insulation, adhesives, coatings and vapor barrier materials shall be applied in accordance with manufacturer's recommendations. Do not apply these materials when ambient temperature is above or below the maximum and minimum ambient temperature respectively, specified as limits by the manufacturer.
- D. The use of staples or other fasteners that penetrate the vapor barrier is not permitted.
- E. **Provide hangers, supports, and anchors that do not penetrate insulation or jackets of insulated piping.**

- F. Insulation systems that require a vapor barrier shall be installed with an intact vapor barrier that covers the entire pipe or piece of equipment to be insulated. All edges of insulation that do not abut another piece of insulation shall have the vapor barrier extended, and sealed to the item being insulated. All penetrations through the insulation such as for thermowells, test ports, nameplates, or other items shall have the vapor barrier extend over the edges of the insulation and sealed to the item being insulated.
- G. For insulated items exceeding 100 square feet, or 20 feet in length, extend the vapor barrier to the item being insulated to reduce the area or length within a single enclosed area to the dimensions listed above.

### 3.02 INSTALLATION OF PIPING INSULATION

- A. Preformed sectional insulation and jacketing shall be used where possible. The use of blanket insulation will be limited to fittings that cannot be insulated with sectional insulation. All joints on preformed and fabricated insulation shall be accurately fitted to eliminate voids. Voids shall be eliminated by refitting or replacing the insulation. End joints shall be firmly butted to adjoining sections of insulation.
- B. Outdoor piping insulation shall be installed so as to keep the insulation dry. Joints shall be located to prevent the entrance of water. Breaks in jacketing caused by vertical connections or instruments shall be protected by hoods or cones. Where there are breaks in the jacket, plastic moisture barriers shall be provided under the jacketing to protect the insulation. Insulation and jacketing of valves shall be waterproofed. Insulation and jacketing of the valve shall be removable to allow servicing of the valve.
- C. Provide valve stem extension kits to match insulation and jacket thickness for interior applications. Provide insulated valve replacement handle and sleeve to match insulation and jacket thickness for exterior applications. Seal vapor barrier and jacket watertight to sleeve.
- D. Where field applied aluminum jacket is specified, the jacket shall be attached with aluminum draw bands located within 3-in of each joint and 24-in on centers maximum. Jackets on outdoor piping shall have joints arranged to shed water.
- E. Vapor seal adhesive shall be used to seal seams and to butt sections on all cold piping if self-sealing laps are not provided. The use of staples or any other fastening method that would penetrate the vapor barrier will not be permitted on cold piping systems.
- F. Metal, elastomeric or plastic jacketing shall have its joints staggered from those of the insulation. Joints between jacketing and insulation shall be a minimum of 3-in.
- G. Metal, elastomeric or plastic jacketing shall have a minimum 3-in overlap on longitudinal joints and end joints. Longitudinal joints in horizontal piping shall have the outer lap of the joint pointed down to shed water. The end of the outer lap shall be located at the 5 or 7 o'clock positions. Seal joints with weather proof mastic.
- H. Where piping is provided with electric heat tracing the insulation shall not be installed until the heat tracing has been tested and accepted. Insulation shall be sized to allow for the heat tracing line without deforming the insulation.



- I. Provide hangers, supports, and anchors that do not penetrate insulation or jackets of insulated piping.
- J. On vertical risers exceeding 15-ft in height, provide intermediate support for the insulation. For carbon steel pipe, this support shall consist of angle clips or other suitable devices welded to the pipe at about 15-ft on centers and concealed by the pipe covering. On non-carbon steel piping, clamps or other non-welded devices shall be used.
- K. Unless otherwise specified insulate all valves, control valves, fittings, pipe specialties and all other components that could be construed as being part of the piping system. Insulate valve bonnets to a point just below the stuffing box.
- L. Bridge flanges, unions, and pipeline strainers with block or sectional insulation wired in place. Wire shall be black steel, annealed. Stop the pipe insulation a sufficient distance to allow removal of flange bolts without disturbing the pipe insulation and extend the block, at least 2-in over the adjacent pipe insulation. Flange covers shall be designed for removal without damaging the pipe insulation. Fill voids with blanket insulation.
- M. Where there are lines run between two different piping systems, e.g. make up water line between city water and chilled water, the interconnecting line shall be insulated the same as the system having the most rigid requirements. If one of the lines is not insulated the interconnecting line shall be insulated the same as the insulated line.
- N. Where possible, all insulation shall be continuous through wall and floor openings and sleeves.
- O. Insulation thickness shall be as specified in Table 40 42 13-1.

**3.03 INSULATION FOR PIPING – CLOSED CELL (TYPE PI-3)**

- A. Piping must be free of condensation and moisture, extraneous chemicals such as corrosive cleaners or building materials, and dust and dirt prior to the installation of the insulation. The insulation must be clean and dry prior to installation.
- B. Apply insulation in thicknesses indicated. Laps and joints shall be adhered with full coverage on both surfaces using the manufacturer's recommended adhesive. Laps in horizontal piping shall be at the top. Insulation shall not be stretched when adhering.
- C. At the beginning, at every 12 to 18 feet, and at the ends of piping runs, the insulation shall be adhered directly to the copper using a 2" strip of adhesive. Insulation should not be adhered to the pipe at the extreme low points in any piping run.
- D. Where field applied aluminum jacket is specified, the jacket shall be attached with aluminum draw bands located within 3-in of each joint and 24-in on centers maximum. Jackets on outdoor piping shall have joints arranged to shed water.

**3.04 INSULATION FOR BELOW-GROUND PIPING – CLOSED CELL (TYPE PI-6)**

- A. Follow manufacturer's instructions for below ground applications. Furnish and install insulation at least of 18 inches below grade.

- B. Piping must be free of condensation and moisture, extraneous chemicals such as corrosive cleaners or building materials, and dust and dirt prior to the installation of the insulation. The insulation must be clean and dry prior to installation.
- C. Apply insulation in thicknesses indicated. Laps and joints shall be adhered with full coverage on both surfaces using the manufacturer's recommended adhesive. Insulation shall not be stretched when adhering.
- D. At the beginning and at the ends of piping runs, the insulation shall be adhered directly to the piping using type 520 adhesive. Seal all seams and edges with waterproof sealant.
- E. Apply out PVC jacket and apply waterproof heat shrink.
- F. Properly seal all ends. Apply waterproof heat shrink covering the outer jacket.

3.05 INSTALLATION OF EQUIPMENT INSULATION – GENERAL

- A. Equipment normally furnished with inspection splits shall be insulated in two sections so that a removable section can be removed without damage to the stationary section.
- B. Manhole covers and access door covers shall be formed of built-up insulation and reinforced with aluminum jacketing so that the entire piece covering the manhole, or door, can be easily removed and replaced as a unit.

3.06 LABELING

- A. After application of insulation and jacketing (where applicable), label piping. Refer to other Section 40 05 53.

Table 40 42 13-1  
Piping Insulation Schedule

Service	Legend	Location	Installation	Pipe Size (in.)	Insulation		Field- Applied Jacket Type (See Notes 1 -3 below)	Remarks
					Type	Thickness (in.)		
Chemical Feed Line (FeCl <sub>3</sub> )	FC	Membrane Feed Pump Station	Outdo ors	1/2	PI-3	1	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Sample Line	SA	Membrane Feed Pump Station	Outdo ors	1/2	PI-3	1	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Air Supply Line	AH P	Membrane Feed Pump Station	Outdo ors	1	PI-3	1	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Raw Water	RW	Well No.5	Outdo ors	2-1/2 to 4	PI-3 or PI-5	1	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Return Water	ER	Membrane Feed Pump Station	Outdo ors	6 to 8	PI-3 or PI-5	1- 1/2	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Recycle Water	RW	Recycle Pump Station	Outdo ors	6 to 8	PI-3 or PI-5	1- 1/2	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Raw Water	RW	Well No.3	Outdo ors	6 to 8	PI-3 or PI-5	1- 1/2	ALU or FWP	Provide with heat trace. Refer to Div. 26.
Raw Water	RW	Well No.6	Outdo ors	6 to 8	PI-3 or PI-5	1- 1/2	ALU or FWP	Provide with heat trace. Refer to Div. 26.
All	All	Below- Ground	Outsid e	½ to 4	PI-6	1- 1/2	PVC	No heat trace required below ground
All	All	Below- Ground	Outsid e	6 to 8	PI-6	2	PVC	No heat trace required below ground

General Insulation Schedule Notes for all process Piping:

- 1) Specific uses and requirements called out on the Drawings take precedence over those listed above.
- 2) ALU = Aluminum Jacket.
- 3) FWP = Flexible Weather Proofing Jacket
- 4) PVC = Polyvinylchloride Jacket

END OF SECTION

SECTION 40 61 13  
PROCESS CONTROL SYSTEMS - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section covers the furnishing and installation of an instrumentation and control system designated as the Process Control System (PCS).
- B. Contractor shall procure the services of a Process Control System Supplier (PCSS). The PCSS shall be responsible for the following:
  - 1. Coordinate all process control system-related items.
  - 2. Furnish and install all materials, equipment, labor, and services required, except for those services and materials specifically excluded.
  - 3. Achieve a fully integrated and operational PCS as specified herein, in the associated Specification Sections, and as detailed in the Contract Drawings.
  - 4. Check out and calibrate instruments.
  - 5. Perform all testing, training, and startup activities specified to be provided.
- C. Equipment and software furnished under this section and under other related sections listed in the Scope of Work paragraph above shall be designed, coordinated, and supplied by the PCSS or supplier.
- D. PCSS shall procure the services of an Application Services Provider (ASP) to provide all work specified in Section 40 61 18 including Programmable Logic Controller (PLC), Human Machine Interface (HMI), and network configuration and programming for a complete and fully functional system that meets the design intent. The PCSS may also provide the ASP services if they meet all ASP requirements.
- E. Work shall include, but not necessarily limited to the following:
  - 1. Supply, install, and test remote monitoring of new generator controllers and at the Intake Facility, Well #3, and Well #6, and automatic transfer switches at Well #3 and Well #6.
  - 2. Supply, install and test a 4"-inches electromagnetic flow meter at Well #5 and temperature transmitters at the compressor and Copper ION buildings including program the existing PLCs and HMI to add monitoring of the new temperature transmitters. The flow meter parameters are already configured on the PLC-3 and HMI software.
  - 3. Program the existing PLCs (4) and HMI to add monitoring of the new generators, automatic transfer switches and motor protection relays.
- F. Items specifically excluded from the PCSS's scope of work, but included within the ASP's scope of work, include the following:

1. PLC programming, testing of PLC logic, and startup and training activities associated with the programmed PLC applications.
2. HMI graphics development, HMI software configuration, database development, report development, historical database, related software applications, and startup and training activities associated with the configured PCS system.

G. Associated Sections

This section encompasses the equipment and services specified in the following sections:

SECTION	SPEC TITLE
40 61 18	Application Engineering Services
40 61 21	Process Control System Testing
40 61 93	Process Control System Input/Output List
40 61 96	Process Control Descriptions
40 66 00	Network and Communication Equipment
40 67 00	Control Panel Enclosures and Panel Equipment
40 70 00	Instruments

- H. PCSS shall coordinate with the Contractor, Owner, Engineer, and ASP, for all scheduling, installation, testing, and startup services.
- I. Instrumentation specified in other Divisions shall meet the requirements of the Process Control Systems Sections of Division 40.

1.02 GENERAL

- A. The Drawings and Specifications indicate the extent and general arrangement of the systems. If any departures from the Drawings or Specifications are deemed necessary by PCSS, details of such departures and the reasons shall be submitted to Engineer for review with of before the first submittal. No departures shall be made without prior written acceptance.
- B. The specifications describe the minimum requirements for hardware and software. Where PCSS's standard configuration includes additional items of equipment or software features not specifically described herein, such equipment or features shall be furnished as a part of the system and shall be warranted as specified herein.
- C. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

- D. Requirements specified in this Section apply to all equipment specified in the above Sections, unless otherwise stated. In the case of a conflict, the most stringent requirements shall prevail.
- E. The PCSS shall supply, install, and configure all instruments specified in Division 40 and as shown on the drawings.
- F. All equipment and installations shall satisfy applicable Federal, State and local codes.
- G. Drawings
  - 1. The Drawings indicate locations and arrangements of equipment and may include installation details and block and one-line diagrams showing connections and interfaces with other equipment. Section 40 61 93 contains the input/output (I/O) lists.
  - 2. Principal components of the instrumentation systems shall be as indicated on the P&ID drawings.
- H. Dimensional Restrictions
  - 1. Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values.
  - 2. The PCSS shall review the Drawings, the manufacturer's layout drawings and installation requirements, and make any modifications requisite for proper installation subject to acceptance by Engineer.
  - 3. At least three feet of clear access space shall be provided in front of all instrumentation and control system components.
- I. Workmanship and Materials
  - 1. PCSS shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.
  - 2. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice.
  - 3. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field.
  - 4. Like parts of duplicate units shall be interchangeable.
  - 5. Equipment shall not have been in service at any time prior to delivery, except for testing.
- J. Corrosive Fluids
  - 1. All parts which are exposed to corrosive conditions shall be made from corrosion resistant materials.

2. PCSS shall submit certification that the instrument manufacturer approves the selection of materials of primary elements that are in contact with the specified process fluid to be inert to the effects of the process fluid.

K. Programming Devices

1. A programming or system-configuring device shall be provided for systems that contain any equipment that requires such a device for routine calibration, maintenance, and troubleshooting.
2. The programming device shall be complete, newly purchased for this project, and shall be in like-new condition when turned over to Owner at completion of startup.

L. Device Tag Numbering System.

1. Panel, subpanel, and rack-mounted devices shall have laminated phenolic identification tags securely fastened to the device. Hand-lettered or tape labels will not be acceptable. Identification tags shall have white letters on Black background.

M. Permits and Agency Approvals

1. Contractor shall, as part of their work, arrange for and obtain all necessary permits, inspections, and approvals by the authorities having local jurisdiction of such work. This shall include any third-party inspections and testing of panels and equipment.

1.03 GOVERNING CODES AND STANDARDS

- A. All work performed covered by this section and all equipment, materials, and installation shall be in accordance with the National Electrical Code (NEC), with applicable Federal, State, and Local regulations and ordinances, and with the latest edition of the following codes and standards. (Note: Codes and standards are referred to in the text by basic designation only. Where a date is given for reference standards, that edition shall be used. Where no date is given for reference standards, the latest edition in effect at the time of bid opening shall apply.)

1. American National Standards Institute (ANSI)
2. Factory Mutual (FM)
3. Federal Communication Commission (FCC)
  - a. Part 15 – Class A
4. Institute of Electrical and Electronics Engineers (IEEE)
  - a. IEEE 519 – Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
  - b. IEEE C37.90 – Standard for Relays and Relay Systems Associated with Electric Power Apparatus
5. International Society of Automation (ISA):
6. Insulated Cable Engineers Association (ICEA)

7. National Electric Safety Code (NESC)
  8. National Electrical Manufacturers Association (NEMA)
    - a. NEMA ICS 1 – Industrial Control and Systems General Requirements
  9. National Fire Protection Agency (NFPA):
    - a. NFPA 70 – National Electrical Code (NEC)
    - b. NFPA 79 – Industrial Control Equipment
  10. Occupational Safety and Health Administration (OSHA)
    - a. Underwriters Laboratories, Inc. (UL):
    - b. UL 508 – the Standard for Safety for Industrial Control Equipment
    - c. UL 508A – the standard for Safety for Industrial Control Panels
    - d. UL 50 – the Standard for Safety for Enclosures for Electrical Equipment
    - e. A nationally recognized testing laboratory, as approved by the Authority having jurisdiction, may substitute for UL listing on commercial off the shelf products.
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.
- C. If the issue of priority is due to a conflict or discrepancy between the provisions of the contract documents and any referenced standard, or code of any technical society, organization or association, the provisions of the contract documents shall take precedence if they are more stringent or presumptively cause a higher level of performance.
- D. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between laws and regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Owner and/or Engineer.
- E. In accordance with the intent of the contract documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in contract price or an extension in contract time nor limit in any way, the Contractor's responsibility to comply with all laws and regulations at all times.
- 1.04 RELATED WORK
- A. All equipment and work provided under any division of these project specifications including but not limited to vendor supplied instrumentation and control panels shall fully comply with the relevant requirements of Division 40 Sections.
- B. Conduit and Cable
1. Process Control conduit systems are specified in Electrical Division 26.
  2. Instrumentation signal cable and alarm, control, and status wiring are specified in Electrical Division 26.
- C. The contract documents indicate both vendor and PCSS supplied instruments, devices, and control panels. The distinction between equipment suppliers shall be shown on the Drawings,



Instrument Device Schedule, and Panel Schedules. PCSS shall provide all equipment as instruments, devices, and control panels that are not listed as supplied by vendors.

**D. Related Equipment, Materials, and Appurtenances**

1. Related equipment and materials may include, but will not be limited to, instrumentation, motor controllers, valve actuators, chemical feeders, analytical measuring devices, conduit, cable, and piping as described in other sections or furnished under other contracts.
2. PCSS shall provide all auxiliary and appurtenances devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, signal boosters, signal converters, intrinsic safety barriers, signal isolators, special power supplies, special cable, special grounding, software, and drivers to interface with existing equipment or equipment provided by others under other sections of these specifications, whether they are shown on the Drawings or not.
3. All equipment shall be designed and installed in full conformity with the Drawings, specifications, engineering data, instructions, and recommendations of the manufacturer, and the manufacturer of the related equipment.

**E. Coordination**

1. Systems supplied under this section shall be designed and coordinated by PCSS for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications, under other contracts, and, where applicable, with related existing equipment.
2. The PCSS shall coordinate with the Contractor, Owner, Engineer, ASP and other suppliers of Instrumentation and Controls equipment specified under other Divisions that interface with the PCS for all scheduling, installation, testing, startup, and training services.

**1.05 PCSS QUALIFICATIONS**

- A. The PCSS shall be a "systems integrator" regularly engaged in the business of supplying and installing computer-based monitoring, control, data acquisition systems, instrumentation, and their associated subsystems as they are applied to the municipal water and wastewater industry.
- B. The PCSS shall have the following minimum qualifications:
  1. Maintain a permanent, fully staffed and equipped service facility within 200 miles of the project site with full time employees capable of designing, fabricating, installing, calibrating, testing, and troubleshooting the systems specified herein.
  2. Has successfully completed work of similar or greater complexity on at least three previous projects within the last five (5) years. Successful completion shall be defined as a finished project completed on time, without any outstanding claims or litigation involving the PCSS. Potential references shall be for projects where the PCSS's contract was of similar size to this project.

3. Maintain competent and experienced service personnel to service the hardware and software furnished for this project.
  4. Hold a valid UL-508 certification for their panel fabrication facility.
  5. Hold an adequate certificate of insurance for the project work specified herein and in other related Sections.
  6. Be capable of responding to on-site problems, at a minimum, within 12 hours of notice. Provide an on-site response within 4 hours of notification starting at two months before scheduled startup to two months after startup completion.
- C. The selected PCSS shall be one of the following:
1. Control Panels USA, inc.  
Contact: Martin Salyer  
Address: 16310 Bratton Lane, Suite 100, Austin, Texas 78728  
Phone: (512) 863-3224
  2. Any proposed PCSS firm not shown on the pre-qualified list must be identified and submitted a minimum of 10 days prior to bid opening and must be approved by the Owner. Owner will announce via the addendum process a minimum of five days prior to Bid if the proposed PCSS has been accepted. Owner reserves the right to accept or reject any firm based on Owner's evaluation of qualifications, past performance, or experience (or lack thereof) with Owner.
- D. Being listed in this specification does not relieve any potential PCSS from meeting the qualifications and criteria specified in this section.

#### 1.06 ASP QUALIFICATIONS

- A. The ASP shall have the following minimum qualifications:
1. Employ personnel who have previously completed three projects of this size or larger in dollar value and complexity. PLC, OIT, and HMI programmers must be from the same firm.
  2. Employs personnel on this project who have successfully completed manufacturer's training courses on configuration and implementation of the specific programmable controllers, computers, and software proposed for this project. Key personnel shall have manufacturer certifications, training, and have a minimum of 10 years of verifiable plant startup experience. Key personnel shall include, as a minimum, the lead applications programmer.
  3. The ASP shall maintain a permanent, fully staffed and equipped service facility within 300 miles of the project site with full-time employees capable of programming, configuring, installing, commissioning, tuning, and testing the systems specified herein. At a minimum, the AESS shall be capable of responding to onsite problems within 12 hours of notice. Provide an onsite response within four hours of notification, starting at two months before scheduled startup to two months after startup completion.

B. The selected AESS shall be:

1. Control Panels USA, inc.  
Contact: Martin Salyer  
Address: 16310 Bratton Lane, Suite 100, Austin, Texas 78728  
Phone: (512) 863-3224
2. Any proposed ASP firm not shown on the pre-qualified list must be identified and submitted a minimum of 10 days prior to bid opening and must be approved by the Owner. Owner will announce via the addendum process a minimum of five days prior to Bid if the proposed PCSS has been accepted. Owner reserves the right to accept or reject any firm based on Owner's evaluation of qualifications, past performance, or experience (or lack thereof) with Owner.

1.07 SUBMITTALS

A. General submittal requirements:

1. Refer to Section 01 33 00 for general submittal requirements.
2. Submittals shall demonstrate that the equipment and services to be furnished comply with the provisions of these specifications and shall provide a complete record of the equipment as manufactured, delivered, installed, and placed in service.
3. Submittals shall be complete and include equipment dimensional, assembly, and installation drawings, wiring and schematic diagrams, connection details, specifications, ranges, installation requirements, and data covering the materials used and the parts, devices and accessories forming a part of the system furnished. Submittals consisting of only general sales literature shall not be acceptable.
4. Individual drawings and data sheets submitted at random intervals will not be accepted for review.
5. Equipment tag numbers or identifications used on the Drawings shall be referenced where applicable.
6. Shop drawing title blocks shall include, as a minimum, the PCSS's registered business name and address, Owner and project name, drawing name, revision level, and shall identify personnel responsible for the content of the drawing.
7. Incomplete or partial submittals not complying with the submittal requirements outlined in this section will be rejected without review.
8. Submittals shall be bound in separate three-ring binders. Each binder shall include an index and sectional dividers. All drawings shall be reduced to a maximum size of 11-inches by 17-inches and Z-folded to 8.5-inches by 11-inches for inclusion inside the binder. Maximum binder thickness shall be 3 inches.

9. All electronic submittals shall be submitted in a searchable PDF format. The PDF file shall include an index and be bookmarked by section and individual device or component. Submittals that are not bookmarked shall be rejected without review.
10. PLC Programs shall be submitted in the native format of the PLC as suggested by the manufacture and as a PDF printout.
11. The Engineer and Owner will review shop drawings a maximum of two times. The cost of review for the second resubmittal and for each subsequent review by the Engineer and Owner shall be charged to the Contractor in the form of a deductive change order.

B. Submittal Order

1. First Stage Submittals

*Note: Qualifications and Deviation List, Project Plan, and Schedule submittal may be submitted together.*

- a. Qualifications Submittal – Within 30 calendar days after Notice to Proceed
- b. Deviation List, Project Plan, and Schedule - Within 45 calendar days after Notice to Proceed.
- c. Submittal requirements are specified within this section.

2. Second Stage Submittals

*Note: Submit on second stage submittals only after the first stage submittals have been approved.*

- a. Hardware and Software Packages Submittal
  - 1) 40 66 00 – Network and Communication Equipment
- b. Control Panel Submittal
  - 1) 40 67 00 – Control System Equipment Panels and Racks

3. Third Stage Submittals

- a. Process Control and Input/Output (IO) List Submittal
  - 1) 40 61 93 – Process Control System Input/Output List
  - 2) 40 61 96 – Process Control Descriptions
- b. Panel Layout Drawings and Wiring Diagrams Submittal
  - 1) 40 67 00 – Control System Equipment Panels and Racks
- c. Testing Plan Submittals
  - 1) 40 61 21 – Process Control System Testing

4. Fourth Stage Submittals

*Note: Preliminary O&Ms shall be submit prior to any factory testing and/or field installation of equipment and instruments.*

- a. Operations and Maintenance (O&M) Manuals
- b. Submittal requirements are specified within this section.

C. Qualifications Submittal

1. detailed information on staff and organization to show compliance with the Quality Assurance requirements of this section.
2. Submit details of personnel assigned to the project and the organizational structure including the PCSS's project manager, project engineer, and lead project technicians. Include key individual resumes and specify in writing their commitment to this project.
3. The Qualifications submittal shall be submitted and approved before any other submittals from this section will be accepted. Failure to meet the minimum requirements shall be grounds for rejection as a PCSS. The Qualifications Submittal shall, as a minimum, contain the following:
  - a. Copies of ISA CCST Level 1 certificates for all field technicians or resumes demonstrating field experience.
  - b. Notarized statement from the firm's financial institution demonstrating ability for the firm to meet the obligations necessary for the performance of the work.
  - c. Copy of UL-508 certificate for panel fabrication facilities.
  - d. Project references for water or wastewater projects as defined in the Quality Assurance paragraphs.
  - e. Documentation to demonstrate the ability to complete this project including resumes of key staff, financial capacities, details on engineering, design, fabrication, and field service capacity, and location of staff responsible for responding to the site within four hours to resolve startup issues.

**D. Deviation List, Project Plan, and Schedule Submittal**

1. Deviation List
  - a. Submit a detailed list of any exceptions, functional differences, or discrepancies between the system proposed by PCSS and this specification.
  - b. The Deviation List shall consist of a paragraph by paragraph review of the Specifications indicating acceptance or any proposed deviations, the reason for exception, the exact nature of the exception and the proposed substitution so that an evaluation may be made by the Engineer.
  - c. If no exceptions are taken to the specifications or drawings the PCSS shall make a statement as such. If there is no statement by the PCSS, then it is acknowledged that no exceptions are taken.
  - d. The acceptability of any device or methodology submitted as an "equal" or "exception" to the specifications shall be at the sole discretion of the Engineer.
2. Project Plan
  - a. A brief and concise description of the proposed system showing the understanding of the project work, including major hardware and software components, proposed work schedule, startup, and coordination.
  - b. A preliminary system architecture drawing showing the principal items of equipment furnished, including model numbers, and their interrelationships to each other and other systems.
  - c. Approach to work including replacement of existing equipment with new, switchover (Maintaining Plant Operations during system transition), startup and commissioning, testing, training, and any other tasks as required by these specifications.
  - d. Preliminary list of HMI software, PLC software, and PLC hardware, including version numbers, solely to determine compliance with the requirements of the Contract

Documents prior to beginning development of system programming. Review and approval of software and hardware systems as part of this Project Plan stage shall not relieve the PCSS of meeting all the functional and performance requirements of the system as specified herein. Substitution of manufacturer or model of these systems after the submittal is approved is not allowed without Engineer approval.

- e. Sample formats of the shop drawings to be submitted and in conformance with the requirements of the Specifications. At a minimum include samples of panel fabrication drawings, loop, and I/O wiring diagrams.
- f. Preliminary coordination meeting agendas as specified herein.
- g. Training plan outline.

3. Project Schedule

- a. Project schedule shall be prepared in Gantt chart format clearly showing task linkages for all tasks and identifying critical path elements. PCSS schedule must be based on and coordinated with the Contractor's schedule and must meet all field installation, testing, and start-up milestones in their schedule.
- b. The project schedule shall illustrate PCS related major project milestones including the following:
  - 1) Schedule for all subsequent project submittals. Include the time required for Contractor submittal preparation, Engineer's review time, and a minimum of two complete review cycles.
  - 2) Proposed dates for all project coordination meetings.
  - 3) Hardware purchasing, fabrication, and assembly (following approval of related submittals).
  - 4) Software purchasing and configuration (following approval of related submittals).
  - 5) Shipment of instrument and control system equipment.
  - 6) Installation of instrument and control system equipment.
  - 7) Dates and duration of all required testing. Testing schedule shall include submittal approval of test procedures with a minimum of 30 days prior to testing commencement.
  - 8) Schedule shall include submittal of documentation of completed testing activities for review and approval by the Engineer prior to equipment shipment, startup, or subsequent project work.
  - 9) Schedule for system switchover, startup, and/or going on-line for each major system. At a minimum include the schedule for each process controller and HMI server/workstation provided under this Contract.
  - 10) Schedule for all training including submittal and approval of O&M manuals, factory training, and onsite training.
  - 11) Incorporate time constraints for ASP activities as defined in Section 40 61 18.

E. Operations and Maintenance (O&M) Manuals:

- 1. Submit in accordance with Section 01 33 00. O&Ms shall be provided in both hardcopy and electronic copy.
- 2. Operation and Maintenance Manuals shall include complete instruction books for each item of equipment and software furnished. Where instruction booklets cover more than one specific model or range of device, product data sheets shall be included which indicate the device model number and other special features.

3. The O&M manuals shall, at a minimum, contain the following information:
  - a. Table of Contents shall be provided for the entire manual with the specific contents of each volume clearly listed. The complete Table of Contents shall appear in each volume.
  - b. Instrument and Equipment Lists
    - 1) The instrument and equipment lists shall be developed in Microsoft Excel format and provided as a hardcopy in the O&M and electronically as part of the final PDF.
    - 2) Instrument list for all devices supplied including tag number, description, specification section and paragraph number, manufacturer, model number, serial number, range, span, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
    - 3) An equipment list for all non-instrument devices supplied listing description, specification section and paragraph number, manufacturer, model number, serial number, location, manufacturer phone number, local supplier name, local supplier phone number, completion year replacement cost, and any other pertinent data.
4. Equipment Operations and Maintenance Information:
  - a. Data sheets shall be provided for all field and non-field instrumentation devices. Provide a cover page for each device, piece of equipment, and OEM software that lists date, specification number, product name, manufacturer, model number, location(s), and power required. Preferred format for the cover page is ISA-TR20.00.01-2001(updated in 2004-2006), general data sheet; however, other formats will be acceptable provided they contain all required information.
  - b. Vendor O&M documentation for each device, piece of equipment, or OEM software shall be either new documentation written specifically for this project or modified standard vendor documentation. All standard vendor documentation furnished shall have all portions that apply clearly, indicated with arrows, circles or highlighted. All portions that do not apply shall be neatly lined out or crossed out. Groups of pages that do not apply at all to the specific model supplied shall be removed.
  - c. Any component requiring custom software configuration or dip switch settings, that information shall be included along with the corresponding data sheets and O&M information.
  - d. Provide the record documentation of the system audit as specified in Section 40 61 21 - Testing.
  - e. Include the calibration forms developed as specified in Section 40 61 21 - Testing.
5. As-Built Drawings
  - a. As-built drawings shall be complete and including all drawings and diagrams specified in this section. Drawings shall include all wiring, fabrication, and interconnection drawings for all equipment the PCS is connected to including terminal points of equipment not supplied by the PCSS.
  - b. As built documentation shall include information from submittals, as described in this Specification, updated to reflect the as-built system. Errors in or modifications to the system resulting from the Factory and/or Functional Demonstration Tests shall be incorporated in this documentation.
6. Original Licensed Software

- a. Submit original software provided under this Contract. Submit original paper based and electronic documentation for all software provided.
  - b. Submit license agreement information including serial numbers, license agreements, User Registration Numbers and related information.
  - c. All software provided under this Contract shall be licensed to the Owner at the time of purchase.
  - d. Provide media in software sleeves within O&M manual.
7. Electronic O&M Information:
- a. Provide an electronic version of all equipment manuals and data sheets, along with any software back-up of configuration files. Electronic documents shall be supplied in PDF format.
  - b. Provide electronic files for all custom-developed manuals including training manuals. Text shall be supplied in both Microsoft Office format and PDF format.
  - c. Provide electronic files for all drawings produced. Drawings shall be in AutoCAD ".dwg" format and in PDF format. Drawings shall be provided using the AutoCAD eTransmit feature to bind external references, pen/line styles, fonts, and the drawing file into individual zip files.
  - d. Each computer system hardware device shall be backed up onto CDROM or DVD after Substantial Completion and shall be turned over to the Owner.
  - e. If specified in the training section, provide digital copies of all training videos. Videos shall be in a format that is readable by standard DVD players and by standard PC DVD drives. Format shall be a minimum of 800 by 600 pixels and shall include sound.
8. The cover and edge of each volume shall contain the information as specified in Section 01 33 00.

1.08 HAZARDOUS AREAS

- A. Equipment, materials, and installation in areas classified as hazardous on the drawings shall comply with NEC Articles 500, 501, 502 and 503.
- B. Equipment and materials installed in hazardous areas shall be UL listed for the appropriate hazardous area classification.

1.09 SHIPPING, STORAGE, AND HANDLING

- A. Shipping, storage, and handling shall be in accordance with Section 01 66 00.
- B. All electronic equipment and instruments shall be suitably packaged to facilitate handling and to protect against damage during transit and storage in accordance with the manufacturer's instructions. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements, shall be always kept dry, and shall not be exposed to adverse ambient conditions.
- C. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.



- D. Each shipment shall include an appropriate shipping list that indicates the contents of the package, including the specific instrument tags. The shipping list shall be accessible without exposing the instruments to the atmosphere. The shipping list shall also contain any cautionary notes regarding storage of the instruments, including requirements to protect the instrument from static discharge, desensitizing chemicals (solvents, paints, etc.), or ambient atmospheric conditions.
- E. Manufacturer's special instructions for field handling, storage and installation required for protection, shall be securely attached to the packaging for each piece of equipment prior to shipment. The instructions shall be stored in resealable plastic bags or other means of protection.
- F. Individual instruments shall be appropriately tagged or labeled to positively identify the device. All identification shall be visible without the need to unpack the instrument from its protective packaging.
- G. Instrument shipment and storage requirements shall be coordinated with Engineer or Owner prior to shipment. PCSS shall provide adequate storage and be ready to accept the shipment before shipping any equipment to the site. Additional shipping and storage requirements shall be as detailed in the individual instrument specifications.
- H. Equipment shall be installed in its permanent, finished location shown on the drawings within seven (7) calendar days of arriving onsite. If the equipment cannot be installed within seven (7) calendar days, the equipment shall not be delivered to the site, but stored offsite, at the Contractor's expense, until such time that the site is ready for permanent installation of the equipment.
- I. Where space heaters are provided in equipment, provide temporary electrical power and operate space heaters during jobsite storage, and after equipment is installed in permanent location, until equipment is placed in service.
- J. Components which are shipped loose due to transportation limitations shall be assembled and disassembled by the manufacturer prior to shipment to assure that all components fit together and are adequately supported.
- K. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the Owner.

#### 1.10 WARRANTIES

- A. Manufacturer's warranties shall start from date of Substantial Completion in accordance with Section 01 70 49 and be as specified in each specification sections.

### PART 2 PRODUCTS

#### 2.01 ELECTRICAL SURGE PROTECTION

- A. General - Surge protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and power supply lines from lightning, utility, or the plant electrical system. The protection systems shall be such that the protective level shall

not interfere with normal operation but shall be lower than the instrument surge withstand level. Protection shall be maintenance free and self-restoring. Devices shall have a response time of less than 50 nanoseconds and be capable of handling a discharge surge current (at an 8x20 $\mu$ s impulse waveform) of at least 8 kA.

- B. Provide protection of all analog signal (4-20 mA) circuits where any part of the circuit is outside of the building envelope. Circuits shall be protected at both the transmitter and the control system end of the circuit. Protection devices located near the transmitter shall be mounted in a separate NEMA 4X stainless steel enclosure (plastic is not acceptable) or conduit mounted, and shall be Phoenix Contact PT Series, MTL Surge Technologies (Telematic) TP48, Citel TSP-10 series, or equal. Substitution of a single device to protect both 120 VAC and 4-20 mA wires to an instrument is acceptable. Protection devices in control panels shall be MTL Surge Technologies (Telematic) SD Series, Phoenix Contact PT Series, Citel DLA series, or equal.
- C. Provide protection of all 120 VAC power feeds into control panels, instruments, and control room equipment. Surge arresters shall be Transtector ACP-100BW Series, Phoenix Contact "Mains-PlugTrab", MCG Surge Protection 400 Series, Citel DS40 series, or equal.
- D. Non-Fiber Based Data Highway or Communications Circuits - Provide protection on all communication and data highway circuits that leave a building or are routed external to a building. Circuit protection shall be provided at both ends of the line. Surge protection devices shall be Phoenix Contact PlugTrab Series, Transtector FSP Series, MTL Surge Technologies (Telematic) NP Series, Citel DLA series or MJ8 series, or equal.
- E. RF Coaxial Cable - Provide protection on communication cables between radios and antennas, mounted either inside the panel, or in the wall of the enclosure in accordance with NEMA and UL standards. Surge protection devices shall be Citel P8AX series, Polyphaser, or equal.
- F. Inductive Loads - Provide coil surge suppression devices, such as varistors or interposing relays, on all process controller outputs or switches rated 120 VA or less that drive solenoid, coil, or motor loads.

## 2.02 SPARE PARTS

- A. All spare parts shall be wrapped in bubble wrap, sealed in a polyethylene bag complete with dehumidifier, then packed in cartons and labeled with indelible markings. Complete ordering information including manufacturer's contact information (address and phone number), part name, part number, part ordering information, and equipment name and number(s) for which the part is to be used shall be supplied with the required spare parts. The spare parts shall be delivered and stored in a location directed by the Owner or Engineer.
- B. Furnish one of each type of installed Surge protection devices.
- C. Other spare parts are specified in each section.

**PART 3 EXECUTION**

**3.01 INSTALLATION REQUIREMENTS**

- A. The installation of equipment furnished hereunder shall be by the Contractor or their assigned subcontractors.
- B. Field Wiring
  - 1. Field wiring materials and installation shall be in accordance with the electrical section.
  - 2. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded at only one ground point for each shield.
- C. Instrument Installation
  - 1. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions.
  - 2. Instrumentation and control equipment and device locations shown on the drawings are approximate. Exact locations shall be relatively close to the indicated location.
  - 3. Instruments shall be mounted so that they can be easily read and serviced and so that all appurtenant devices can be easily operated.
  - 4. Installation details for some instruments are indicated on the Drawings. Where specific installation details are not shown, the American Petroleum Institute (API) recommended practice 550 shall be followed.
  - 5. In case of any interference with other work, proceed as directed by the Engineer.
  - 6. All equipment used in classified areas shall be designed for the Class, Group, and Division as required for the locations as shown on the Drawings and specified in Division 26. All work shall be in strict accordance with codes and local rulings.
  - 7. Provide brackets and hangers required for mounting of equipment.
  - 8. Provide sunshades for equipment mounted outdoors in direct sunlight. Sunshades shall include standoffs to allow air circulation around the cabinet. Orient equipment outdoors to face North or as required to minimize the impact of glare and ultraviolet exposure on digital readouts.
- D. Salvage of Existing Equipment
  - 1. Existing equipment and materials removed or replaced under this contract shall be delivered to the Owner at a location designated by the Owner or shall be properly disposed of at the Owner's discretion. Care shall be taken to avoid damage to equipment delivered to the Owner.

2. Any mounting brackets, enclosures, stilling wells, piping, conduits, wiring, or openings that remain after removal of equipment and support hardware shall be removed or repaired in a manner acceptable to the Owner. Transmitters or switches containing mercury shall be removed and disposed of by personnel trained in the handling of hazardous materials and using approved procedures.

### 3.02 PCSS PROJECT COORDINATION MEETINGS

- A. The PCSS shall schedule and administer mandatory Coordination Meetings during the project. The PCSS shall make arrangements for the meetings and prepare and send a proposed agenda to all participants at least one week before scheduled meetings. The PCSS shall be responsible for promptly preparing and distributing meeting minutes to all attendees.
- B. The PCSS shall prepare meeting minutes and distribute them to all attendees and others affected by any decisions made at the meetings. The meeting minutes shall be distributed within one week following the meeting.
- C. The meetings shall be held at the Owner's facility, General Contractor's field office, or at the project site (as coordinated with the Engineer and Owner).
- D. Prepare and distribute an agenda for meetings a minimum of one week before the scheduled meeting date.
- E. PCSS Kick-off Meeting
  1. A project kick-off coordination meeting shall be held within two weeks after submitting the Project Plan and Schedule Submittal. The purpose of the meeting shall be to discuss the PCSS's Project Plan and Schedule Submittal, to summarize the PCSS's understanding of the project; discuss any proposed substitutions or alternatives; schedule testing and delivery deadline dates; provide a forum to coordinate hardware and software related issues; and request any additional information required from the Owner.
  2. The PCSS kick-off meeting shall include ASP kick-off meeting requirements from Section 40 61 18, Application Engineering Services.

### 3.03 SYSTEMS CHECK

- A. PCSS shall provide the services of a trained and experienced field supervisor to assist the installation contractor during installation, and to calibrate, test, and advise others of the procedures for installation, adjustment, and operation.
  1. Field Manager.
    - a. PCSS shall appoint a field services manager who shall be responsible for the coordination of all system check-out and startup activities, and who shall be immediately available to Engineer and Owner by phone or on site for the duration of this project.
- B. Field Inspection at Delivery

1. The field supervisor shall inspect major equipment items within five working days of delivery, to assure that the equipment was not damaged during shipment and shall supervise or assist with unpacking, initial placement, and initial wiring of the system.

C. Field Calibration of Instruments

1. After each instrument has been installed, a technical representative of PCSS shall calibrate each instrument and shall provide a written calibration report for each instrument, indicating the results and final settings. A typical instrument calibration report is attached to the end of this section.
2. The adjustments of calibrated instruments shall be sealed or marked, insofar as possible, to discourage tampering.
3. Instrument calibration shall be done before checkout of the system operation.

D. Training for Installation Personnel

1. The field supervisor shall train the installation personnel in reading and understanding submittal drawings, and in the correct installation and wiring procedures for the equipment.

E. Field Inspection Prior to Start Up

1. After installation and wiring connections are complete, the field supervisor, with additional PCSS's personnel shall verify that each external connection to the system is correctly wired and field process components and devices are functioning as intended. PCSS shall be responsible for completing the following scope of work.
  - a. Analog Signals – Analog input signals shall be simulated at the transmitting source and verified to be received at the proper register address in the control system. Analog outputs shall be generated at the control system, and verified to be received with the correct polarity, at the respective receiving device.
  - b. Discrete Signals – Discrete input and output signals shall be simulated and verified that they are received at the respective receiving device, and at the proper voltage.
  - c. Devices by Other Suppliers – If interrelated devices furnished by other suppliers, under other contracts, or by Owner, such as valve actuators, motor controls, chemical feeders, and instruments, do not perform properly at the time of system checkout, the field supervisor shall use suitable test equipment to introduce simulated signals to and/or measure signals from these devices to locate the sources of trouble or malfunction.
  - d. System Check Out Report – The PCSS shall submit a written report on the results of such tests to Engineer. Additional documentation shall be furnished as requested by Engineer to establish responsibility for corrective measures. PCSS shall verify, in writing, to Owner that PCSS has successfully completed the external connection check before beginning system startup or field acceptance testing.

- F. Start Up Assistance – After the field supervisor has completed the system check and submitted his report, PCSS shall supply a factory-trained programmer to provide on-site start up assistance. During the startup period, these personnel shall thoroughly check all equipment, correct any deficiencies, and verify the proper operation of all components.

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SECTION 40 61 18  
APPLICATION ENGINEERING SERVICES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. If referred to anywhere else in the project manual, Application Engineering (AE) or Applications Engineering System Supplier (AESS) services are those services specified in this Section.
- B. Provide all programming, configuration, and related services required to achieve a fully integrated and operational system as specified herein. All equipment shall be controlled in full conformity with the Contract Drawings, process control descriptions, specifications, engineering data, instructions, and recommendations of the equipment manufacturer. Coordinate the control system for proper operation with related equipment and materials furnished by other suppliers under other Sections of these specifications and with related existing equipment.
  - 1. Provide configuration of Programmable Logic Controllers (PLCs) provided for all equipment shown on the Drawings, except for controls equipment shown being provided as part of a vendor package system.
  - 2. Provide configuration of the HMI System Software, Operator Interface Terminals, and drivers provided for all equipment shown on the Drawings, including equipment provided by vendor package systems. The BCMUD HMI existing standards and conventions shall be followed to develop the graphics.
  - 3. Provide configuration of the SCADA Historian Software.
  - 4. Provide configuration of system reports using the Reporting Software provided.
  - 5. Provide for and test communications and functionality between all connected devices (such as PLCs) and the HMI software packages, including devices supplied by others, as depicted on the system architecture drawings to provide a comprehensive working system of data collection, storage, and reporting.
  - 6. Coordinate with vendors supplying PLC control systems and other Ethernet devices to establish peer-to-peer communication monitoring programs (e.g., “watch-dog” or “heartbeat”) and to coordinate read/write passing of data via peer-to-peer communications.
  - 7. Provide startup and training activities associated with the configured PCS system, including equipment provided by vendor package systems.
  - 8. Auxiliary and accessory programming structures necessary for proper system operation and performance shall be included whether or not they are shown on the Drawings.
  - 9. Abide by Owner’s remote access policy when working on the SCADA system. If remote access is not allowed, then all the personnel must be on site during startup/commissioning.



- C. All work shall be coordinated with plant operating personnel to minimize impacts on daily operation. Delays caused for any reason shall be noted and formally submitted to the Engineer and the Owner in the form of a letter.

1.02 RELATED WORK

- A. Refer to Section 40 61 13 – Process Control System General Provisions.

1.03 SUBMITTALS

- A. Provide all required submittals in accordance with Section 01 33 00. The submittals listed below shall be provided as a minimum:
  - 1. System Standards and Conventions
  - 2. Operator Interface
  - 3. Controller Program
  - 4. Historical Data Management
  - 5. Software Maintenance documentation
  - 6. Operations and Maintenance Manuals
- B. Supplement to Project Plan Submittal
  - 1. Supplement the "Project Plan, Deviation List, and Schedule" submittal in Section 40 60 13 by adding the following items to the submittal requirements:
    - a. List of all graphics intended to be created for this project.
    - b. List of all PLC programs that will be created or modified for this project.
- C. Supplement to Input/Output (I/O) List Submittal
  - 1. Supplement the "Input/Output (I/O) List " submittal in Section 40 61 13 by adding the following item to the submittal requirements:
    - a. LOGICAL POINT ADDRESS: I/O address of each point.
- D. System Standards and Conventions Submittal
  - 1. Owner standards and conventions for the HMI systems will be available and shall be used by the AESS.
  - 2. The submittal shall define, at a minimum:
    - a. Graphic display standards, including color conventions, equipment symbols, display format, equipment control pop-up displays, trend displays, and display navigation. Include samples of each proposed type of graphic display (i.e., overview, detail, diagnostic, tabular, etc.)
    - b. System naming conventions, such as graphic displays naming, database naming, tag names, and computer naming.

- c. System configuration, including network addressing and PLC/RTU addressing.
- d. Alarm configuration standards, including priorities and logging.
- e. Security configuration standards, including user groups and privileges.
- f. PLC/RTU standard programming modules, including analog input scaling, flow totalization, equipment runtime, motor start/stop, valve open/close, and any other standard logic planned to be used.

**E. Operator Interface**

- 1. Submit a draft of all proposed graphic displays, examples of each type of pop-up (faceplate) displays, and examples of trends. For those graphics which will be duplicated more than once for similar type of equipment, submit the graphics for the first equipment only.
- 2. Following the draft graphics review meeting and prior to the factory test, submit a ready-for testing version of all graphic displays. These graphics should be completely finished other than the incorporation of comments and changes resulting from testing.
- 3. Submitted graphic displays and trends shall be no less than 8.5 inches by 11 inches and in full color.

**F. Controller Program Submittal**

- 1. For each controller, submit the following using the controller manufacturer's built in printing functions. Electronic submission of Adobe Portable Document Format ("pdf") files in lieu of paper submittals is acceptable. Review will be for general program organization, level of documentation, and overall programming standards (basic pump and valve control, for example). The review will not attempt to confirm the logic works correctly for every loop.
  - a. PLC programs showing ladder logic, function block, high level language or other controller language used. Include individual rung, network, and/or command descriptions with abundant comments to clearly identify function and intent of each code segment. Each logic segment shall be clearly presented, the function of each timer described, the purpose of each subroutine call labeled and defined, etc. Program documentation shall be sufficiently clear to allow determination of compliance with the process control requirements included in the control descriptions and with the Drawings. The submittal shall demonstrate that all logic provided under this project follows the same structure and format and reflects a common programming approach.
  - b. Submit a memory usage report for the controller. This report shall indicate total memory capacity and unused memory capacity.
  - c. Submit cross reference index of I/O allocation and controller memory address. Every physical I/O point as well calculated or virtual I/O required for the implementation of the process scheme shall be included.
- 2. Submit details of control system communication. Submit a "memory map" or other means showing which signals are exchanged between PLCs. Also submit an HMI tag database showing all signals exchanged between the PLCs and HMI. Any specific communication block memory addresses shall be defined.

**G. Historical Data Management**

1. Submit all aspects of the historical data management system and shall include as a minimum the following:
  - a. A complete listing of all signals to be collected and stored. This listing shall include data sampling rate and duration for which the data will be immediately accessible.
  - b. Data reduction methods, rates, and duration data will be immediately accessible.
  - c. Storage space requirements and supporting calculations.
  - d. Description of historical database design, including data flow diagram, table definitions, procedures used, and queries used. Method of accumulating and displaying run times and flow totals shall be described. Method of interfacing to the reporting system shall be defined. Methods of handling Data Quality Flags shall be defined. Method of storing and displaying trending information shall be defined.
  - e. Description of methodology for restoring data collected locally during times that the historical data management system is not available. Description of database failure and recovery, including data correction.
  - f. Description of selecting only the active real-time data source for systems that are utilizing redundant data acquisition nodes.
  - g. List of data source interfaces to be used with the system (for example, OPC, file collection, historian-historian collector, HMI applications, etc.)

H. O&M Manuals - Software Maintenance Manuals

1. Include these manuals as part of Section 40 61 13 "Operations and Maintenance (O&M) Manuals". This required information is in addition to all requirements of Section 40 61 13.
2. Software Listings and Databases- Submit hard copies of the same information required in the "Controller Program Submittal" except include files updated to reflect the as built system. Include PDF versions of these files in the CD specified below.
3. PID Loop Tuning Parameters - Submit annotated chart recorder traces or computer system trend screen printouts showing tuned control loop response to plus and minus 40 percent of full span step changes of loop setpoint for each individual loop. For cascade loops, submit charts showing response of the secondary loop with secondary setpoint on manual and also response of the entire cascade control loop in automatic mode. Include a description of tuning methodology used.
4. If available as part of the software provided, supply hardcopies of configuration information for the HMI systems, reporting systems, Historian Systems, and any other programs developed under this Contract.
5. Machine Readable Documentation - Provide two sets of as built software documentation on CD-ROMs in original electronic format for all PLC, HMI systems, reporting systems, Historian Systems, and any other programs developed under this Contract. All changes made during or after testing, start-up, and commissioning shall be incorporated.

I. O&M Manuals - Operator Manuals

1. Provide Operator's Manuals prior to final acceptance of the system.
2. These manuals shall be separately bound and shall contain all information necessary for the operator to monitor and control the plant from the control system. The manuals shall be

written in non-technical terms and shall be organized for quick access to each detailed description of the operator's procedure. Manuals shall contain, but not be limited to, the following information:

- a. A comprehensive table of contents of the manual.
  - b. A simple overview of the entire system indicating the function and purpose of each piece of equipment.
  - c. A detailed description of the operation of the HMI and OIT including all appropriate displays. Including a screenshot of each HMI and OIT display screen and annotating each function in text is an acceptable format for presenting this information.
  - d. Step-by-step procedures for starting up or shutting down an individual component of the control system and also of the entire system.
  - e. Login / logout procedures.
  - f. Complete, step-by-step procedures for printing reports and entering manual data.
  - g. Complete, step-by-step procedures for performing system or selected file backup and restoration including archiving historical data. Include recommended archiving schedule for historical data.
  - h. Operational description for operating HMI computer equipment and peripherals including printers, CD-ROMs, removable bulk storage devices, UPS, etc. Description shall include procedures for typical maintenance and troubleshooting tasks.
  - i. A complete glossary of terms and definition of acronyms.
  - j. List of personnel to be contacted for warranty and emergency services, including name, address, telephone number, pager or cell phone number, fax number, and email address.
3. Include these manuals as part of Section 40 61 13 " Operations and Maintenance (O&M) Manuals". This required information is in addition to all requirements of Section 40 61 13.

#### 1.04 MAINTENANCE

- A. Refer to Section 40 61 13 – Process Control System General Provisions.

#### 1.05 WARRANTY

- A. Refer to Section 40 61 13 – Process Control System General Provisions and supplement that with the requirements below.
- B. All application work shall be warranted from the date of Substantial Completion in accordance with Section 01 70 49.
- C. Provide telephone technical support within 4 hours of warranty claim. If failure cannot be resolved by telephone, provide onsite technical support within 24 hours of warranty claim.

#### 1.06 QUALITY ASSURANCE

- A. Refer to the Section 40 61 13 - Process Control System General Provisions.

## PART 2 EXECUTION

### 2.01 GENERAL

- A. The system specified herein shall perform the following generalized functions:
1. The system shall allow the operator to control equipment such as pumps and valves as shown on the Drawings and as defined in Section 40 61 96 - Control Descriptions.
  2. Perform real-time process control, including proportional integral derivative control action, sequencing, process calculations, etc.
  3. Collect, calculate, and store accurate, reliable operating information for present and future uses.
  4. Assist remote site operating personnel by noting and communicating off normal operating conditions and equipment failures.
  5. Accumulate and store equipment running times for use in preventative maintenance.
  6. Provide color graphic displays and reports for use by the system operating and supervisory personnel.
  7. Provide trending for all analog values.
  8. Provide control system diagnostics.
  9. All process control functions including PID, calculations, sequencing, timing, etc., shall be done in the process controller. The HMI software shall perform the real-time database, report generation, graphic screens, program development, set point modification, data archiving, etc.
  10. The system shall allow the operator to manually control (by keyboard entry and mouse type pointing device) the status of pumps, valves, etc. (i.e., on off, open close, setpoint value, etc.) when viewing the appropriate graphic screen on the HMI.

### 2.02 COORDINATION MEETINGS AND WORKSHOPS

- A. Refer to Section 40 61 13 – Process Control System General Provisions.

### 2.03 CONTROLLER PROGRAMS

- A. All applications programs shall be developed in a structured manner and shall follow an intuitive arrangement so that an instrumentation technician with basic programming knowledge will be able to understand. Programs shall utilize standard program templates or subroutines for repetitive logic such as equipment control, flow total calculations, equipment runtime calculations.

- B. Make changes to the application programs and software configuration, based on comments during the submittals, the factory tests, the field tests, and during the commissioning process to meet the design intent, at no additional cost to the Owner.

2.04 GRAPHIC DISPLAYS - GENERAL

- A. All displays shall contain and continuously update the displayed process variables, date and time of day. All process values shall be displayed in engineering units. All displays shall incorporate references to both instrumentation tag numbers and plant equipment numbers. All process variables shall be displayed on their associated display(s) with correct engineering units. Process variables shall display their associated data quality flags.
- B. All operator commands related to controlling field devices or system attributes shall require multiple keystrokes or mouse actions to protect against inadvertent operations. The operator shall receive confirmation of the selected point to be controlled, at which time a cancellation of the control can be affected.
- C. Process graphic displays, shall be based on the P&IDs, site plan drawings, mechanical drawings and electrical drawings included in these Contract Documents. The graphic displays shall depict process flow streams, process structures, and all major items of process equipment and control devices in a schematic format.
- D. All main graphical screens shall include a title bar, main graphic area, navigational buttons, and alarm summary bar. Title bar shall be displayed on the top of each screen and include display name, description and time/date. The main graphical area shall contain primary screen data in graphical format. Navigational buttons shall include a minimum of main menu, trends, main alarm summary, and security log in. The alarm summary bar shall display the last three valid alarms on the bottom of each screen.
- E. Animation shall be provided to mimic level changes in tanks or vessels, and to mimic rotation of rotating equipment when running. Valve colors shall change when opened and closed.
- F. Unless specifically noted, all timers, setpoints, alarm actuation levels, etc., shall be adjustable from the operator interface.
- G. The system shall show field conditions with text that can alternate (i.e., OPEN/CLOSE, START/STOP, HIGH/LOW) and change color correspondingly. Field devices that are tri-state must be represented in three conditions.
- H. Conditions in the field designated as alarm conditions shall report to the operator workstation, actuate an audible alarm, and provide a visual blinking image on the associated graphic page. All alarms and events shall be displayed on the screen and archived.
- I. All interlocks that affect equipment operation shall be identified both by alarm and by HMI indication.
- J. All analog inputs shall be checked for out of range (via high and low limit checks) and alarmed.

- K. All process flow streams shall be labeled and color coded using the project color schedule in Division 9. All structures and equipment shall be identified by name and appropriate equipment and loop tags.
- L. Color coding for equipment status and alarms shall be as follows:
  - 1. Red for off or closed.
  - 2. Green for on or open.
  - 3. Active, unacknowledged alarms are indicated by flashing amber.
  - 4. Active, acknowledged alarms are indicated solid amber.
- M. Automatically record all alarm and events should any of the following sequences or events occur:
  - 1. Date/Time entry
  - 2. Limit changes
  - 3. Any commanded or un-commanded change of any point
  - 4. Alarm conditions
  - 5. PLC activation or deactivation
  - 6. Operator login or logout activity
- N. There may be additional general programming requirements listed in Part 1 of the Section 40 61 96 - Control Descriptions that impact the HMI configuration. Contractor shall furnish up to an additional 30% quantity of HMI graphic screens and PLC ladder logic programming to provide controls and monitoring of any additional I/O at no additional cost to the Owner.

## 2.05 SPECIFIC GRAPHIC SCREENS

- A. At a minimum, provide the following types of graphic screen indicated below. Where such screens exist, edits shall be made to incorporate new equipment added in this project.
  - 1. Main menu screen shall be developed to link to all screens and process areas. The screen shall be a complete and logical listing of the names and number of all screens.
  - 2. Individual treatment process screens shall graphically screen key process variables and equipment. No operator entries shall be done from these screens. Individual process flow screens for each process shall include all process components, including tanks, pumps, blowers, mixers, drives, flow meters, valves, mechanical devices, as well as generators.
  - 3. Individual unit process screens depicted from the P&IDs are used for control and screen of each major item of process equipment, process variables, and control devices, including

pumps, blowers, valves, gates, mixers, drives etc. The unit process screens shall provide the ability for the operator to go to individual equipment popup screens.

4. Popup screens shall be provided for each piece of equipment to start/stop equipment, open / close valves, implement automatic control, adjust set points, establish and adjust tuning parameters, set alarm limits and initiate a sequence.
5. Communications diagnostic screens, showing the details of network status, communications status of all new major network components.
6. Maintenance screens shall screen the raw value for each analog and digital I/O point in the system. They shall also allow the operators/maintenance personnel to enter an override value for an analog point that is then used by the system instead of the value read from the input card / communications link.
7. Trend screens with the capability to screen up to eight, operator assigned, analog and/or digital process variables. Each analog value will be shown on a trend screen.
8. Main alarm summary screen shall screen the following information on each alarm: Time, tag name, description, alarm type, current value and status. An acknowledge alarm button shall acknowledge all new unacknowledged alarms. The acknowledged and unacknowledged alarms shall be different colors. Acknowledged alarms shall clear automatically after the condition is corrected.
9. Analog variable screens showing a tabular summary of all plant process variables, in operator assigned groupings.

## 2.06 SECURITY

- A. The system shall be configured and implemented with security to prevent unauthorized access. The system shall allow authorized changes to system operation through defined user accounts and password verification.
- B. Coordinate with Owner user account information, including login name and password for each account.
- C. Security levels of "display only", "operator mode", "supervisor mode", and "engineer mode" shall be available through assignable passwords. On system startup, the "display only" security level shall automatically be entered. In the "display only" mode, information is available to be displayed on the screen but no changes may be made. In the "operator mode", changes may be made to process set points, times, etc.; however, the overall control concepts may not be modified. In the "supervisor mode", all operator functions can be modified and any special reports or critical process set points (data can be modified; however, the overall control concepts may not be modified). In the "engineer mode" level, all user modifiable parameters of the system shall be available for modification.

## 2.07 ALARM/EQUIPMENT STATUS REPORTING

- A. The alarm log shall display all alarms as they occur. The alarm message shall include the time of occurrence, tag name, tag number, and whether it is a low, high, or failure alarm. When the



point in alarm returns to normal, the time, point identification number, and return to normal shall be displayed. All reports shall include the plant equipment number of the associated device.

- B. The equipment status shall be logged whenever a change in status occurs (i.e., start, stop). The equipment status log shall include the time, equipment name, tag number, and the particular change in status.

## 2.08 HISTORICAL DATA MANAGEMENT

- A. The following features shall be provided for processing and storage of system historical data:
  - 1. Each system point (analog or digital, real or pseudo) shall have the capability of being historically logged. A point shall have the capability of being deleted from historical log at any time. It shall be easy to add or delete system points using minimal keystrokes.
  - 2. All process analogs and all flow totals and run time indications of all primary process equipment motors shall be sampled and stored in the historical data management system.
  - 3. Data Processing: The real time instantaneous values shall be stored in a historical log file on the hard disk at defined sampling rates.
  - 4. Data Correction: Historical data shall be manually modifiable by personnel with appropriate security levels. Such data shall be differentiated from actual monitored values on reports, in the database and in trends.
  - 5. Data Quality: Data Quality flags shall propagate to the next higher level of the history based on user selectable percentage determining tolerance levels for averages and totals. If the percentage of suspect data exceeds the tolerance level, the suspect data flag propagates to the next higher level. Maximums and minimums shall be taken from good data.

## 2.09 TESTING

- A. Refer to Section 40 61 21 – Process Control System - Testing.

END OF SECTION

SECTION 40 61 21  
PROCESS CONTROL SYSTEMS - TESTING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section covers the testing requirements for all process equipment, instruments, and devices that are monitored, controlled, or otherwise part of the process control system (PCS) and is detailed in the contract drawings and those specified in 40 61 13 - Process Control System General Provisions.
- B. Testing of vendor supplied equipment connecting to the PCS shall adhere to the same testing requirements herein. The PCSS shall coordinate with the vendor(s) for integration and testing of their equipment into the PCS.
- C. PCSS shall coordinate all testing activities with the Owner, Engineer, Contractor, all affected subcontractors, equipment suppliers, and vendors.
- D. PCSS shall provide all labor, materials, equipment, and incidentals required to complete all testing listed herein.
- E. PCSS shall perform all test listed per testing requirements as specified herein.
  - 1. Testing of Existing Systems
    - a. Pre-functional demonstration test (PFDT)
  - 2. Field Testing
    - a. Operational Readiness Test (ORT)
    - b. Functional Demonstration Test (FDT)
    - c. Site Acceptance Test (SAT)
- F. PCSS shall provide to the Engineer certified calibration / recalibration (for existing Instruments) reports for field instruments and devices specified or shown on the drawings immediately upon completion of calibration.
  - 1. Receipt of any calibration / recalibration certificates shall in no way imply acceptance of any work or of instruments supplied.
  - 2. Each calibration / recalibration certificate shall be signed and dated by an authorized representative of the PCSS. Completed certificates shall be submitted to the Engineer through the submittal process.
  - 3. A typical instrument calibration certificate form is included at the end of this Section.

1.02 TEST – GENERAL

- A. The PCSS shall test all PCS equipment at the factory prior to shipping to site. To the extent possible all PCS equipment shall be tested as a single fully integrated system at the factory.

- B. Each test shall be performed in the cause-and-effect format. The person administering the test shall initiate an input (cause) and, in which the system's or subsystem's produce the correct result (effect).
- C. Whether explicitly stated on the test procedures, the Engineer reserves the right to test or retest all specified functions to determine compliance with the functional requirements. Additional testing by Engineer to determine compliance with the specified requirements shall be performed at no additional cost to the Owner. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- D. Test using actual process variables, equipment, and data when possible. If it is not practical to test with actual process variables, equipment, and data, variables, equipment, and data shall be simulated.
- E. PCSS shall prepare and submit testing procedures to be approved by Owner and Engineer that shall demonstrate that the system conforms to the specifications.
- F. PCSS shall notify Engineer and Owner in writing at least 14 days before the proposed testing date.
- G. If any test is concluded unsuccessfully, the test shall be repeated.
- H. Equipment shall not be shipped to the project site until the Engineer and/or Owner has received all Factory Acceptance testing submittals and approved the system ready to ship in writing.
- I. Correction of Deficiencies
  - 1. Deficiencies in workmanship and/or items not meeting specified testing requirements shall be corrected to meet such requirements at no additional cost to Owner.
  - 2. Testing shall be repeated after correction of deficiencies are made until the test is deemed successful. This work shall be performed at no additional cost to Owner.

#### 1.03 RELATED WORK

- A. Refer to Section 40 61 13, Process Control System General Provisions.
- B. Refer to Section 40 61 18, Application Engineering Services.

#### 1.04 SUBMITTALS

- A. PCSS shall submit all testing documents in one submittal. Testing documents shall include the following:
  - 1. Testing Procedures
    - a. Detailed procedures proposed to be followed for each tests specified herein. The test procedures shall serve as the basis for the execution of the required tests to demonstrate that the PCS meets, and functions as specified.

- b. Sample test forms and procedures to be included to allow the Owner/Engineer an opportunity to comment on format and content prior to the PCSS developing the detailed test procedures.
    - c. Structure procedures in an orderly and easy to follow manner to facilitate an efficient and comprehensive test. Test shall be in a cause-and-effect format.
    - d. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests.
    - e. The PCSS shall include punch list forms with the test procedures to document issues that arise during the testing. Punchlist forms, at a minimum, shall include a specification cross reference; an issues description field; a resolution description field; and a sign-off area for the PCSS, Owner, and Engineer.
    - f. Indicate all pre-testing setup requirements, all required test equipment, and simulation techniques to be used.
    - g. Include the demonstration and validation under normal operating conditions and under various failure scenarios as specified in Contract Documents.
  - 2. Testing Status signoff forms
    - a. Develop project specific I/O Status and Automatic Control Strategy signoff forms to be used during factory and field testing to organize and track each loop's inspection, adjustment, calibration, configuration, and testing status and sign off. Include sign-off forms for each testing phase showing all loops with sign-off areas for the PCSS and Owner/Engineer.
    - b. Separate forms for factory and field testing can be used, or they can be combined, at the discretion of the PCSS.
    - c. Testing Status signoff forms shall provide space to note any deficiencies and whether the test passed or failed.
    - d. Example forms are shown in the Appendices.
  - 3. Testing Documentation
    - a. After completion of each required test, the signed Testing Status signoff forms shall be submitted to the Owner/Engineer within 10 days of completion of each test.
    - b. Testing shall not be considered complete until the signed-off forms have been submitted and approved.
    - c. Submittal of other test documentation, including "highlighted" wiring diagrams with field technician notes, are not acceptable substitutes for the formal test documentation.
  - B. Testing may not start until all Testing Submittals have been approved.
- 1.05 COST OF TRAVEL
- A. Scheduled tests will only be attended once by Owner and/or Engineer. If test is not successful, all subsequent tests will be performed at PCSS's expense.
  - B. PCSS shall reimburse Owner for all labor and expenses incurred in connection with attending repeated test necessitated by system failure or inadequate preparation.
  - C. Reimbursement will go through the Owner with Engineer invoicing Owner for all expenditures associated with retesting.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. The PCSS shall conduct factory test prior to equipment shipping to the project site.
- B. The PCSS shall conduct field test once all equipment and devices that makeup the PCS has been installed.
- C. All tests shall be specifically addressed in Test Procedure submittal.
- D. All tests shall be recorded on the approved Test Status Signoff forms.

3.02 TESTING OF EXISTING SYSTEM

- A. Pre-Functional Demonstration Test (PFDT)
  - 1. Purpose of PFDT is for PCSS to verify the functionality, performance, and stability of the existing system to document the existing conditions prior to installation of the replacement process control system.
  - 2. At the beginning of project and prior to installation of the process control system components and prior to performing the electrical or PLC replacement work, the existing system shall be tested (inspect and document terminations, calibrations, field wire routing to the end device, functionality of connected equipment and instruments, circuit power type and source, loop functionality, field equipment functionality, and controls functionality) as installed to document conditions prior to construction activities.
  - 3. The PFDT shall be performed by PCSS, and Owner. The PCSS shall facilitate testing under the direction of Owner personnel and provide sufficient staff to cover onsite PLC and HMI inspections, and documentation.
  - 4. Loop/Component Inspections and Tests: The entire system shall be checked on a loop-by-loop and component-by-component basis.
    - a. The Loop/Component Inspections and Tests shall be implemented using Owner/Engineer approved forms and checklists. PCSS shall submit testing forms for approval as part of the testing plan and prior to testing.
      - 1) Each loop shall have a Loop Status Report to organize and track its inspection. These reports shall include the following information and check-off items with spaces for sign-off by the Contractor and Owner:
        - a) Project Name, test date, PCSS name, and lead PCSS technician name.
        - b) PLC name, PLC loop tags (arranged by input/output channel or type), PLC loop description, PLC loop range, PLC loop HI/LO state, setpoint, etc.
        - c) Check-offs/sign-offs for the loop: Panel interface terminations; I/O interface terminations; I/O signal operation; inputs/outputs operational (received/sent, processed, adjusted); total loop operation; process controller scaling and adjustment; and space for comments.
        - d) Total loop operation: Provide space for comments.

- e) Equipment status: Provide space for comments.
- b. Computer-Manual (i.e., Remote-Manual) start/stop, open/close commands of all devices controlled by the SCADA system shall be verified by the PCSS during the PFDT.
- c. Upon completion of the PFDT, the PCSS shall submit a record copy of the test results to the Owner/Engineer and request the scheduling of Operational Readiness Test.

### 3.03 FIELD TESTS

#### A. Operational Readiness Test (ORT)

1. Purpose of ORT is to check that process equipment, instrument installation, instrument calibration, instrument configuration, field wiring, control panels, and all other related system components are ready to monitor and control the processes. This test will determine if equipment is ready for operation.
2. This test shall take place after the installation of all PCS components and prior to FDT and startup. Prior to starting this test, relevant process equipment shall be installed and mechanically tested, instruments installed, control panels installed, and field wiring complete.
3. ORT shall be conducted by the PCSS, Contractor, subcontractors, equipment vendors, and any others that are responsible for process equipment being monitored or controlled by and through the PCS.
4. All deficiencies found shall be corrected and retested by PCSS prior to commencement of the FDT.
5. Required Documents for Test
  - a. Master copy of the PCSS developed field Testing Signoff forms.
  - b. Testing Procedures
  - c. Calibration forms
6. PCSS shall maintain Sign-off forms and Calibration forms at job site and make them available to Engineer/Owner at any time.
7. The following tests shall be performed as part of ORT
  - a. Instrument calibration, configuration, and set-up.
  - b. Input/Output (I/O) Testing from field device to PLC and to HMI/OITs.
  - c. Testing of individual process control strategies.
8. Instrument calibration, configuration, and set-up
  - a. Calibrate, configure, and set-up all components and instruments to perform specified functions. This included tuning all process equipment PID loops.
  - b. Calibration form
    - 1) PCSS shall maintain a calibration form in field to document any component or instrument requiring dip switch settings, calibration, or custom configuration. These forms shall provide a summary of the actual settings used in the field to allow an Instrument technician to replace the device entirely and configure it to function as it did before.

- 2) Calibration information shall be added to Instrument data sheet, shall be added to a copy of manufacturer's standard "Configuration Sheet", or a separate form shall be created.
    - a) If a separate form is used, the form shall list Project Name, Loop Number, ISA Tag Number, I/O Module Address, Manufacturer, Model Number/Serial Number, Output Range and Calibrated Value.
  - 3) Required information shall include but not be limited to:
    - a) Discrete Devices: Actual trip points and reset points.
    - b) Instruments: Any configuration or calibration settings entered into the instrument
    - c) Controllers: Mode settings (PID).
    - d) I/O Modules: Dip switch settings, module configuration (if not documented in native programming documentation).
  - 4) Any device that allows configuration files to be backup of to a laptop, the PCSS shall make configuration files to be available to Engineer and/or Owner for inspection. Submit backup files as part of Final System Documentation.
9. I/O Testing
- a. PCSS in conjunction with Contractor shall test all signals under process conditions. Each I/O shall be tested from the field device to the PLC terminal block and from PLC to HMI/OIT. Simulation of I/O, such as jumpering inputs, will not be accepted unless authorized by Engineer.
  - b. The following I/O tests shall be performed:
    - 1) Discrete Input – At device or instrument, change signal condition from inactive to active state. Observe results on all indicators within loop such as HMI screens, OIT screens, pilot lights, horns, beacons, etc.
    - 2) Analog Input – Test analog signal over entire engineering range at various intervals including 0, 25%, 50%, 75%, and 100% as well as on increasing and decreasing range. Observe results on all indicators within loop such as HMI screens, OIT screens, recorders, digital indicators, etc.
    - 3) Discrete Output – Signals shall be tested by switching equipment to manual control at the HMI and OIT nodes and turning output on or using other means to turn output on, then verify equipment responds accordingly.
    - 4) Analog Output – Test analog signal over entire engineering range at various intervals including 0, 25%, 50%, 75%, and 100% as well as on increasing and decreasing range by switching equipment to manual control at HMI and OIT nodes and manipulating the variable output, then verify equipment responds accordingly.
10. Testing of Automatic Control Strategies
- a. All automatic control strategies shall be verified using actual process equipment and instruments, or other means, to verify logic performs as expected. Verify faults and logical failure scenarios for control strategies such as instrument failures, equipment failures, loss of communication between HMI Server and PLC, loss of peer-to-peer communication, out of range testing for analog inputs, loss of power, and all other strategies specified in control strategy document.
  - b. Repeat all systems tests specified under factory testing.
  - c. UPS shall be tested to verify UPS switch power correctly while keeping all UPS powered loads online. Test UPS capacity by switching offline power to UPS and verify if they maintain specified run time.

- d. Panels modified by this Contract shall test the internal control panel temperature under full running conditions to ensure proper cooling/ventilation is being provided.
- e. Upon successful completion of ORT, PCSS shall submit a record copy of test results and request scheduling of FDT.

**B. Functional Demonstration Test (FDT)**

- 1. Purpose of the FDT is to certify that the entire PCS is ready for operation by demonstrating each specified function on a paragraph-by-paragraph, loop-by-loop, and site-by-site basis. FDT is to be witnessed by the Engineer and/or Owner.
- 2. FDT shall be performed after successful completion of the ORT and individual process startup, and prior startup and the SAT. The FDT shall be completed in a single testing period. The testing period may span over several days.
- 3. Failure of five (5) percent of I/O tested or more than one (1) hour of troubleshooting during the FDT will deem test as unsuccessful and the FDT shall be rescheduled once the system is ready for retesting.
- 4. All test shall be the same as specified under ORT, except that the entire installed system shall be tested and all functions demonstrated using live field-based data to the greatest extent possible. The FDT can take place immediately following a successful ORT.
- 5. Required Documents for Test:
  - a. Set of panel drawings and wiring diagrams from WFAT and ORT with corrections noted.
  - b. A set of Contract drawings and specification including addenda and change orders.
  - c. Signed-off master copy of the PCSS developed field testing signoff forms.
  - d. Testing procedures.
  - e. Copy of completed calibration forms.
  - f. One copy of all O & M Manuals for PCSS supplied equipment.
- 6. Daily schedule during FDT shall be as follows:
  - a. Morning meeting to review the day's test schedule.
  - b. Scheduled tests and signoffs.
  - c. End of day meeting to review day's test results and to review or revise next day's test schedule.
  - d. Unstructured testing period by Engineer and/or Owner.
- 7. The system shall operate for 96 continuous hours without failure before this test shall be considered successful. The start of the continuous hours will commence after all testing has been completed.
- 8. Punch list items and resolutions noted during the test shall be documented on the Punch list/Resolution form. In the event of rejection of any part or function test procedure, the PCSS shall perform repairs, replacement, and/or retest within 10 days.
- 9. Upon successful completion of the FDT, PCSS shall submit a record copy of test results to the Engineer and/or Owner as specified and request the scheduling of the SAT.



**C. Site Acceptance Test (SAT)**

1. Purpose of the SAT is to verify that the PCS capable of functioning as specified and intended for an extended period and without major malfunctions.
2. The SAT duration shall be 30 consecutive days under full plant process operations. SAT will be deemed successful if there are no major non-field-repairable malfunctions.
  - a. Any malfunction which cannot be corrected within 24 hours of occurrence by PCSS personnel, or more than two similar failures of any duration, will be considered a non-field-repairable malfunction.
  - b. Any malfunction during the SAT shall be analyzed and corrected by the PCSS. The Engineer and/or Owner will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.
  - c. In the event of any part or function of the SAT being rejected, the PCSS shall perform repairs or replacement within 5 days of the event. Upon completion of repairs by the PCSS, the SAT will be re-started from the date which the PCSS successfully corrected the malfunction(s) and the Engineer and/or Owner have accepted and signed off on the repairs.
  - d. Malfunctions shall include any logic sequencing that is not operating per the specifications.
3. During the SAT plant operations and PCSS shall be present and available to address any potential issues that may impact the overall system process.
  - a. The PCSS shall provide personnel who has intimate knowledge of the system, its functionality, hardware, and software.
  - b. When PCSS personnel is not onsite, they shall be available by phone, with their phone number given to the Owner for immediate assistance. The PCSS personnel shall be able to be onsite within 8 hours of a notification by the Owner.
4. While this test is proceeding, Engineer and Owner shall have full use of system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes. Plant operations shall remain responsibility of Owner and decision of plant operators regarding plant operations shall be final.
5. During the SAT no software or hardware modifications shall be made to the system without prior approval from Owner or Engineer.
6. Upon successful completion of the SAT and subsequent review and approval of complete system final documentation, the system shall be considered substantially complete and the one-year warranty period shall commence.

**D. CERTIFICATE OF INSTALLATION**

1. Following successful completion of the SAT, PCSS shall submit a Certification of Installation. Certification shall be on PCSS corporate letterhead and signed by an officer of the company.

END OF SECTION

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SECTION 40 61 93.1  
PROCESS CONTROL SYSTEM INPUT/OUTPUT LIST

Item	Controller ID	IO Type	Field Device	Loop Number	IO TAGGING SUFFIX	IO TAG No.	Service Description	I/O Range		Engineering Unit	ALARM INFORMATION					Historical Information		Analog		Discrete				Drawing/P&ID No.	Remarks
								HI / ON	LO / OFF		ALARM / EVENT	HI HI	HI	LO	LO LO	Update Rate (sec)	Historical Logging	Signal Type	Power Type	Signal Type	Close State	Power Source	Interposing Relay		
1	HMI	EDI	0100-GEN	9001	YIR	0100_GEN_9001_YIR	INTAKE FACILITY GENERATOR RUNNING	RUN	OFF	N/A	EVENT					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-4	
2	HMI	EDI	0100-GEN	9001	YA	0100_GEN_9001_YA	INTAKE FACILITY GENERATOR ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-4	
3	HMI	EDI	0100-GEN	9301	YA	0100_GEN_9301_YA	INTAKE FACILITY GENERATOR FUEL LEAK ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-4	
4	HMI	EDI	0100-GEN	9001	HSI	0100_GEN_9001_HSI	INTAKE FACILITY GENERATOR E-STOP	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-4	
5	HMI	EAI	0100-GEN	9201	LI	0100_GEN_9201_LI	INTAKE FACILITY GENERATOR FUEL LEVEL	100	0	%	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-4	
6	PLC-CMP	AI	0110-TIT	8001	TI	0110_TIT_8001_TI	INTAKE COMPRESSOR BUILDING TEMPERATURE	150	0	DEG F						1	Y	4-20mA	2-WIRE	N/A	N/A	N/A	N/A	I-7	
7	PLC-CHM	AI	0150-TIT	8001	TI	0150_TIT_8001_TI	INTAKE COPPER ION BUILDING TEMPERATURE	150	0	DEG F						1	Y	4-20mA	2-WIRE	N/A	N/A	N/A	N/A	I-7	
8	PLC-WELL3	DI	3000-ATS	9001	ZSH	3000_ATS_9001_ZSH	WELL #3 & #5 AUTOMATIC TRANSFER SWITCH IN UTILITY POSITION	UTILITY	NOT UTILITY	N/A	EVENT					N/A	Y	N/A	N/A	120VAC	ON UTILITY	ATS Panel	Y	I-5	
9	PLC-WELL3	DI	3000-ATS	9001	ZSL	3000_ATS_9001_ZSL	WELL #3 & #5 AUTOMATIC TRANSFER SWITCH IN GENERATOR POSITION	GENERATOR	NOT GENERATOR	N/A	ALARM					N/A	Y	N/A	N/A	120VAC	ON GENERATOR	ATS Panel	Y	I-5	
10	HMI	EDI	3000-GEN	9001	YI	3000_GEN_9001_YI	WELL #3 & #5 GENERATOR IN AUTO	REMOTE	LOCAL	N/A	EVENT					N/A	N	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
11	HMI	EDI	3000-GEN	9001	YIR	3000_GEN_9001_YIR	WELL #3 & #5 GENERATOR RUNNING	RUN	OFF	N/A	EVENT					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
12	HMI	EDI	3000-GEN	9001	YA	3000_GEN_9001_YA	WELL #3 & #5 GENERATOR ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
13	HMI	EDI	3000-GEN	9301	YA	3000_GEN_9301_YA	WELL #3 & #5 GENERATOR FUEL LEAK ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
14	HMI	EDI	3000-GEN	9001	HSI	3000_GEN_9001_HSI	WELL #3 & #5 GENERATOR E-STOP	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
15	HMI	EAI	3000-GEN	9201	LI	3000_GEN_9201_LI	WELL #3 & #5 GENERATOR FUEL LEVEL	100	0	%	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-5	
16	PLC-3	AI	5000-FIT	5001	FI	5000_FIT_5001_FI	WELL #5 EFFLUENT FLOW	250	0	GPM						1	Y	4-20mA	2-WIRE	N/A	N/A	N/A	N/A	I-8	
17	PLC-WELL6	DI	6000-ATS	9001	ZSH	6000_ATS_9001_ZSH	WELL #6 AUTOMATIC TRANSFER SWITCH IN UTILITY POSITION	UTILITY	NOT UTILITY	N/A	EVENT					N/A	Y	N/A	N/A	120VAC	ON UTILITY	ATS Panel	Y	I-6	
18	PLC-WELL6	DI	6000-ATS	9001	ZSL	6000_ATS_9001_ZSL	WELL #6 AUTOMATIC TRANSFER SWITCH IN GENERATOR POSITION	GENERATOR	NOT GENERATOR	N/A	ALARM					N/A	Y	N/A	N/A	120VAC	ON GENERATOR	ATS Panel	Y	I-6	
19	HMI	EDI	6000-GEN	9001	YI	6000_GEN_9001_YI	WELL #6 GENERATOR IN AUTO	REMOTE	LOCAL	N/A	EVENT					N/A	N	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
20	HMI	EDI	6000-GEN	9001	YIR	6000_GEN_9001_YIR	WELL #6 GENERATOR RUNNING	RUN	OFF	N/A	EVENT					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
21	HMI	EDI	6000-GEN	9001	YA	6000_GEN_9001_YA	WELL #6 GENERATOR ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
22	HMI	EDI	6000-GEN	9301	YA	6000_GEN_9301_YA	WELL #6 GENERATOR FUEL LEAK ALARM	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
23	HMI	EDI	6000-GEN	9001	HSI	6000_GEN_9001_HSI	WELL #6 GENERATOR E-STOP	ALARM	NORMAL	N/A	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
24	HMI	EAI	6000-GEN	9201	LI	6000_GEN_9201_LI	WELL #6 GENERATOR FUEL LEVEL	100	0	%	ALARM					N/A	Y	ETHERNET/IP	N/A	N/A	N/A	N/A	N/A	I-6	
25	HMI	EAI	8000-MPR	10-1-1	J1	8000_MPR_10-1-1_J1	INTAKE PUMP 10-1-1 ENERGY KW/H			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
26	HMI	EAI	8000-MPR	10-1-1	J2	8000_MPR_10-1-1_J2	INTAKE PUMP 10-1-1 ENERGY KW			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
27	HMI	EAI	8000-MPR	10-1-1	J3	8000_MPR_10-1-1_J3	INTAKE PUMP 10-1-1 FREQUENCY			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
28	HMI	EAI	8000-MPR	10-1-1	E1	8000_MPR_10-1-1_E1	INTAKE PUMP 10-1-1 AVG VOLTAGE			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
29	HMI	EAI	8000-MPR	10-1-1	E1	8000_MPR_10-1-1_E1	INTAKE PUMP 10-1-1 VOLTAGE A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
30	HMI	EAI	8000-MPR	10-1-1	E2	8000_MPR_10-1-1_E2	INTAKE PUMP 10-1-1 VOLTAGE B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
31	HMI	EAI	8000-MPR	10-1-1	E3	8000_MPR_10-1-1_E3	INTAKE PUMP 10-1-1 VOLTAGE C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
32	HMI	EAI	8000-MPR	10-1-1	C1	8000_MPR_10-1-1_C1	INTAKE PUMP 10-1-1 AVG CURRENT			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
33	HMI	EAI	8000-MPR	10-1-1	C1	8000_MPR_10-1-1_C1	INTAKE PUMP 10-1-1 CURRENT A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
34	HMI	EAI	8000-MPR	10-1-1	C2	8000_MPR_10-1-1_C2	INTAKE PUMP 10-1-1 CURRENT B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
35	HMI	EAI	8000-MPR	10-1-1	C3	8000_MPR_10-1-1_C3	INTAKE PUMP 10-1-1 CURRENT C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
36	HMI	EAI	8000-MPR	10-1-2	J1	8000_MPR_10-1-2_J1	INTAKE PUMP 10-1-2 ENERGY KW/H			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
37	HMI	EAI	8000-MPR	10-1-2	J2	8000_MPR_10-1-2_J2	INTAKE PUMP 10-1-2 ENERGY KW			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
38	HMI	EAI	8000-MPR	10-1-2	J3	8000_MPR_10-1-2_J3	INTAKE PUMP 10-1-2 FREQUENCY			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
39	HMI	EAI	8000-MPR	10-1-2	E1	8000_MPR_10-1-2_E1	INTAKE PUMP 10-1-2 AVG VOLTAGE			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
40	HMI	EAI	8000-MPR	10-1-2	E1	8000_MPR_10-1-2_E1	INTAKE PUMP 10-1-2 VOLTAGE A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
41	HMI	EAI	8000-MPR	10-1-2	E2	8000_MPR_10-1-2_E2	INTAKE PUMP 10-1-2 VOLTAGE B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
42	HMI	EAI	8000-MPR	10-1-2	E3	8000_MPR_10-1-2_E3	INTAKE PUMP 10-1-2 VOLTAGE C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
43	HMI	EAI	8000-MPR	10-1-2	C1	8000_MPR_10-1-2_C1	INTAKE PUMP 10-1-2 AVG CURRENT			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
44	HMI	EAI	8000-MPR	10-1-2	C1	8000_MPR_10-1-2_C1	INTAKE PUMP 10-1-2 CURRENT A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
45	HMI	EAI	8000-MPR	10-1-2	C2	8000_MPR_10-1-2_C2	INTAKE PUMP 10-1-2 CURRENT B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
46	HMI	EAI	8000-MPR	10-1-2	C3	8000_MPR_10-1-2_C3	INTAKE PUMP 10-1-2 CURRENT C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
47	HMI	EAI	8000-MPR	10-1-3	J1	8000_MPR_10-1-3_J1	INTAKE PUMP 10-1-3 ENERGY KW/H			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
48	HMI	EAI	8000-MPR	10-1-3	J2	8000_MPR_10-1-3_J2	INTAKE PUMP 10-1-3 ENERGY KW			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
49	HMI	EAI	8000-MPR	10-1-3	J3	8000_MPR_10-1-3_J3	INTAKE PUMP 10-1-3 FREQUENCY			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
50	HMI	EAI	8000-MPR	10-1-3	E1	8000_MPR_10-1-3_E1	INTAKE PUMP 10-1-3 AVG VOLTAGE			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
51	HMI	EAI	8000-MPR	10-1-3	E1	8000_MPR_10-1-3_E1	INTAKE PUMP 10-1-3 VOLTAGE A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
52	HMI	EAI	8000-MPR	10-1-3	E2	8000_MPR_10-1-3_E2	INTAKE PUMP 10-1-3 VOLTAGE B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
53	HMI	EAI	8000-MPR	10-1-3	E3	8000_MPR_10-1-3_E3	INTAKE PUMP 10-1-3 VOLTAGE C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
54	HMI	EAI	8000-MPR	10-1-3	C1	8000_MPR_10-1-3_C1	INTAKE PUMP 10-1-3 AVG CURRENT			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
55	HMI	EAI	8000-MPR	10-1-3	C1	8000_MPR_10-1-3_C1	INTAKE PUMP 10-1-3 CURRENT A/B			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
56	HMI	EAI	8000-MPR	10-1-3	C2	8000_MPR_10-1-3_C2	INTAKE PUMP 10-1-3 CURRENT B/C			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	
57	HMI	EAI	8000-MPR	10-1-3	C3	8000_MPR_10-1-3_C3	INTAKE PUMP 10-1-3 CURRENT C/A			N/A						N/A	Y	MODBUS RTU	N/A	N/A	N/A	N/A	N/A	I-9	

SECTION 40 61 96  
PROCESS CONTROL DESCRIPTIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This section is provided to clarify the control strategies to be used to program the changes defined as part of this project.
- B. All SCADA PLC controller programming and SCADA Operator Interface Terminal (OIT) or Operator Workstation Station (OWS) graphics and programming shall be performed as defined in Section 40 61 13.

1.02 RELATED WORK

- A. Refer to Section 40 61 13 – Process Control System General Provisions.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. The control descriptions are broken into areas. The following is a list of areas.
  - 1. Generators and Automatic Transfer Switches
- B. The control descriptions are broken into a hierarchical layer concept. There may be one layer or multiple layers per loop, depending upon that loop. An example of multiple layered loop is as follows. The lowest layer of control, local control, is at that piece of equipment or that piece of equipment's panel or drive. The second layer of control is at an intermediate control panel between the equipment and the SCADA I/O or vendor's PLC I/O. The third layer would be at the vendor's PLC or microprocessor touchscreen station. The highest layer of control is by the SCADA PLC System with its associated operator workstations (OWS) in the main control room, remote office locations, and satellite locations operator interface terminals (OITs). The SCADA PLC/ OWS refers to both the SCADA PLC, which does the actual monitoring and control logic for the process equipment and the SCADA operator workstation (OWS), which are computers that have graphical software that interface to the PLC software for monitoring and implementing all operator-required tasks to control that process equipment. Any functions done in the operator workstations also take place at all the SCADA OITs.

3.02 CONTROL FUNCTION DEFINITIONS AND GENERAL CRITERIA

- A. The hardware and/or software functions noted by this paragraph reference are to be implemented by the SCADA PLC/OWS control system specified herein.
- B. The following list of ISA abbreviations is typical of those utilized. The description, following the abbreviation, summarizes the basic function to be implemented in the SCADA PLC/OWS software.

1. HS: Represent selector switches or pushbuttons, which shall be implemented by keyboard entry. Function shall be similar to their hardware counterparts. Examples are as follows:
    - a. HSH-Open Command
    - b. HSL-Close Command
    - c. HSS-Start/Stop Command
  2. YI: Represents equipment status (i.e., availability, running, in remote, etc.) implemented by a change of color on the OWS symbol for this equipment. For motor driven equipment such as pumps, blowers, compressors, etc., availability contact represents remote operation and no alarm conditions. Examples are as follows:
    - a. YCI-Selector switch in computer, auto or remote position
    - b. YRI-Motor running status
    - c. YFI-Motor failure or overload status
    - d. YMI-Selector switch in maintenance position
  3. PAL, AAH, UA, etc.: Represent high or low alarms implemented on the OWS.
  4. FIC, PIC, AIC, etc.: Represent PID process controllers implemented in a computer logic algorithm incorporating proportional, integral, and/or derivative modes. Local/remote and manual/auto capabilities shall be provided.
  5. FIK, PIK, AIK, etc.: Represent control stations implemented in logic (via keyboard entry and CRT display) to allow downloading of a set point to a FIC, PIC, AIC, etc., and display of the process variable or controller output.
  6. FI, PI, AI, etc.: Represent digital output display on the CRT of a process variable in engineering units and/or a dynamic representation of the variable by symbol or graphical means.
  7. FIR, PIR, AIR, Represent values stored on the hard disk to provide the data for historical trend graphics of process variables against time (or other selected variables).
  8. ZSH, ZSL etc.: Represent high or low, open or close limit positions implemented on the OWS
- C. Following are general criteria used followed for SCADA system design. Not all of them will be applicable for the project. Detailed control descriptions for each process area are provided in the following sections.
- D. All interlocks that are represented, before the local operational descriptions, or are stated as hardwired interlocks, shall interlock all the controls locally and at the SCADA PLC/OWS or at the vendor PLCs. The SCADA PLC shall be programmed to shutdown that equipment if that hardwired interlock is also wired to the SCADA PLC.
- E. All interlocks that are represented in a particular layer of the operational descriptions, shall interlock all the controls in that layer and the layer after it. However, the interlock shall not interlock the commands in the layer before it.
- F. All motors that are requested to start by an operator or an automatic program shall alarm if the run confirm status for that motor does not activate within two seconds. If a motor stops by an

- interlock or stops without any operator or SCADA intervention, then that motor shall go into alarm. All motors that are stopped by a program or the operator shall not go into an alarm.
- G. All valves that are requested to open by an operator or an automatic program shall alarm if the open feedback status for that valve does not activate within ten seconds. All valves that are requested to close by an operator or an automatic program shall alarm if the close feedback status for that valve does not activate within ten seconds.
- H. Motors that have an H/O/A shall indicate to the operator that the pump is being run in the "Hand" position. A motor is being run in "Hand" when the "Auto" position is not true, and the run confirm status is true. If not in "Auto" the SCADA PLC shall open up its output contact to stop (shutdown) the pump from SCADA.
- I. All motors shall be programmed so if a motor stops for any reason, it shall not be re-started automatically once the problem with the motor has been resolved. The start command on the OWS shall not be a maintained contact but a momentary command to the PLC. The run confirms of all motors shall seal in the control output to the motor once the momentary start command drops out. The run confirms shall be on a five second timer delay in that if the run confirm is not present after five seconds, the contact output to the motor from the PLC shall drop out. Thus, the only way a motor can be restarted after five seconds by the SCADA system is if the operator reinitiates the start command for that motor on the OWS or when that motor control at the OWS is placed in complete automatic mode and the SCADA computer through logic/interlocks requests the motor to run.
- J. Terminology associated with interlocks is as follows:
1. When a contact or status is true, the SCADA computer will receive power to its input channel. The SCADA computer registers this as a binary bit of one.
  2. When a contact or status is false, the SCADA computer will receive no power (open circuit) to its input channel. The SCADA computer registers this as a binary bit of zero.
- K. When an analog signal goes outside the 4-20 mA range due to a failure at the instrument or PLC card, the following SCADA programming shall take place:
1. Alarm the signal at any local OITs and in the HMI system.
  2. If the analog signal is associated with a control loop or ratio control loop that loop shall go into manual.
  3. If the analog signal is used in a calculation, that calculation shall use the last good analog signal. The computer shall place the control loop in manual if using the calculation.
- L. Disable all alarms on analog inputs unless specifically called for in the drawings or specifications.
- M. All interlocks that shutdown (Stop a piece of equipment and prevent it from being restarted or moved) shall be shown on the faceplate pop-up graphic for that piece of equipment.

- N. The run confirms or on status of all motors and lamps shall be accumulated to calculate a run time status of the equipment on the HMI graphic. Each run time accumulation shall come with a reset button on the HMI screen.
- O. All flow indications shall be totalized. Do not totalize if the analog signal is outside the 4-20 mA range. Each flow totalization shall come with a reset button on the HMI screen. Do not totalize if the value of the flow input is less than 2% of the full range of the input.

### 3.03 GENERATORS AND AUTOMATIC TRANSFER SWITCHES

#### A. Associated equipment:

- 1. 0100-GEN-9001 – Intake Facility Generator
- 2. 3000-GEN-9001 – Wells #3 and #5 Generator
- 3. 3000-ATS-9001 – Wells #3 and #5 Automatic Transfer Switch
- 4. 6000-GEN-9001 – Well #6 Generator
- 5. 6000-ATS-9001 – Well #6 Automatic Transfer Switch

#### B. Associated PLCs:

- 1. Well #3 and #5 PLC
- 2. Well #6 PLC

#### C. Associated P&IDs and drawings:

- 1. I-4 – Intake Generator P&ID
- 2. I-5 – Well No. 3 & No. 5 Generator P&ID
- 3. I-6 – Well No. 6 Generator P&ID

#### D. Overview:

- 1. A continuous electric power supply is provided by the electrical utility. The Intake Facility and Wells #3, #5, and #6 are equipped with backup emergency generators. The control system is designed to monitor the status of the generator and the position of the ATS, where present.

#### E. Local Manual Mode:

- 1. When the generator is placed in manual control mode from the generator control panel, the following controls are available:
  - a. Start/stop command.
  - b. Exercise interval.
  - c. Exercise duration.
  - d. Reset.

F. Local Automatic Mode:

1. When the generator is placed in automatic control mode from the generator control panel, the automatic transfer switch controls shall start the generator upon a loss of utility power. The transfer switch shall supply the main bus with generator power until utility power returns. The transfer switch shall return the bus to utility power, and the generator shall be shut down.
2. Further details on the local automatic control sequence are described in Section 26 32 13.13.

G. Remote Manual Mode:

1. None

H. Remote Automatic Mode:

1. None.

END OF SECTION



SECTION 40 66 00  
NETWORK AND COMMUNICATIONN EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section includes network equipment used in process control networks including:
  - 1. Network switches
  - 2. Horizontal Cabling
  - 3. Patch Cords
  - 4. Related accessories.
- B. The Process Control System Integrator (PCSI) shall furnish the labor and materials required to install and bring into operation the control and data network, complete as shown on the Drawings and specified herein.
- C. Minimum sizing is based upon initial engineering design and needs to be confirmed prior to equipment procurement. It is the responsibility of the CONTRACTOR or PCSI to design and size the network systems.
- D. The network shall be capable of supporting communications between all Control Panel Ethernet equipment, routers and switches, PLCs, radios, and other communication devices. The PCSI shall furnish all necessary cables required for a complete and operational network. Some communication devices may be required for network operation, which may not be explicitly shown on the Drawings.
- E. The control and data network shall include all nodes on the network. Communication between nodes will be Ethernet.

1.02 RELATED DOCUMENTS

- A. Refer to Section 40 61 00 Process Control and Instrumentation Systems General Provisions.
- B. Refer to Section 40 67 00 Control Panel Enclosures and Panel Equipment.

1.03 SUBMITTAL REQUIREMENTS

- A. Refer to Division 01 for general submittal requirements.
- B. Refer to Section 40 61 00 Process Control and Instrumentation Systems General Provisions.
- C. Photographs
  - 1. Submit photographs in high quality jpeg format for each site after the installation and after the testing are complete. As a minimum, provide photographs of the following:
    - a. All cable connectors

- b. The Communications enclosure
- c. All communications conduits
- d. Surge arrestors

#### 1.04 REFERENCE STANDARDS

- A. Institute of Electrical and Electronics Engineers (IEEE)
  - 1. 802.3 – Ethernet.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver network components in packaging designed to prevent damage from static electricity and physical damage.
- B. Store network equipment according to manufacturer requirements. At a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation. Protect network components from exposure to dirt, fumes, water, corrosive substances, and physical damage. Also, protect from all forms of electrical and magnetic energy that could reasonably cause damage.

#### 1.06 SUBMITTALS

- A. Submit the following documentation prior to commissioning each site.
  - 1. Network Cable Test Results Manual.
  - 2. Operations and Maintenance Manual.

### PART 2 PRODUCTS

#### 2.01 GENERAL

- A. All cabling required to interconnect all components of the network system shall be provided by the PCSI and/or CONTRACTOR.
- B. The network equipment shall be suitable for installation at the location as shown on the drawings.
- C. Ethernet Network Switches will be programmed by CONTRACTOR.
- D. As a minimum, installation of each component includes rack mounting, supplying power, installing modules, and installing patch cords.

#### 2.02 UNMANAGED INDUSTRIAL ETHERNET SWITCH

- A. Manufacturer
  - 1. Cisco IE-1000-8P2S
  - 2. Phoenix Contact FL SWITCH

3. Engineer Approved Equal.

**B. General**

1. Copper Ports: 10 x 10/100 BASE-T ports, 4 POE ports, minimum.
2. RJ45 ports: 10 Fast Ethernet.
3. Combo ports: 2 Gigabit Ethernet.
4. Switch shall support the quantity of 100/1000 Mb/s RJ-45 ports and fiber ports to meet the functionality indicated in this specification and shown on the drawings.
5. Operating Temperature: -20 to 70 °C (-4...140 °F).
6. Layer 2 switching.
7. Din-rail mounted.

**C. Options/Accessories**

1. Provide Expansion Modules as required to meet connectivity requirements.
2. Full access to vendor device images, technical support and warranty.

**2.03 CABLING AND CONNECTORS**

**A. Category 6 Outside Plant (OSP) Shielded Cable**

1. Manufacturers
  - a. Superior Essex CAT6 04-001-64 with optional aluminum armor.
  - b. Belden DataTuff 127953A.
  - c. Approved equal.
2. General
  - a. Armored twisted pair cable shall be designed for use with a gigabit communications network.
  - b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Shielded Twisted Pair (STP) cable, tested up to 250MHz.
3. Physical
  - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
  - b. Jacketed in flame-retardant PVC.
  - c. Aluminum or copper interlock armor.
  - d. Outer shield of aluminum tape (F/UTP, F/FTP, or SF/UTP).

**B. Category 6 Outside Plant (OSP) Unshielded Cable**

1. Manufacturers
    - a. Superior Essex CAT6 04-001-65.
    - b. Belden DataTuff 121872A.
    - c. Approved equal.
  2. General
    - a. Armored twisted pair cable shall be designed for use with a gigabit communications network.
    - b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Unshielded Twisted Pair (UTP) cable, tested up to 250MHz.
  3. Physical
    - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
    - b. Jacketed in flame-retardant PVC.
    - c. Aluminum or copper interlock armor.
- C. Category 6 Shielded Cable
1. Manufacturers
    - a. Superior Essex CAT6 04-001-62.
    - b. Belden DataTuff 7953A.
    - c. Approved equal.
  2. General
    - a. Shielded twisted pair cable shall be designed for use with a gigabit communications network.
    - b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Shielded Twisted Pair (STP) cable, tested up to 250MHz.
  3. Physical
    - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
    - b. Jacketed in flame-retardant PVC.
    - c. Outer shield of aluminum tape (F/UTP, F/FTP, or SF/UTP).
    - d. Jacket color as indicated on the drawings.
- D. Category 6 Unshielded Cable
1. Manufacturers
    - a. Superior Essex
    - b. Belden DataTuff 7940A.
    - c. Approved equal.
  2. General
    - a. Unshielded twisted pair cable shall be designed for use with a gigabit communications network.

- b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Unshielded Twisted Pair (UTP) cable, tested up to 250MHz.
  - 3. Physical
    - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
    - b. Jacketed in flame-retardant PVC.
    - c. Jacket color as indicated on the drawings.
- E. Category 6 Shielded Patch Cable
  - 1. Manufacturers
    - a. Belden C6S410X00XM.
    - b. Approved equal.
  - 2. General
    - a. Twisted pair cable shall be designed for use with a gigabit communications network. Cable shall come pre-assembled with RJ-45 connectors.
    - b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Shielded Twisted Pair (STP) cable, tested up to 250MHz.
  - 3. Physical
    - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
    - b. Length as required such that excess cable does not crowd the enclosure. Length shall not exceed 6.5 feet (2 meters).
    - c. Outer shield of aluminum tape (F/UTP, F/FTP, or SF/UTP).
- F. Category 6 Unshielded Patch Cable
  - 1. Manufacturers
    - a. Belden C6F110X00X.
    - b. Approved equal.
  - 2. General
    - a. Twisted pair cable shall be designed for use with a gigabit communications network. Cable shall come pre-assembled with RJ-45 connectors.
    - b. Cable shall meet the requirements of the ANSI/TIA-568 specification for Category 6 (CAT6), Unshielded Twisted Pair (UTP) cable, tested up to 250MHz.
  - 3. Physical
    - a. Constructed from 23AWG, solid, bare copper wire insulated. Two insulated conductors shall be twisted together to form a pair and four pairs shall be laid up to form the basic unit.
    - b. Length as required such that excess cable does not crowd the enclosure. Length shall not exceed 6.5 feet (2 meters).
- G. Cellular Coaxial Cable

1. All connectors shall be from the same manufacturer as the cable.
2. Coaxial Cable – ½”
  - a. Description: cellular cable for connecting antenna and radio, where feedline run is 30 feet or less, and meets the following requirements:
    - 1) Diameter: 0.4”
    - 2) Outdoor rating
    - 3) Dielectric foam PE
    - 4) Minimum Bending Radius, Single Bend: 1”
  - b. Acceptable Products
    - 1) Times Microwave, Model LMR400

H. Small Form-Factor Pluggable (SFP) Modules

1. Manufacturers
  - a. Same manufacturer as the network device into which the transceiver will be installed.
2. General
  - a. Data rate of 100Mb/s.
  - b. LC connectors where connecting to new fibers. Where connecting to existing fibers, connectors shall match those of existing patch cables.
  - c. Capable of interface with fiber type shown on the Drawings.

2.04 ETHERNET SURGE ARRESTOR

A. Description: POE cable lightning protection unit / surge arrestor that meets the following minimum requirements:

1. Chassis
  - a. Wall Mountable
  - b. Chassis Physical Size: 2”H x 7”W x 3.41”D
  - c. Operating Temperature: -40 deg C to 85 deg C
2. Data Surge Protector (SPD)
  - a. Protocols: GbE, PoE+
  - b. Connectors: Shielded RJ-45
  - c. Compatible Cables: Cat5/5e UTP/STP, CAT6/6A STP
  - d. Data Protocols: Gigabit Ethernet/PoE+
  - e. Data Rate: 1000 Mb/s
  - f. Characteristic Impedance: 100 Ohms
  - g. Vdc Rating (Data): 60 Vdc (typical)
  - h. PoE Power: 56 Watts (max)
  - i. PoE Current Per Pin: 800 mA

B. Acceptable Products

1. Transtector System, Inc. Model CPX 4-Position Chassis, part number 1101-1137 with Model CPX GbE/PoE Module, part number 1000-1117.

C. Ground Cable

1. Description: 4/0 insulated stranded copper ground wire.

## 2.05 PATCH PANELS AND HUBS

### A. Rack Mount Ethernet Patch Panel

1. General
  - a. Provide CAT6 patch panels as shown on the Drawings and specified herein.
2. Physical Features:
  - a. RJ45 ports: 96 x 10/100 TX RJ45 ports, minimum
  - b. Operating temperature: 32 to 130 degrees F
  - c. Enclosure: 19-inch rack mountable
3. Acceptable Manufacturers:
  - a. Belden AX103253
  - b. Engineer Approved Equal

### B. DIN Rail Mount Ethernet Patch Panel

1. General
  - a. Provide CAT6 patch panels as shown on the Drawings and specified herein.
2. Physical Features
  - a. RJ45 ports: 12 x 10/100 TX RJ45 ports, minimum
  - b. Operating temperature: 32 to 130 degrees F
  - c. Enclosure: Steel DIN rail mountable
3. Acceptable Manufacturers:
  - a. SNaP-Cu-12
  - b. Engineer Approved Equal

## 2.06 GATEWAY UNIT

### A. General

1. Modbus/RS232/RS485 to Ethernet IP converter.
2. Supply Gateway Unit with a memory card.

### B. Acceptable Manufacturers:

1. Red Lion DSPSX000 Station, XCRS0000 RS232/RS485 Expansion Card, XCENET00 Ethernet Expansion Card.

## PART 3 EXECUTION

### 3.01 GENERAL INSTALLATION

- A. Install and connect the equipment in accordance with the manufacturer's instructions.

- B. Build/Modify and install the network equipment as listed in this Section and locations identified in the Contract Drawings.
- C. Provide a complete and operational system, all components and appurtenance necessary to ensure that the network is functional and meet the intent of this Specification.
- D. Install network panels in locations identified in the Contract Drawings.
- E. Field-verify and obtain written approval from the Owner of final locations of the enclosure including but not limited to the network panel. Costs required to relocate enclosures and work-area outlets in unapproved locations will be the responsibility of the CONTRACTOR.
- F. Field-verify distances before starting work.
- G. CONTRACTOR is to maintain a complete set of Contract Drawings on-site as Site Drawings. CONTRACTOR is to annotate the Site Drawings in red ink with any differences noted between the Contract Drawings and the as-constructed network.
- H. The OWNER reserves the right to relocate enclosures within 30 feet of the locations identified in the Contract Drawings at no additional cost to the OWNER.
- I. It is the CONTRACTOR's responsibility to size power supply cables to meet the requirements of the National and State Electrical Codes based on field-verified length of cable run and power supply load.
- J. For each end devices, the CONTRACTOR is to determine and provide the appropriate number and length of all ethernet patch cords.
- K. Cable and Conduit
  - 1. The minimum conduit size shall be 1 inch.
  - 2. Conduit fill ratio shall not exceed 40 percent of the internal diameter of the conduit.
  - 3. Conduit shall be galvanized rigid steel unless the environment is corrosive. Conduit running through corrosive environment shall be Rigid PVC.
  - 4. It is the CONTRACTOR's responsibility for all X-raying and coring where conduit passes through floors, walls, and ceilings.
  - 5. Install a continuous length of pull string in all outdoor conduit runs.
  - 6. To the greatest extent possible the final route selected for conduits should be run in the most direct route possible and is to avoid beams, columns and other obstructions.
  - 7. Conduit shall not interfere with other Contractors and shall be mounted over other piping where possible in parallel rows, parallel or perpendicular to walls and ceilings. Bends and offsets shall be uniform and symmetrical. The use of conduit bends shall be kept to a minimum.



8. Conduit and cables shall be installed to avoid proximity of water and heating pipes. In no case shall they run within 3 inches of such pipe except where crossings are unavoidable in which case they shall be kept at least 1 inch from the covering of pipe crossing.
9. Conduits shall be bonded to ground on one or both ends in accordance with the electrical code.
10. The inside radius of a bend in the conduit shall be at least 6 times the internal diameter of the conduit. When the conduit size is greater than 50mm (2 inches), the inside radius shall be at least 10 times the internal diameter of the conduit. For fiber optic cable, the inside radius of a bend shall always be at least 10 times the internal diameter of the conduit. Bends in the conduit shall not contain any kinks or other discontinuities that may have a detrimental effect on the cable sheath during cable pulling operations.

L. Pull Boxes

1. Pull boxes will be placed at strategic locations in the conduit system to allow installers: to pull cable through the conduit with minimum difficulty, to protect the cable from excess tension, and ensure that the manufacturer's recommended minimum bend radius requirements are maintained.
2. No section of conduit shall be longer than 100 ft. between pull points.
3. No section of conduit shall contain more than two 90-degree bends or the equivalent of 180 degrees cumulative between pull points or pull boxes. If there is a reverse (U-shaped) bend in the section, 180 degrees or 10 ft. is exceeded, a pull box shall be installed.
4. All pull boxes shall be accessible.
5. Pull boxes will be installed at points where a larger conduit carrying multiple cables transitions to smaller conduits each carrying fewer cables.
6. Other locations for Pull Boxes are to be recommended by the CONTRACTOR.
7. Conduit entry points must be at opposite ends of the pull box.
8. Pull boxes shall be placed in a straight section of conduit and not used in lieu of a bend.
9. All pull box covers must be marked for easy identification.

3.02 CABLE INSTALLATION

- A. Connect network cables to devices as shown on the contract drawings.
- B. Install category 6 cables suitable to the application shown on the Drawings.
  1. Where network cabling is shown outside the building envelope (underneath or outside), install outside plant-rated (OSP) cable.
  2. Install shielded category 6 cables for connections that meet any of the following criteria:

- a. Cable connects within a panel that contains 480V devices or conductors.
  - b. Cable is run in parallel with power conductors within 2 feet for more than 10 feet.
  - c. Cable is run to a radio/antenna.
3. Install category 6 patch cables only between devices within the same enclosure or desk.
4. Where none of the above apply, install unshielded category 6 cables.
- C. The bend radius for network cables shall not be less than the manufacturer's recommended minimum bend radius. Avoid any cable kinks and maintain proper bend radius control during cabling pulling. If any kinks should occur, kinked cable should be removed and replaced.
- D. At a minimum, provide a two (2) foot service loop of all network cables (except patch cables) within all enclosures.
- E. The cable shall not come in contact with any water or chemicals (ex. paint, lubricants) during or after installation.
- F. Labeling
  1. Label both ends of the cable. Label each cable within pull boxes.
  2. Use durable non-fading sleeve-type wire markers to identify network cables. Labels shall be laser-printed, self-laminating, adhesive, polyester (indoor/outdoor).
  3. Lettering shall be black on a white background. Characters shall be a minimum of 5/32" in height. Handwritten labels will not be accepted.
  4. Cables shall be labeled per the following tagging convention:
    - a. XXX:YYY
      - 1) XXX – the tagname of a device in which is the cable is terminated.
      - 2) YYY – the tagname of the other device in which is the cable is terminated.  
Where the connected devices on are different hierarchical layers of the network, the lowest layer device shall be listed second. The order of layer hierarchy from highest to lowest is as follows: routers, backbone switches, spur switches, multiplexers, hubs, end devices.
    - b. Where labels would include building or facility codes that are common to both ends of the network cable, the building or facility codes may be omitted for simplicity.
    - c. Example tags:
      - 1) ELEC\_SW4:CF\_SW2
      - 2) SW4:PQM1M1
      - 3) SW2:UPS01

### 3.03 CABLE ACCEPTANCE TESTING – GENERAL

- A. This Section specifies the inspection, test, and acceptance requirements for the structured cabling of the Local Area network.
- B. Provide test equipment required to conduct acceptance tests.

- C. Submit acceptance documentation as defined in this Section.
- D. All of the installed cabling must be tested and successfully pass test criteria.
- E. Standards referenced in this Section include:
  - 1. ANSI/TIA-568-D: Telecommunications Cabling Standard. Standards referenced within the ANSI/TIA-568-D, where applicable, constitute standard provisions of this Specification.
- F. Visually inspect cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport. Visibly damaged goods are to be returned to the Supplier and replaced at no additional cost to the OWNER.
- G. equipment and labor, a re-test to confirm documented results. Any failed cabling shall be re-tested and restored to a passing condition.
- H. Acceptance shall be subject to completion of Work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation as specified in the Contract Documents.
- I. Cable Test Results Manual
  - 1. Submit test reports in electronic format. Handwritten and scanned test reports are not acceptable. Submit electronic files in PDF format.
  - 2. The CONTRACTOR must sign the submitted test results, certifying that the test results are accurate and complete.
  - 3. The Consultant and OWNER will review the submitted test result for conformance with the design as specified.
- J. CAT6 UTP horizontal twisted pair cable shall meet or exceed the permanent link performance requirements specified in ANSI/TIA-568-D.2 for Category 6, Shielded Twisted Pair (STP).
- K. CAT6 STP horizontal twisted pair cable shall meet or exceed the permanent link performance requirements specified in ANSI/TIA-568-C.2 for Category 6, Shielded Twisted Pair (STP).
- L. Test Equipment shall meet the following minimum criteria:
  - 1. All test equipment of a given type shall be from the same manufacturer and have compatible electronic results output. Acceptable test equipment manufacturers are Fluke Corporation, Hewlett-Packard Development Company, L.P. (Hewlett Packard), or MicroTest Inc. (MicroTest).
  - 2. Test adapters must be approved by the manufacturer of the test equipment. Adapters from other sources are not acceptable.
  - 3. Baseline accuracy of the test equipment must exceed TIA Level III, as indicated by independent laboratory testing.

4. Test equipment must be capable of certifying Category 5e STP to ANSI/TIA-568-C.2-1 standards.
  5. Test equipment must have a dynamic range of at least 200 dB to minimize measurement uncertainty.
  6. Test equipment must be capable of storing full frequency sweep data for tests.
  7. Test equipment must include S-Band time domain diagnostics for NEXT and return loss (TDNXT and TDRL) for accurate and efficient troubleshooting.
  8. Test equipment must be capable of running Wire Map, Length, Insertion Loss, NEXT Loss, PS NEXT Loss, ACR-F Loss, PS ACR-F Loss, Return Loss, Propagation Delay and Delay Skew tests. Individual tests increase productivity when diagnosing faults.
  9. Test equipment must make swept frequency measurements in compliance with latest ANSI/TIA-568 standards.
  10. The measurement reference plane of the test equipment shall start immediately at the output of the test equipment interface connector. There shall not be a time domain dead zone of any distance that excludes any part of the link from the measurement.
- M. Documentation: At a minimum, test reports shall include the following information for each UTP/STP Ethernet cabling element tested:
1. Wiremap results that indicate the cabling has no shorts, opens, mis-wires, split, reversed, or crossed pairs, and end-to-end connectivity is achieved.
  2. Attenuation, NEXT, PSNEXT, Return Loss, ACR-F, and PS ACR-F data that indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept-frequency manner from 1 MHz to highest relevant frequency, using a swept-frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for pairs or pair combinations and in both directions when required by the appropriate standards.
  3. Length (in feet), propagation delay, and delay skew relative to the relevant limit.
  4. Any individual test that fails the relevant performance specification shall be marked as a FAIL.
  5. Cable manufacturer, cable model number/type, and NVP.
  6. Tester, manufacturer, model, serial number, hardware version, and software version.
  7. Circuit ID number (Cable Tag ID).
  8. Test criteria used.
  9. Overall pass/fail indication.

10. Date and Time of test.

3.04 NETWORK CONFIGURATION

- A. Fully configure all network devices. All device configuration shall be fully coordinated with the Owner to ensure compatibility with existing systems and standards.
- B. Configure redundancy protocol usage as required by the drawings, or as best suited to the selected network hardware where not stated on the drawings.
- C. Configure virtual network segregation via VLAN and VRF as required by the drawings.

END OF SECTION

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SECTION 40 67 00  
CONTROL PANEL ENCLOSURES AND PANEL EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Refer to Section 40 61 13 Process Control System General Provisions.
- B. Furnish and install control panels and panel-mounted equipment as specified herein and shown on the Drawings. Control panel requirements shall apply to all control panels and panel-mounted equipment furnished as part of an equipment package, as well as all control panels and panel-mounted equipment furnished by the Process Control System Supplier (PCSS).
- C. All new panels and panel components shall match existing equipment makes and models wherever possible so that system additions can be most easily integrated with respect to operation and maintenance training, spare parts inventory, and service contracts. Even when exact matches are not possible, equipment furnished must be fully compatible with the existing system. Color, size, and material of new panels should conform to that of existing panels.
- D. Each panel shall be supplied with full sub-panels with the minimum specified dimensions regardless of the quantity of mounted components inside the panel. All panel-mounted components shall be mounted on the single rear-of-panel sub-panel unless the density of devices exceeds the panel mounting space permitted by the minimum panel dimensions specified. Side panel-mounted components shall only be permitted after review and approval of the Engineer.

1.02 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for this Work. Include payment in the lump sum base bid.

1.03 RELATED WORK

- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.04 SUBMITTALS

- A. Refer to Section 40 61 13 Process Control System General Provisions.
- B. Descriptive literature, bulletins, catalog cuts and Drawings for the equipment specified herein.
- C. Complete bill of materials for the equipment.
- D. Spare parts list.
- E. Panel Layout Drawings and Wiring Diagrams Submittal
  - 1. Where direct hard-wired interfaces exist between the PCSS control panels and vendor provided control panels furnished under other Divisions, the Contractor shall provide to the PCSS the approved submittals in order for the PCSS to provide complete wiring diagrams showing all wiring connections in the I/O system. This includes but is not limited to

terminal block numbering, relay contact information, instruments, equipment, and control panel names. These drawings shall be included in the Final O&M submittal. Leaving this information blank on the Final Documentation drawings is not acceptable.

2. Panel Layout Drawings: Drawings shall be furnished for all panels, consoles, and equipment enclosures specified. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. Panel drawings shall be 11-inch x 17-inch in size. At a minimum, the panel drawings shall include the following:
  - a. Interior and exterior panel elevation drawings to scale.
  - b. Nameplate schedule.
  - c. Conduit access locations.
  - d. Panel construction details.
  - e. Cabinet assembly and layout drawings to scale. The assembly drawing shall include a bill of material on the drawing with each panel component clearly defined. The bill of material shall be cross-referenced to the assembly drawing so that a non-technical person can readily identify all components of the assembly by manufacturer and model number.
  - f. Fabrication and painting specifications including color (or color samples).
  - g. Construction details, NEMA ratings, intrinsically safe barrier information, gas sealing recommendations, purging system details, etc. for panels located in hazardous locations or interfacing to equipment located in hazardous areas.
  - h. For every control panel, heating and cooling calculations for each panel supplied indicating conformance with cooling requirements of the supplied equipment and environmental conditions. Calculations shall include the recommended type of equipment required for both heating and cooling.
  - i. Submit evidence that all control panels shall be constructed in conformance with UL 508 and bear the UL seal confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL seal and any inspections shall be borne by the Contractor.
3. Panel Wiring Diagrams: Panel wiring diagrams depicting wiring within and on the panel as well as connections to external devices. If ISA Loop Wiring Diagrams are specified below, equipment external to the control panel and related external connections do not need to be shown on the Panel Wiring Diagrams. Panel wiring diagrams shall include power and signal connections, UPS and normal power sources, all panel ancillary equipment, protective devices, wiring and wire numbers, and terminal blocks and numbering. Field device wiring shall include the device ISA-tag and a unique numeric identifier. The diagrams shall identify all device terminal points that the system connects to, including terminal points where I/O wiring lands on equipment not supplied by the PCSS. Wiring labeling used on the drawings shall match that shown on the Contract Documents or as developed by the PCSS and approved by the Engineer. I/O wiring shall be numbered with rack number, slot number, and point number. Two-wire and four-wire equipment shall be clearly identified and power sources noted. Submit final wire numbering scheme. Panel drawings shall be 11-inch x 17-inch in size.
4. ISA Loop Wiring Diagrams: Not required.

1.05 COORDINATION MEETINGS



- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.06 REFERENCE STANDARDS

- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.07 QUALITY ASSURANCE

- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.09 NOMENCLATURE AND IDENTIFICATION

- A. Refer to Section 40 61 13 Process Control System General Provisions.

1.10 MAINTENANCE

- A. Refer to Section 40 61 13 Process Control System General Provisions.

- B. Test Equipment

- 1. Refer to Section 40 61 13 Process Control System General Provisions.

1.11 WARRANTY

- A. Refer to Section 40 61 13 Process Control System General Provisions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Refer to Section 40 61 13 Process Control System General Provisions.

2.02 LIGHTNING/SURGE PROTECTION

- A. Refer to Section 40 61 13 Process Control System General Provisions.

2.03 CONTROL PANEL GENERAL REQUIREMENTS

- A. The dimensions within this Section and on the Contract Drawings are for general reference only. Ensure that final enclosure sizing and panel arrangements accommodate all required equipment for a fully integrated and operational system as specified herein and in the Contract Documents.
- B. Each control panel and terminal cabinet shall bear the UL label. The UL label shall apply to the enclosure, the specific equipment supplied with the enclosure, and the installation and wiring of the equipment within and on the enclosure. If required for UL labeling, provide ground fault

protective devices, isolation transformers, fuses and any other equipment necessary to achieve compliance with UL 508 requirement. The Drawings do not detail all UL 508 requirements.

- C. All panel doors shall have a lock installed in the door handle, or a hasp and staple for padlocking. Locks for all panels provided under this Contract shall be keyed alike.
- D. The devices designated for rear-of-panel mounting shall be arranged within the panel according to respective panel drawings and in a manner to allow for ease of maintenance and adjustment. Heat generating devices such as power supplies shall be located at or near the top of the panel.
- E. The panels shall be completely fabricated, instruments and devices installed and wired at the PCSS's facility.
- F. All components shall be mounted in a manner that shall permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component mounting shall be oriented in accordance with manufacturer's recommendations. The internal components shall be identified with suitable plastic or metal engraved nametags mounted adjacent to (not on) each component identifying the component in accordance with the drawing, specifications, and PCSS's data.
- G. All exterior panel-mounted equipment shall be installed with suitable gaskets, faceplates, etc., required to maintain the NEMA rating of the panel.
- H. Nameplates
  - 1. All panels and panel devices shall be supplied with suitable nameplates, which identify the panel and individual devices as required. Unless otherwise indicated, each device nameplate shall include up to three lines with the first line containing the device tag number as shown on the drawings, the second line containing a functional description (e.g., Recirculation Pump No. 1), and the third line containing a functional control description (e.g., Start).
  - 2. Unless escutcheon plates are specified or unless otherwise noted on the Drawings, nameplates shall be 3/32-inch thick, black and white, Lamicoid with engraved inscriptions. The letters shall be white against a black background unless otherwise noted. Edges of the nameplates shall be beveled and smooth. Nameplates with chipped or rough edges will not be acceptable.
  - 3. Nameplate fasteners and mounting shall be epoxy adhesive or stainless steel screws for cabinet-mounted nameplates.
  - 4. For every panel, provide a panel nameplate with a minimum of 1-inch high letters. Provide legend plates or 1-inch by 3-inch engraved nameplates with 1/4-inch lettering for identification of door-mounted control devices, pilot lights, and meters.
  - 5. Single lamicoid nameplates with multiple legends shall be used for grouping of devices such as selector switches and pilot lights that relate to one function.

I. Mounting Elevations

1. ISA Recommended Practice RP60.3 shall be used as a guide in layout and arrangement of panels and panel mounted components. Dimensions shall account for all housekeeping pads that panels will sit on once they are installed.
2. Centerline of indicators and controllers shall be located no lower than 48-inches or higher than 66-inches above the floor on a panel face.
3. Centerline of lights, selector switches, and pushbuttons shall be located no lower than 32-inches or higher than 70-inches above the floor on a panel face.
4. Tops of annunciators shall be located no higher than 86-inches above the floor on a panel face.
5. Installation of panel components shall conform to component manufacturers' guidelines.

2.04 PANEL MATERIALS AND CONSTRUCTION

A. Structure and Enclosure

1. Panels shall be of continuous welded-steel or FRP construction as shown on the Panel Schedule. Provide angle stiffeners as required on the back of the panel face to prevent panel deflection under instrument loading or operation. Internally the panels shall be supplied with a structural framework for instrument support purposes and panel bracing. The internal framework shall permit panel lifting without racking or distortion. Provide removable lifting rings designed to facilitate simple, safe rigging, and lifting of the control panels during installation.
2. Each panel shall be provided with full height, fully gasketed access doors where shown. Doors shall be provided with a three-point stainless steel latch (except for NEMA 4X panels) and heavy duty stainless steel locking handle. Rear access doors (if included) shall be conveniently arranged and sized such that they extend no further than 24-inches beyond the panel when opened to the 90-degree position. Front and side access doors shall be as shown. Panel access doors shall be provided with full length, continuous, piano type stainless steel hinges with stainless steel pins. Front access doors with mounted instruments or control devices shall be of sufficient width to permit door opening without interference from flush mounted instruments.
3. The panels, including component parts, shall be free from sharp edges and welding flaws. Wiring shall be free from kinks and sharp bends and shall be routed for easy access to other components for maintenance and inspection purposes.
4. The panel shall be suitable for top and bottom conduit entry as required by the Electrical Drawings. For top mounted conduit entry, the panel top shall be provided with nominal one-foot square removable access plates, which may be drilled to accommodate conduit and cable penetrations. All conduit and cable penetrations shall be provided with ground bushings, hubs, gasketed locknuts, and other accessories as required to maintain the NEMA rating of the panel and electrical rating of the conduit system.

5. All panels in indoor, dry, non-corrosive environments shall be NEMA 12 unless otherwise noted. All panels in outdoor, wet, and non-chemically corrosive environments shall be NEMA 4 unless otherwise noted. Panels in chemically corrosive environments shall be NEMA 4X unless otherwise noted. All panels located in a hazardous location shall be rated for the type of hazard (e.g., NEMA 7 for Class 1, Division 1).

**B. Freestanding and Floor-Mounted Vertical Panels**

1. Freestanding and floor-mounted vertical panels shall meet the NEMA classification as shown on the drawings or specified herein. The panels shall be constructed of 12 gauge sheet steel, suitably braced internally for structural rigidity and strength. All NEMA 4X rated panels shall be constructed of Type 316 stainless steel, unless FRP is specifically indicated to be provided. Front panels or panels containing instruments shall be not less than 10 gauge stretcher leveled sheet steel, reinforced to prevent warping or distortion.

**C. Wall and Unistrut Mounted Panels**

1. All wall and Unistrut mounted panels shall meet the NEMA classification as shown on the drawings or specified herein. The panels shall be constructed of not less than USS 14 gauge steel, suitably braced internally for structural rigidity and strength. All NEMA 4X rated wall mounted panels shall be constructed of Type 316 stainless steel, unless FRP is specifically indicated. FRP panels shall be used in chlorine areas. All FRP panels located in direct sunlight shall be provided with a protective coating and sun shield to prevent discoloration and cracking.

**D. Finish Requirements**

1. All sections shall be descaled, degreased, filled, ground and finished. The enclosure when fabricated of steel shall be finished with two rust-resistant phosphate prime coats and two coats of enamel, polyurethane, or lacquer finish which shall be applied by either the hot air spray or conventional cold spray methods. Brushed anodized aluminum, stainless steel, and FRP panels will not require a paint finish.
2. The panels shall have edges ground smooth and shall be sandblasted and then cleaned with a solvent. Surface voids shall be filled and ground smooth.
3. Immediately after cleaning, one coat of a rust-inhibiting primer shall be applied inside and outside, followed by an exterior intermediate and top coat of a two-component type epoxy enamel. A final sanding shall be applied to the intermediate exterior coat before top coating.
4. Apply a minimum of two coats of manufacturer's standard, flat light-colored lacquer, on the panel interior after priming.
5. Unless otherwise noted, the finish exterior colors shall be ANSI 61 gray with a textured finish.

- E. Print storage pockets shall be provided on the inside of each panel. The storage pockets shall be steel, welded on to the door, and finished to match the interior panel color. The storage pocket**

shall be sufficient to hold all of the prints required to service the equipment, and to accommodate 8.5 inch by 11 inch documents without folding.

- F. Where specified on the Panel Schedule, a folding shelf shall be provided on the inside of the door on all free-standing and floor-mounted panels. The shelf shall be suitable for a laptop computer and shall be placed such that an open laptop computer does not interfere with any door-mounted devices. The folded shelf shall not interfere with any internal panel components when the door is closed. The folding shelf shall automatically lock in the horizontal position when raised. The folding shelf shall be approximately 18 inches wide by 12 inches deep and shall have a minimum distributed load rating of 100 pounds. All parts shall be made of heavy gauge steel and shall be painted white or finished to match the interior panel color.

## 2.05 ENVIRONMENTAL CONTROL

- A. All panels shall be provided with louvers, sun shields, heat sinks, forced air ventilation, or air conditioning units as required to prevent temperature buildup inside of panel. The internal temperature of all panels shall be regulated to a range of 45 degrees F to 104 degrees F under all conditions. Under no circumstances shall the panel cooling or heating equipment compromise the NEMA rating of the panel.
- B. Except for panels mounted with their backs directly adjacent to a wall, louvers shall be in the rear of the panels, top and bottom, and shall be stamped sheet metal construction.
- C. For panels mounted with their backs directly adjacent to a wall, louvers shall be on the sides.
- D. Forced air ventilation fans, where used, shall provide a positive internal pressure within the panel, and shall be provided with washable or replaceable filters. Fan motors shall operate on 120-Volt, 60-Hz power.
- E. For panels with internal heat that cannot be adequately dissipated with natural convection and heat sinks, or forced air ventilation, an air conditioner shall be provided.
- F. Provide custom-fabricated sun shields for all outdoor panels in accordance with the following requirements:
  - 1. Sun shields shall be fabricated from minimum 12 gauge Type 316 stainless steel. Units shall be designed, fabricated, installed, and supported to fully cover and shade the top, sides and back of the enclosure, and to partially shade the front panel of the enclosure, from direct exposure to sunlight from sunrise to sunset.
  - 2. Depending on overall size, sun shields may be fabricated in single or multiple segments for attachment to the enclosure support framing or to separate free standing framing around the enclosure.
  - 3. Sun shields shall not be attached directly to the enclosure by drilling holes through, or welding studs to, the enclosure surfaces, and shall be designed and mounted to provide a minimum 3-inch air gap all around the enclosure for air circulation and heat dissipation.
  - 4. The top section of all sun shields shall be sloped at a minimum angle of 5 degrees from horizontal. For wall mounted enclosures, the top section shall slope downward away from

the wall and towards the front of the enclosure. For free standing, floor mounted and frame mounted enclosures the top section shall slope downward towards the back side of the enclosure.

5. The front edge of the top section of all sun shields shall incorporate a narrow and more steeply sloped drip shield segment which sheds water away from the front of the enclosure and prevents it from dripping or running directly onto the front panel of the enclosure.
  6. All seam welds used in sun shield fabrication shall be continuous and shall be ground smooth.
  7. All exposed corners, edges and projections shall be smooth rounded or chamfered to prevent injury.
- G. All outdoor enclosures and enclosures located in unheated areas indoors or in areas subject to humidity and moisture shall be provided with an integral heater, fan, and adjustable thermostat to reduce condensation and maintain the minimum internal panel temperature. Mount the unit near the bottom of the enclosure with discharge away from heat-sensitive equipment. Heater shall be Hoffman DAH Series and shall be of appropriate wattage, 115 Volt, 50/60 HZ or equal.

## 2.06 CORROSION CONTROL

- A. Panels shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Technologies International Corporation, Model Zerust VC; Hoffman, Model AHCI; or equal.

## 2.07 CONTROL PANEL - INTERNAL CONSTRUCTION

### A. Internal Electrical Wiring

1. All interconnecting wiring shall be stranded, type MTW, and shall have 600 Volt insulation and be rated for not less than 90 degrees Celsius. Wiring for systems operating at voltages in excess of 120 VAC shall be segregated from other panel wiring either in a separate section of a multi-section panel or behind a removable Plexiglas or similar dielectric barrier. Panel layout shall be developed such that technicians shall have complete access to 120 VAC and lower voltage wiring systems without direct exposure to higher voltages.
2. Power distribution wiring on the line side of fuses or breakers shall be 12 AWG minimum. Control wiring on the secondary side of fuses shall be 16 AWG minimum. Electronic analog circuits shall utilize 18 AWG shielded, twisted pair, cable insulated for not less than 600 Volts.
3. Power distribution blocks shall be covered with protective guards to meet "finger-safe" requirements of IP20.
4. Power and low voltage DC wiring systems shall be routed in separate wireways. Crossing of different system wires shall be at right angles. Different system wires routed parallel to each other shall be separated by at least 6-inches. Different wiring systems shall terminate

on separate terminal blocks. Wiring troughs shall not be filled to more than 60 percent visible fill.

5. Terminations

- a. All wiring shall terminate onto single tier terminal blocks, where each terminal is uniquely and sequentially numbered. Direct wiring between field equipment and panel components is not acceptable.
- b. Multi-level terminal blocks or strips are not acceptable unless they are approved by the Engineer in advance of panel wiring diagrams. If approved, they shall be mounted on angled din rail elevated from the back panel.
- c. Terminal blocks shall be arranged in vertical rows and separated into groups (power, AC control, DC signal). Each group of terminal blocks shall have a minimum of 25 percent spares.
- d. Terminal blocks shall be the compression type, fused, unfused, or switched as shown on the Contract Drawings or specified elsewhere in Division 40.
- e. Discrete inputs and outputs (DI and DO) shall have two terminals per point with adjacent terminal assignments. All active and spare PLC and controller points shall be wired to terminal blocks.
- f. Analog inputs and outputs (AI and AO) shall have three terminals per shielded pair connection with adjacent terminal assignments for each point. The third terminal is for shielded ground connection for cable pairs. Ground the shielded signal cable at the PLC cabinet. All active and spare PLC and controller points shall be wired to terminal blocks.
- g. Wire and tube markers shall be the sleeve type with heat impressed letters and numbers.
- h. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal or within 8-inches of the bottom of free-standing panels, or within 3-inches of stanchion mounted panels, or 3-inches of adjacent wireway.
- i. Circuit power from the SCADA cabinet out to field devices (switches, dry contacts etc.) that are used as discrete inputs to the PLC input cards shall be isolated with an isolating switch terminal block with flip cover that is supplied with a dummy fuse. Isolating switch block shall be an Allen Bradley Model 1492-H7 or equal. One isolating switch terminal block per loop numbered piece of equipment and one per spare I/O point is acceptable.
- j. All PLC discrete outputs to the field shall be isolated with an isolating fuse switch terminal block with a flip cover and a neon blown fuse indicator. The single circuit fusible terminal block shall be an Allen Bradley 1492-H4 or equal.

6. All wiring to hand switches and other devices, which are live circuits independent of the panel's normal circuit breaker protection, shall be clearly identified as such.

7. All wiring shall be clearly tagged and color coded. All tag numbers and color coding shall correspond to the panel wiring diagrams and loop drawings prepared by the PCSS. All power wiring, control wiring, grounding, and DC wiring shall utilize different color insulation for each wiring system used. The color coding scheme shall be:

- a. Incoming 120 VAC Hot - Black
- b. 120 VAC Hot wiring downstream of panel circuit breaker – Red
- c. 120 VAC Hot wiring derived from a UPS system – Red with Black stripe

- d. Three-phase power – Brown, Orange, Yellow, and Green ground or as specified in Division 16.
  - e. 120 VAC neutral – White
  - f. Ground - Green
  - g. DC power or control wiring – Blue
  - h. DC analog signal wiring – Black (+), White (-)
  - i. Foreign voltage – Yellow
- 8. Provide surge protectors on all incoming power supply lines at each panel per the requirements of Section 40 61 13.
  - 9. Each field instrument furnished under Division 40 and shown on the Drawings as deriving input power from the control panel(s) shall have a separate power distribution circuit with a circuit breaker or fuse and blown fuse indication. Instruments requiring 120 VAC power shall be powered from the UPS source in the panel where the instrument signal lands.
  - 10. Provide redundant 24 VDC power supplies to power field instruments and panel devices. Twenty-four VDC power supplies shall be as specified in this Section.
  - 11. Wiring trough for supporting internal wiring shall be plastic type with snap-on covers. The side walls shall be open top type to permit wire changing without disconnecting. Trough shall be supported to the subpanel by stainless steel screws. Trough shall not be bonded to the panel with glue or adhesives.
  - 12. Each panel shall have a single tube, fluorescent light fixture, 20 Watt in size, mounted internally to the ceiling of the panel. Light fixture shall be switched and shall be complete with the lamp.
  - 13. Each panel shall have a specification grade duplex convenience receptacle with ground fault interrupter, mounted internally within a stamped steel device box with appropriate cover. Convenience receptacle shall not be powered from a UPS and shall be protected by a dedicated fuse or circuit breaker.
  - 14. Each panel shall be provided with an isolated copper grounding bus for all signal and shield ground connections. Shield grounding shall be in accordance with the instrumentation manufacturer's recommendations.
  - 15. Each panel shall be provided with a separate copper power grounding bus (safety) in accordance with the requirements of the National Electrical Code.
  - 16. Each panel shall have control, signal, and communication line surge suppression in accordance with Section 40 61 13.
  - 17. All microprocessor-based electronic devices in the panel that are powered by 120 VAC shall be powered by the UPS (refer to appropriate Section in Division 40).
  - 18. Each panel shall be provided with a circuit breaker to interrupt incoming power.
  - 19. Additional electrical components including transformers, motor starters, switches, circuit breakers, etc. shall be in compliance with the requirements of Division 26.



- B. Relays not provided under Division 26 and required for properly completing the control function specified in Division 40, Division 26, or shown on the Drawings shall be provided under this Section.
- C. The orientation of all devices, including PLC and I/O when installed, shall be per the manufacturer's recommendations. No vertical orientation of PLC racks shall be allowed unless specifically indicated by the manufacturer as an acceptable mounting alternative and also approved by the engineer.

## 2.08 PILOT TYPE INDICATING LIGHTS

- A. Type: Energy efficient Solid State LED Lamps.
- B. Functional:
  - 1. Units shall be provided with low voltage LED lamps suitable for the voltage supplied.
  - 2. Lights supplied with 120V AC power shall have integral reduced voltage transformers.
  - 3. Lamps shall be replaceable from the front of the unit.
- C. Physical:
  - 1. Lens color:
    - a. Running, on, open - Green.
    - b. Stopped, off, closed - Red.
    - c. Alarm - Amber.
    - d. White - Power on.
    - e. Blue - All other status indications not covered by the above.
    - f. Lens caps shall be approximately .46 inch diameter. Provide legend faceplates engraved to indicate the required function of each device; NEMA rating - 4X.
- D. Manufacturer(s):
  - 1. Cutler-Hammer.
  - 2. Allen Bradley.
  - 3. General Electric.
  - 4. Square D.
  - 5. Crouse Hinds (NEMA 7).
  - 6. Or equal.

## 2.09 SELECTOR SWITCHES AND PUSHBUTTONS

- A. Type:
  - 1. Control devices shall be heavy-duty oil tight type with stackable contact blocks.

B. Functional:

1. Provide contact arrangement and switching action as required for the control system specified.

C. Physical:

1. For 120 VAC service provide contacts rated 10 amps at 120 VAC, for 24 VDC service provide silver sliding contacts rated 5 amps at 125 VDC, for electronic (millivolt/ milliamp) switching provide contacts rated 1 amp at 28 VDC.
2. Pushbuttons shall have flush type operators.
3. Selector switches shall have knob or wing lever operators; NEMA rating - 4X; Provide legend plates denoting switch/pushbutton position/ function.

D. Manufacturer(s):

1. Cutler-Hammer.
2. Allen Bradley.
3. General Electric.
4. Square D.
5. Crouse Hinds (NEMA 7).
6. Or equal.

2.10 GENERAL PURPOSE RELAYS AND TIME DELAYS

A. Type

1. General purpose plug-in type.

B. Functional

1. Contact arrangement/function shall be as required to meet the specified control function; Mechanical life expectancy shall be in excess of 10 million.
2. Duty cycle shall be rated for continuous operation; Units shall be provided with integral indicating light to indicate if relay is energized.
3. Solid state time delays shall be provided with polarity protection (DC units) and transient protection.
4. Time delay units shall be adjustable and available in ranges from 0.1 second to 4.5 hours.

C. Physical

1. For 120 VAC service, provide contacts rated 10 amps at 120 VAC; for 24 VDC service, provide contacts rated 5 amps at 28 VDC; for electronic (milliamp/millivolt) switching applicator, provide gold-plated contacts rated for electronic service; relays shall be provided with dust and moisture resistant covers.

D. Options/Accessories Required

1. Provide mounting sockets with pressure type terminal blocks rated 300 Volt and 10 amps.
2. Provide mounting rails/holders as required.

E. Manufacturer(s)

1. Allen Bradley.
2. Potter & Brumfield.
3. Or equal.

2.11 SIGNAL RELAY SWITCHES (CURRENT TRIPS)

A. Type

1. Solid state, ASIC technology, electronic type.

B. Functional

1. Input: 4-20 mA.
2. Output: Isolated contact output, double pole double throw, rated 5 amps at 120 VAC.
3. Accuracy: 0.1 percent.
4. Protection: Provide RFI protection.
5. Deadband: Adjustable between 0.1 and 5.0 percent of span.
6. Set point Adjustment: Single Point alarms shall be adjustable to trip on rising or falling input signal, dual point alarms shall be adjustable to trip on rising and falling input signals.
7. Repeatability: Trip point repeatability shall be at least 0.1 percent of span.

C. Physical

1. Mounting: DIN rail.

D. Manufacturer(s)

1. Action Instruments Slim Pak.
2. Acromag.

3. Or equal.

## 2.12 SIGNAL ISOLATORS/BOOSTERS/CONVERTERS

### A. Type

1. Solid state, ASIC technology; electronic type.

### B. Functional

1. Accuracy: 0.15 percent.
2. Inputs: Current, voltage, frequency, temperature, or resistance as required.
3. Outputs: Current or voltage as required.
4. Isolation: There shall be complete isolation between input circuitry, output circuitry, and the power supply.
5. Adjustments: Zero and span adjustment shall be provided.
6. Protection: Provide RFI protection.

### C. Physical

1. Mounting: DIN Rail.

### D. Manufacturer(s)

1. Action Instruments Slim Pak.
2. Acromag.
3. Or equal.

## 2.13 SIGNAL SELECTORS, COMPUTATION, AND CONDITIONING RELAYS

### A. Type

1. Solid state, ASIC technology, electronic type.

### B. Functional

1. Inputs: 4-20 mA.
2. Outputs: 4-20 mA.
3. Protection: Provide RFI protection.

4. Operation: The relay shall multiply, add, subtract, select, extract the square root, or perform the specified conditioning/computation function required. All inputs shall be able to be individually rescaled and biased as required.
5. Isolation: All inputs, outputs, and power supplies shall be completely isolated.
6. Accuracy: 0.35 percent of span.
7. Adjustments: Multi-turn potentiometer for zero, span, scaling, and biasing.

C. Physical

1. Mounting: DIN rail.

D. Manufacturer(s)

1. Action Instruments Slim Pak.
2. Acromag.
3. Or equal.

2.14 INTRINSIC SAFETY BARRIERS

A. Type

1. Barriers shall be of the solid state electronic type in which the energy level of the sensing or actuation circuit is low enough to allow safe usage in hazardous areas.
2. Provide a barrier for instrumentation and equipment transmitting analog or digital signals that originate in a hazardous area as indicated in the design documents.

B. Options Required

1. Barriers shall match power supply provided.
2. Barriers shall be located in non-hazardous areas.

C. Manufacturer(s)

1. Siemens Water Technologies – IS1 (4-20mA) and IS6 (dry contacts)
2. Gems – 54800 (4-20mA) and 65800 (dry contacts)
3. R. Stahl – Intrinspak
4. Or equal.

2.15 INTRINSIC SAFETY BARRIERS (FOR TWO-WIRE TRANSMITTER SYSTEMS)

- A. Intrinsic safety barriers shall be passive devices requiring no external voltage supply and supplied with series resistors, series fuse and shunt zener diodes to limit the transfer of energy to levels required by intrinsically safe protection between safe and hazardous locations.
- B. Unit shall be Factory Mutual approved and certified for use in accordance with National Fire Protection Association (NFPA 493).
- C. Manufacturer(s)
  - 1. P&F.
  - 2. Gems.
  - 3. Unitech.
  - 4. Or equal.

2.16 24 VDC POWER SUPPLIES

- A. Provide a 24 VDC power supply in the control panel to power field instruments, panel devices, etc., as required. Equip the power supply with a power on/off circuit breaker.
- B. The 24 VDC power supply shall meet the following requirements:
  - 1. Input power: 115 VAC, plus or minus 10 percent, 60 Hz.
  - 2. Output voltage: 24 VDC.
  - 3. Output voltage adjustment: 5 percent.
  - 4. Line regulation: 0.05 percent for 10 volt line change.
  - 5. Load regulation: 0.15 percent no load to full load.
  - 6. Ripple: 3 mV RMS.
  - 7. Operating temperature: 32 to 140 degrees Fahrenheit.
- C. Size the 24 VDC power supply to accommodate the design load plus a minimum 25 percent spare capacity.
- D. If power supply on/off status signal is shown, provide a relay contact (internal to the power supply or external if the power supply is not so equipped) to indicate on/off status of the power supply.
- E. Provide output overvoltage and overcurrent protective devices with the power supply to protect instruments from damage due to power supply failure and to protect the power supply from damage due to external failure.
- F. Mount the 24 VDC power supply such that dissipated heat does not adversely affect other panel components.

G. Manufacturer(s)

1. Acopian.
2. Lambda.
3. Or equal.

2.17 EMERGENCY ALARM BEACON AND AUDIBLE HORN

A. Beacon alarm light:

1. Type:
  - a. Beacon alarm light.
2. Physical:
  - a. Beacon alarm light for building exterior mounting shall be 120 VAC, flush mounted, weatherproof construction.
  - b. A 750,000-candle power xenon strobe tube and red polycarbonate lens.
3. Manufacturer(s):
  - a. Federal Signal.
  - b. Edwards.
  - c. Wheelock.
  - d. Or equal.

B. Alarm Horn:

1. Type:
  - a. Alarm horn shall be vibrating type for 120 Volts, 60 Hz.
2. Manufacturer(s):
  - a. Federal Signal Corp.
  - b. Edwards Co.
  - c. Benjamin.
  - d. Or equal.

2.18 SPARE PARTS

- A. General requirements for spare parts are specified in Section 40 61 13 Process Control System General Provisions.
- B. The following control panel spare parts shall be furnished:
  1. Timers and sockets - Two of each type installed.
  2. Relays and sockets - Two of each type installed.
  3. Fuses and circuit breakers – 10 percent (minimum of 10 fuses and two circuit breakers) of each type and size installed.

4. Light bulbs – 10 percent (minimum of 10) of each type installed. For LED type lights, 5 percent (minimum of three) of each color installed.
5. Panel-mounted power supplies - one of each type installed.
6. Provide touch-up paint, of each type and color used for all cabinets, panels, and consoles supplied.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. The panels shall be installed at locations as shown on the Contract Drawings.
- B. Refer to Section 40 61 13 Process Control System General Provisions.

#### 3.02 TESTS

- A. Refer to Section 40 61 13 Process Control System General Provisions.

END OF SECTION



SECTION 40 70 00  
INSTRUMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This section covers the furnishing, installation, and services for all instruments and accessories required for the Process Control System as specified herein or as indicated on the drawings.
- B. Equipment and services provided under this section shall be subject to all Associated Sections listed below.
- C. This section shall be used and referenced only in conjunction with the Process Control System sections.
- D. This section supplements the Process Control System section. Instrument data, special requirements, and options are indicated on the drawings or the Instrument Device Schedule.
- E. When multiple instruments of a particular type are specified, and each requires different features, the required features are described on the Drawings or the Instrument Device Schedule.

1.02 ASSOCIATED SECTIONS

This section encompasses the equipment and services specified in the following sections:

SECTION	SPEC TITLE
40 61 13	Process Control System General Provisions
40 71 00	Flow Measurement
40 74 00	Temperature Measurement

1.03 DESIGN CRITERIA.

- A. Each device shall be a pre-assembled, packaged unit. Upon delivery to the work site, each device or system shall be ready for installation with only minor piping and electrical connections required by Contractor.
- B. Primary elements shall derive any required power from the transmitter, unless otherwise indicated.
- C. The instruments shall be installed to measure, monitor, or display the specified process at the ranges and service conditions indicated on the Drawings or as indicated in the Instrument Device Schedule. The instruments shall be installed at the locations indicated on the Drawings or in the Instrument Device Schedule.
- D. Instrument Calibrations

1. Where possible, each instrument shall be factory calibrated to the calibration ranges indicated in the Drawings or in the Instrument Device Schedule. Flowmeters shall be wet flow calibrated.
2. Transmitters or similar measurement instruments shall be calibrated using National Institute of Standards and Technology (NIST) approved bench calibration procedures, when such procedures exist for the instrument type.
3. Calibration data shall be stored digitally in each device, including the instrument tag designation indicated on the Drawings and/or Instrument Device Schedule.

#### 1.04 SUBMITTALS

- A. Submittals shall be per the Process Control System – General Provisions section.

#### 1.05 INSTRUMENT TAGS

- A. All supplied instrument transmitters and instrument transmitter elements shall have a 316 stainless steel identification tag attached to each transmitter and element prior to shipment.
- B. Tag shall be attached via stainless steel chain or stainless-steel wire (24 gauge minimum) to a non-removable part of the device.
- C. The tag size shall be a minimum of 1.5 square inches.
- D. Tag shall include the ISA alphanumeric instrument number as indicated in the P&ID, loop, and detail drawings.
- E. The alphanumeric instrument number shall be stamped into the tag and shall have a minimum of 3/16-inch high alphanumeric characters.

### PART 2 - PRODUCTS

#### 2.01 GENERAL.

- A. The Associated Sections listed above provide minimum device requirements. The Drawings or Instrument Device Schedule shall be used to determine any additional instrument options, requirements, or service conditions.

#### 2.02 INTERCONNECTING CABLE

- A. For instruments where the primary element and transmitter are physically separated, interconnecting cable from the element to the transmitter shall be provided.
- B. The cable shall be the type approved by the instrument manufacturer for the intended purpose of interfacing the element to the transmitter.
- C. The cable shall be provided in the length necessary for installation. Splices shall not be allowed in the installed cable.
- D. The cable's minimum length shall be a minimum of three meters or as indicated on the Drawings or in the Instrument Device Schedule.

2.03 PROGRAMMING DEVICE.

- A. For instruments that require a dedicated programming device for calibration, maintenance, or troubleshooting, one such programming device shall be provided for each Owner facility (quantity required shall be as indicated in the Instrumentation and Control System section).
- B. The programming device shall include appropriate operation manuals and shall be included in the training requirements.
- C. For systems that allow the programming device functions to be implemented in software, running on a laptop computer, the software shall be provided instead of the programming device.

2.04 CONFIGURATION SOFTWARE/SERIAL INTERFACE.

- A. Devices indicated as requiring a serial interface shall be provided with all accessories required to properly communicate over the serial link.
- B. As a minimum, an appropriate cable shall be provided to allow the transmitter serial interface to be connected to a personal computer.
- C. One licensed copy of the diagnostic/interface software shall be provided for each Owner facility (quantity required shall be as indicated in the Instrumentation and Control System section).
- D. Software shall be capable of running under the Windows 10 operating system. If the software furnished performs the same functions as the programming device, specified elsewhere, then the programming device shall not be furnished.

PART 3 - EXECUTION

3.01 GENERAL

- A. Manufacturer's field services shall be provided for installation, field calibration, startup, and training as specified in the Instrumentation and Control System section.

3.02 MANUFACTURERS' FIELD SERVICES

- A. If indicated in the individual instrumentation sections, the instrument manufacturer or manufacturer's certified service representative shall provide start-up and training services. This work shall not be done by the PCSS contractor.
- B. The field services shall be to calibrate, oversee the installations of the sensor, and start-up the sensor/transmitter to provide reliable measurement at the instrument and to a remote system. The vendor shall work with the PCSS and ASP to verify the transmitter sends correct information to the remote system (i.e., that the scaling and units are the same at the instrument and on the remote operator interface).

3.03 INSTRUMENT SHIPPING

- A. The PCSS shall be responsible for coordinating the installation schedule with the Installation

Contractor.

- B. Instruments shall not be shipped to the Work Site until two weeks prior to the scheduled installation.
- C. Each shipment shall contain a listing of protective measures required to maintain sensor operation, including a listing of any common construction or cleaning chemicals that may affect instrument operation.

### 3.04 TRAINING

- A. While the instrument manufacturer or manufacturer's certified service representative is starting up the instrumentation, training shall be provided to the Owner's instrumentation technicians.
- B. The training shall be in how to calibrate, install, troubleshoot, read the diagnostics, and maintain the sensor and transmitter.

### 3.05 INSTRUMENT DEVICE SCHEDULE

- A. Instrument Device Schedule is included to provide further details and requirements for the instruments.
- B. Instrument Device Schedule contains only major plant instrumentation devices. Devices such as switches and indicating lights located on MCCs or local panels and gate/valve actuators are not included.
- C. Instrument Device Schedule includes the following information:
  - 1. Item: An arbitrary sequential number that is for reference only.
  - 2. System Code: The system code, which denotes the associated process.
  - 3. Loop No.: The numeric (or alphanumeric) loop designation for the instrument.
  - 4. Tag No.: The ISA alpha tag representing the function of the instrument.
  - 5. Service Description: The description of the instrument service (Example: Fine Screen Level High).
  - 6. Device Type: The instrument device type and should match the description as listed in the specification.
  - 7. Component Options: The instrument component options and indicates specific features and requirements, such as integral/remote mounted installations, valve manifolds, diaphragm seal, etc.
  - 8. Size: The instrument device size (such as the diameter of flowmeters).
  - 9. Output Type: Output signal type, '4-20mA' or 'Dry Contact'. It could also be a serial output for smart devices (such as HART or FLD-BUS) but only if the serial output is the primary I/O interface.
  - 10. Output Range/Setpoint: The calibrated range for the analog devices or the trip point(s) for the discrete devices.
  - 11. Power: The instrument power requirements such as '2-wire' for loop powered devices, or

'4-wire' for 120 volt powered devices.

12. Installation Details No.: The drawing number of the Installation Details Drawing where the device mounting instruction is provided.
13. Location Drawing No.: The drawing number of the process/mechanical drawing where the device location is shown.
14. Drawing/P&ID No.: The drawing number of the drawing or Process and Instrumentation Diagram where the device is shown.
15. Specification Section No.: The section in the specifications where the device is specified.
16. Remarks: A cross-reference to another specification section where applicable, or to a note which provides additional information.

END SECTION

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SECTION 40 70 00.1  
INSTRUMENT DEVICE SCHEDULE

Item	System Code	Loop No.	Tag No.	Service Description	Device Type	Component Options	Size	Output Type	Output Range/Setpoint	Power	Installation Details No.	Location Drawing No.	Drawing/P&ID No.	Specification Section No.	Remarks
1	0110	8001	0110-TIT	COMPRESSOR BUILDING ROOM TEMPERATURE	TEMPERATURE TRANSMITTER	WALL MOUNTING HARDWARE AS NEEDED	N/A	4-20mA	0-150 °F	2-WIRE	I-10	N/A	I-7	40 74 00	
2	0150	8001	0150-TIT	COPPER ION BUILDING ROOM TEMPERATURE	TEMPERATURE TRANSMITTER	WALL MOUNTING HARDWARE AS NEEDED	N/A	4-20mA	0-150 °F	2-WIRE	I-10	N/A	I-7	40 74 00	
3	5000	5001	5000-FIT	WELL NO. 5 EFFLUENT FLOW	ELECTROMAGNETIC FLOW METER	GROUNDING RINGS	6"	4-20mA	0-250 GPM	4-WIRE	I-10	N/A	I-9	40 71 00	

SECTION 40 71 00  
FLOW MEASUREMENT

PART 1 - GENERAL

1.01 SCOPE

- A. The Flow Measurement Section covers the furnishing of flow instruments and accessories required for the Process Control System (PCS) as specified herein or as indicated on the Drawings.
- B. Refer to section 40 70 00 - Instruments for general requirements.

PART 2 - PRODUCTS

2.01 MAGNETIC FLOW METER

A. Flow Element

- 1. Type
  - a. Pulsed DC type.
- 2. Function/Performance
  - a. Minimum Turndown ratio: 1000 : 1
  - b. Accuracy: Accuracy shall be +/- 0.5 % of rate for all flow rates greater than 1.9 feet per second.
  - c. Repeatability: +/-0.05% or +/-0.0008ft/s, whichever is greater.
  - d. Optional High Accuracy for Custody Transfer meters when noted +/- 0.2 % of rate for flow rates above 2.8 fps.
  - e. Calibration shall be per compliance with OIML R49 Type P recommendation.
  - f. Operating Temperature: -10 to 60°C (14 to 140°F)
  - g. Radio Frequency Interference (RFI) protection: RFI protection shall be provided as recommended by the manufacturer.
  - h. Pressure rating: Equal to piping system where meter is installed.
  - i. Additional: Meter shall be capable of running empty indefinitely without damage to any component.
- 3. Physical
  - a. Metering Tube: Type 304 stainless steel or equivalent.
  - b. Connection Type: Flanged: ASME Class 150 up to 24 inches.
  - c. Pressure Rating: Meter system shall be fully rated to the same design pressure as the flanges.
  - d. Flange Material: ANSI B 16.5 Class 150 or AWWA Class D epoxy-coated carbon steel flanges as required to match the associated piping system.



- e. Liner Material: Hard Rubber or Polyurethane, in conformance with Manufacturer's recommendations for the intended service.
  - f. Electrodes material: Type 316 stainless steel standard minimum requirements. All electrodes to be compatible with process fluid as indicated on the Drawings or electrodes to be supplied as listed in the Instrument Device Schedule.
  - g. Housing Material: Aluminum or Epoxy Coated Carbon Steel. For meters with remote mounted transmitters, meters below grade shall be suitable for submergence for up to 48 hours to a depth of 30 ft. (9m). Meters above grade shall be NEMA 6P (IP68). Where hazardous areas are indicated on the Drawings, the equipment shall be rated for that area.
  - h. Sensors in all sizes shall be provided with full bore design to reduce pressure loss (Optional reduced bore meters shall be available in sizes up to 24 inch for low flow measurement for custody transfer applications.)
  - i. Finish: All external surfaces shall have a chemical and corrosion resistant finish.
4. Power Requirements
- a. Meter shall be 24 VDC powered instrument, receiving its power from transmitter.
5. Accessories/Documentation Required
- a. Factory calibration: All meters shall be factory calibrated. A copy of the calibration report shall be included in the O&M manual.
  - b. Grounding: Meter shall be grounded in accordance with the manufacturer's recommendation. Provide ground ring, ground wires, gaskets, etc., as required. All materials shall be suitable for the liquid being measured and must be compatible with process fluid and with the process pipe.
  - c. For meters with remote-mounted transmitters, provide 50 feet cable length for installation between the flow tube and the transmitter. Length shall be as required by installation as indicated on the Drawings.
- B. Flow Converter/Transmitter
1. Type
- a. Microprocessor-based, intelligent transmitter compatible with flow tube provided.
  - b. Integral mount or mounted remote from the flow tube as shown on the drawings or as required by the physical location.
2. Functional/Performance
- a. Accuracy (including flow tube):  $\pm 0.5\%$  from 1 f/s to max velocity, up to  $\pm 1\%$  for 0.3 to 1 f/s.  $\pm 1\%$  for reverse - flow.
  - b. Operating Temperature:  $-10$  to  $140$  degrees F.
  - c. Output: One Isolated 4-20 mA HART linear analog output. Current output adjustable over the full range of the instrument.
  - d. Diagnostics: Self diagnostics with on screen display of faults.
  - e. Display: Three line back-lit graphical display with capacitive keys; allows for external configuration without removing covers and compromising the integrity of environmental classifications.

- f. Empty Tube Zero: The transmitter shall include a feature that will lock the output at zero when no flow is detected. The empty tube zero feature shall be enabled automatically when the transmitter detects no flow or manually through a contact input.
- g. Cable: Meter shall only require one cable and conduit between sensor and transmitter. Cable and termination strips shall be color coded to allow for easy installation.
- h. Provide electrode cleaning unit to match flow element requirements.
- 3. Physical
  - a. Transmitter shall be suitable for surface or pipe stand mounting.
  - b. Enclosure shall be NEMA 4X (IP65). Transmitter made of aluminum.
- 4. Power Requirements
  - a. Input Power: 120 VAC to flow transmitter.
- 5. Calibration
  - a. Test Mode: Provide the ability to verify the accuracy of the unit and the integrity of the current loop without any external equipment.
  - b. Meter calibration shall be in accordance with OIML R49 Type P, self-calibration requirements.
  - c. Meter must be able to periodically generate simulated signals that verify that the output is within predefined limits.
  - d. Coil inductance and resistance along with electrode voltage and impedance must be verifiable through diagnostic functionality.
  - e. Warnings and Alarms: Shall be classified to NAMUR NE 107 standards. Meter must have ability to display severity of warning with "maintenance, check function, failure and out of spec" warning indications.
  - f. The quantity of occurrences, total time duration of the alarm occurrences, and time since last occurrence.
  - g. All replacement transmitters shall be interchangeable without need for programming sensor calibration factors, meter size, site information, and serial numbers.
  - h. Insitu Calibration Verification: This system shall be used to verify in a quantifiable manner the meter's current conditions vs. the meters condition when originally manufactured. This calibration verification of the meter shall be performed without need for physical access to the meter flow tube. Method must be able to print out hard copy of verification and diagnostic reports.
  - i. Meters to be designed, manufactured, and calibrated in an ISO9001, UKAS/NAMAS, NIST, or NATA certified or traceable facility. Flow facility must be certified by volume or weight certified provers. Facility must have the capability to hold the flow rate at the specified calibration points for a minimum of five minutes to allow stabilization for flow and repeatability point checks.

C. Manufacturer

- 1. Endress & Houser Promag 400.

2. McCrometer Ultra Mag.
3. Rosemount 8705.
4. Or approved equal.

**PART 3 - EXECUTION**

**3.01 GENERAL**

- A. See section 40 70 00 - Instruments.

**END SECTION**

SECTION 40 74 00  
TEMPERATURE MEASUREMENT

PART 1 - GENERAL

1.01 SCOPE

- A. The Temperature Measurement Section covers the furnishing of temperature instruments and accessories required for the Process Control System (PCS) as specified herein or as indicated on the Drawings.
- B. Refer to section 40 70 00 - Instruments for general requirements.

PART 2 - PRODUCTS

2.01 TEMPERATURE TRANSMITTER

- A. Type:
  - 1. Wall-mounted, room temperature.
- B. Function:
  - 1. Range: See Instrument Schedule.
  - 2. Accuracy: Greater than  $\pm 0.5$  deg F.
  - 3. Ambient Temperature Limit: -40 to 185 deg F.
- C. Physical:
  - 1. Output: 4-20mA with HART protocol.
  - 2. Stability:  $\pm 0.12\%$ , for one year for RTDs.
  - 3. Power: 24 VDC loop powered.
  - 4. Housing: Wall Box. Mounting on surface or on a flush-mounted box.
  - 5. Display: LCD displaying Temperature in engineering units.
- D. Options/Accessories:
  - 1. 316SS wall mounting bracket, mounting plates, angles.
- E. Manufacturer:
  - 1. Endress + Hauser, TMT82/TH11.
  - 2. Or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. See section 40 70 00 - Instruments.

END SECTION

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SECTION 40 74 63  
TEMPERATURE TRANSMITTERS

PART 1 GENERAL

1.01 GENERAL PROVISIONS

- A. See Section 40 70 00 Instruments.

PART 2 PRODUCTS

2.01 GENERAL

- A. All cabling, mounting hardware, and accessories required to install all components of the instrumentation system shall be provided by the PCSI and/or CONTRACTOR.
- B. Instrumentation shall be suitable for installation at the location as shown on the Drawings.

2.02 SPARE PARTS

- A. Refer to Section 40 61 00 Process Control and Instrumentation Systems – General Provisions.

2.03 WARRANTY

- A. Refer to Section 40 61 00 Process Control and Instrumentation Systems – General Provisions.

2.04 TEMPERATURE TRANSMITTER

- A. Type:
  - 1. Wall-mounted, room temperature.
- B. Function:
  - 1. Range: See Instrument Schedule.
  - 2. Accuracy: Greater than  $\pm 0.5$  deg F.
  - 3. Ambient Temperature Limit: -40 to 185 deg F.
- C. Physical:
  - 1. Output: 4-20mA with HART protocol.
  - 2. Stability:  $\pm 0.12\%$ , for one year for RTDs.
  - 3. Power: 24 VDC loop powered.
  - 4. Housing: Wall Box. Mounting on surface or on a flush-mounted box.
  - 5. Display: LCD displaying Temperature in engineering units.

D. Options/Accessories:

1. 316SS wall mounting bracket, mounting plates, angles.

E. Manufacturer:

1. Endress + Hauser, TMT82/TH11.
2. Approved Equal.

**PART 3 EXECUTION**

**3.01 INSTALLATION REQUIREMENTS**

- A. The installation of equipment furnished hereunder shall be by the Contractor or their assigned subcontractors.
- B. Install and connect the equipment in accordance with the manufacturer's instructions.
- C. Each instrument shall be supplied with a nameplate identifying the instrument tag number as shown on the Drawings and specified herein. All wiring shall be labeled at each end.

**3.02 STARTUP AND TRAINING**

- A. As specified in Section 40 61 26 Process Control System – Training.
- B. If indicated in the instrumentation paragraphs above, the instrument manufacturer or manufacturer's certified service representative shall provide start-up and training services. This work shall not be done by the PCSI/ASP CONTRACTOR.
- C. The start-up services shall be to calibrate, oversee the installations of the sensor, and start up the sensor/transmitter in order to provide reliable measurement at the instrument and to a remote system. The vendor shall work with the PCSI/ASP to verify the transmitter sends correct information to the remote system (i.e., that the scaling and units are the same at the instrument and on the remote operator interface).

END OF SECTION

BRUSHY CREEK MUNICIPAL UTILITY DISTRICT

WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

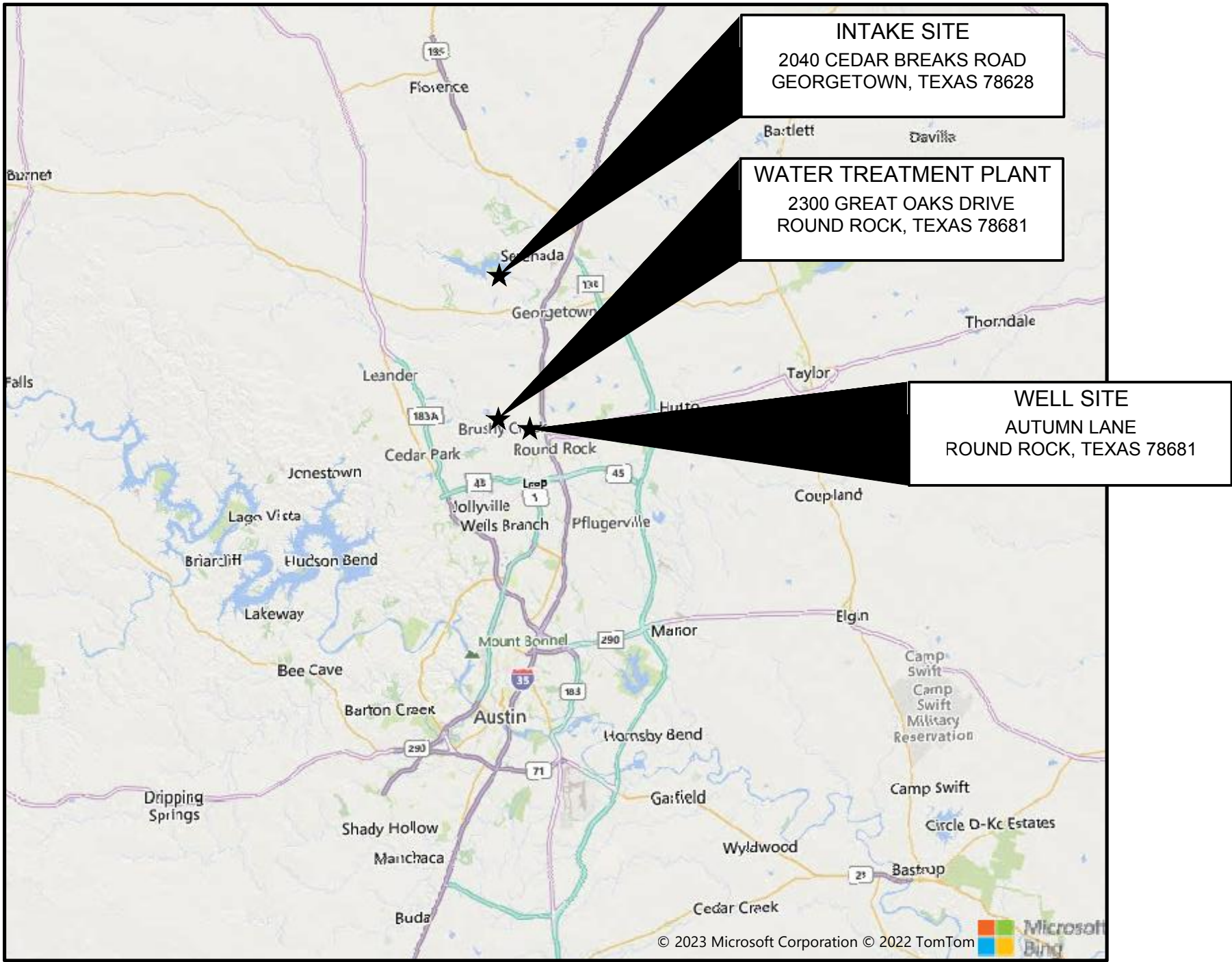
OCTOBER 2023

BOARD MEMBERS

REBECCA B. TULLOS, PLACE 1, TREASURER  
MICHAEL TUCKER, PLACE 2, PRESIDENT, ASSISTANT TREASURER  
KIM FILIATRAULT, PLACE 3, VICE PRESIDENT  
CYNTHIA ELKINS, PLACE 4  
KEN REIFSHCLAGER, PLACE 5, SECRETARY

BUSINESS PERSONNEL

SHEAN R. DALTON, GENERAL MANAGER  
BILL CARR, UTILITY SYSTEMS MANAGER  
AMY GIANNINI, DISTRICT ENGINEER



LOCATION MAP  
NOT TO SCALE

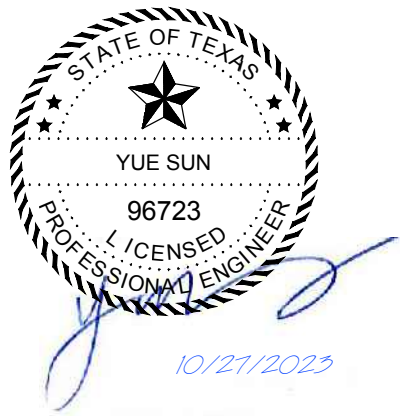


16318 Great Oaks,  
Round Rock, TX 78681

PREPARED BY:



3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



SUBMITTED BY: Yue Sun DATE: 3/16/2023  
YUE SUN, P.E.  
Ardurra Group, INC

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



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DRAWING INDEX

NO. SHEET SHEET DESCRIPTION

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G-2 DRAWING INDEX AND GENERAL NOTES

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C-5 EROSION AND SEDIMENTATION CONTROL DETAILS

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S-3 GENERATOR FOUNDATION PLAN, SECTION AND DETAILS  
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E-6 INTAKE PANEL AND CONDUIT/CABLE SCHEDULES  
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E-12 WELL SITES PANEL, CONDUIT AND CABLES SCHEDULES  
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E-20 WTP RECYCLE ENLARGED PLAN  
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E-25 HEAT TRACE DETAILS 1 OF 3  
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I-4 INTAKE GENERATOR PROCESS AND INSTRUMENTATION DIAGRAM  
I-5 WELL NO. 3 & NO. 5 GENERATOR PROCESS AND INSTRUMENTATION  
I-6 WELL NO. 6 GENERATOR PROCESS AND INSTRUMENTATION DIAGRAM  
I-7 INTAKE BUILDINGS PROCESS AND INSTRUMENTATION DIAGRAM  
I-8 WELL NO.5 PROCESS AND INSTRUMENTATION DIAGRAM  
I-9 INTAKE PUMPS MOTOR PROTECTION RELAYS PROCESS AND INSTRUMENTATION DIAGRAM  
I-10 INSTALLATION DETAILS

GENERAL CONSTRUCTION NOTES:

- CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING REQUIRED SECURITY TO PROTECT HIS OWN PROPERTY, EQUIPMENT, AND WORK IN PROGRESS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY PROTECTING EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS, SPRINKLER SYSTEM AND OTHER ADJOINING FACILITIES, AND REPAIR OR REPLACE DUE TO DAMAGE CAUSED BY CONTRACTOR.
- CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND CONDITIONS BEFORE COMMENCING WORK. ALL LANDSCAPING FEATURES SHALL BE FIELD VERIFIED. IT SHALL BE CONTRACTOR'S RESPONSIBILITY TO REPORT ANY DISCREPANCIES TO THE ENGINEER IN A TIMELY MANNER. CONTRACTOR SHALL INCLUDE ALL FIELD VERIFIED INFORMATION ON THE PROJECT RECORD DRAWINGS.
- ANY EXISTING UTILITIES IN CONFLICT WITH PROPOSED CONSTRUCTION SHALL BE TEMPORARILY RELOCATED AS REQUIRED SO AS TO PROVIDE CONTINUOUS SERVICE BY THE UTILITY (NO SEPARATE PAY). AFTER CONSTRUCTION, UTILITY SHALL BE RETURNED TO ORIGINAL LOCATION (NO SEPARATE PAY).
- ANY PERMANENT RELOCATION OF EXISTING UTILITY NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO RELOCATION AND SHALL CONFORM TO THE APPLICABLE GOVERNING STANDARDS AND SPECIFICATIONS OF THE DISTRICT.
- THE LOCATION OF ALL UNDERGROUND UTILITIES AS SHOWN IS APPROXIMATE. THE DISTRICT REQUIRES THE CONTRACTOR TO PRE-LOCATE, BY WHATEVER MEANS MAY BE REQUIRED (METAL DETECTION EQUIPMENT, PROBES, EXCAVATION, SURVEY), ALL UNDERGROUND UTILITIES (SHOWN OR NOT SHOWN) BEFORE TRENCHING FOR THIS PROJECT. ALL INVESTIGATIVE WORK SHALL BE DONE AND ALL REPAIRS REQUIRED AFTER INVESTIGATION SHALL BE ACCOMPLISHED BY THE CONTRACTOR (NO SEPARATE PAY). CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ALL UNDERGROUND UTILITIES.
- EXISTING UTILITIES ARE TO REMAIN IN SERVICE AT ALL TIMES.
- CONTRACTOR SHALL PROVIDE A TRENCH SAFETY SYSTEM TO MEET, AS A MINIMUM, THE REQUIREMENTS OF OSHA SAFETY AND HEALTH REGULATION, PART 1926, SUBPART P AS PUBLISHED IN THE FEDERAL REGISTER, VOLUME 54, NO 209, DATED OCTOBER 31, 1989 OR LATEST EDITION.
- OVERHEAD LINES EXIST ALONG AND WITHIN THE PROJECT BOUNDARY. CONTRACTOR TO LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION AND COMPLY WITH SPECIAL ONCOR ENERGY AND PEDERNALES ELECTRIC COOP RESTRICTIONS. TEXAS LAW, SESSION 752, HEALTH AND CODE GOVERNING ANY ACTIVITIES WHICH MAY CAUSE PEOPLE OR OBJECTS TO APPROACH LIVE OVERHEAD HIGH-VOLTAGE LINES SHALL BE STRICTLY ADHERED TO. CONTRACTOR AND OWNERS ARE LEGALLY RESPONSIBLE FOR SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. CONTRACTOR SHALL CONTACT ONCOR ENERGY FOR THE WELL SITE, PEDERNALES ELECTRICAL COOP FOR THE RAW WATER INTAKE SITE.
- THE INFORMATION CONTAINED WITHIN THE PROJECT DRAWINGS WITH REGARDS TO THE EXISTING FACILITIES WAS TAKEN FROM THE ORIGINAL CONSTRUCTION DRAWINGS AND THIS PROJECT SURVEY WITH ORIGINAL WORK SHOWN LIGHT AND PROPOSED WORK SHOWN DARK. ORIGINAL WORK SHOWN LIGHT IS FOR THE CONTRACTOR'S INFORMATION ONLY. ITS ACCURACY IS NOT GUARANTEED AND ITS USE IN NO WAY RELIEVES THE CONTRACTOR OR OTHERS OF ANY RESPONSIBILITY FOR LOSS DUE TO INACCURACIES.
- CONTRACTOR TO KEEP ACCESS ROAD TO EXISTING PLANT SECURE AND FREE OF CONSTRUCTION RELATED DEBRIS AT ALL TIMES. CONTRACTOR STAGING AREA SHALL BE USED FOR CONTRACTOR'S PERSONNEL, PARKING, MATERIAL, AND STORAGE. STOCKPILE, MATERIAL FABRICATION AND RELATED CONSTRUCTION USES WILL NOT BE ALLOWED TO INTERFERE WITH NORMAL PLANT OPERATION. CONTRACTOR TO PROVIDE TEMPORARY ALL-WEATHER ACCESS ROADS AS NEEDED TO MAINTAIN ACCESS TO ALL UNLOADING AREAS THROUGHOUT THE DURATION OF THE PROJECT.
- OBTAIN ALL REQUIRED CONSTRUCTION PERMITS PRIOR TO COMMENCEMENT OF WORK. SEE SUMMARY OF WORK 01 11 00
- CONTRACTOR TO GIVE NOTICE TO ALL AUTHORIZED INSPECTORS, SUPERINTENDENTS OR PERSONS IN CHARGE OF PRIVATE UTILITIES AFFECTED BY HIS OPERATIONS PRIOR TO COMMENCEMENT OF WORK.
- PLANT COORDINATES SHOWN FOR PROPOSED STRUCTURE LOCATIONS ARE REFERENCED TO OUTSIDE OF FACE OF EXTERIOR WALL OR TO CENTERLINE OF STRUCTURE, UNLESS OTHERWISE NOTED ON DRAWINGS.
- THE FINISHED GRADE ELEVATIONS SHOWN ARE INTENDED TO PROVIDE DRAINAGE AWAY FROM PLANT FACILITIES. MINOR CHANGES MAY BE NECESSARY TO PROVIDE ADEQUATE DRAINAGE. FINISHED GRADE ELEVATIONS SHALL BE COORDINATED WITH FINAL GRADING PLANS.
- THESE DRAWINGS, PREPARED BY ARDURRA GROUP, INC. (ARDURRA), DO NOT EXTEND TO OR INCLUDE DESIGNS OR SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR ITS EMPLOYEES OR AGENTS. ARDURRA'S REGISTERED PROFESSIONAL ENGINEER(S) THAT HAVE SEALED THESE BID DOCUMENTS DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED IN THESE DRAWINGS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS, INCLUDING THE DRAWINGS AND SPECIFICATIONS REQUIRED BY THE HOUSE BILLS 662 AND 665 ENACTED BY THE TEXAS LEGISLATURE - REGULAR SESSION.
- THE CONTRACTOR SHALL CONTACT THE FOLLOWING, A MINIMUM OF 48 HOURS PRIOR TO BEGINNING CONSTRUCTION:  
  
TEXAS ONE CALL (800) 545-6005
- CONTRACTOR SHALL NOT OPERATE ANY EXISTING VALVES, PLANT APPURTENANCES OR PLANT EQUIPMENT. PROVIDE SUFFICIENT NOTIFICATION AND LEAD TIME, IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 01 14 19 USE OF SITE, FOR PLANT OPERATOR WHERE IT BECOMES NECESSARY TO ACTUATE OR DE-ACTUATE VALVES, PLANT APPURTENANCES, OR PLANT EQUIPMENT.
- PLANT MANAGER AND CONSTRUCTION MANAGER/PROJECT MANAGER TO BE NOTIFIED 7 DAYS IN ADVANCE OF EXISTING PROCESS EQUIPMENT OR PUMP "SHUTDOWN". REFER TO 01 33 05 CONSTRUCTION PROGRESS SCHEDULE FOR PLANT PRODUCTION REQUIREMENTS.
- CONTRACTOR IS RESPONSIBLE FOR SUBMITTING FITTING SCHEDULE AND METHOD OF JOINT RESTRAINT WHERE FIRST BELOW-GROUND FITTING WILL NOT BE FLANGED.
- CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS OF UTILITY COMPANIES CONCERNING SAFETY AND HEALTH PRACTICES.
- CONTRACTOR SHALL PROVIDE SODDING IN ALL AREAS DISTURBED AS A RESULT OF CONSTRUCTION OPERATIONS THAT ARE NOT COVERED BY STRUCTURES OR PAVEMENT. TEMPORARY ROADWAYS SHALL BE REMOVED AT THE CONCLUSION OF THE PROJECT, AND SITE WILL BE RESTORED TO ITS ORIGINAL CONDITIONS.
- PIPING DRAWINGS INDICATE INVERT ELEVATIONS FOR GRAVITY FLOW LINES. SLOPE PIPE UNIFORMLY BETWEEN ELEVATIONS SHOWN. NO VALLEYS OR PEAKS PERMITTED IN GRAVITY FLOW LINES. FOR OTHER PIPING, REFER TO DETAIL SHEETS FOR PIPE ELEVATIONS AT EACH STRUCTURE. YARD PIPING DRAWINGS DO NOT INDICATE VERTICAL BENDS AND TRANSITIONS. WHEN NECESSARY, MAKE VERTICAL TRANSITIONS OR FURNISH AND INSTALL VERTICAL BENDS AT NO EXTRA COST. DO NOT EXCEED MANUFACTURER'S RECOMMENDATIONS FOR CURVATURE OF LINES AND/OR DEFLECTION OF PIPE JOINTS. ALL VERTICAL TRANSITIONS AND BENDS TO BE DOCUMENTED ON REQUIRED "RED LINE DRAWINGS."

- YARD PIPING LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY LOCATIONS OF EXISTING PIPE. ARRANGE NEW PIPING AS NECESSARY TO AVOID INTERFERENCE AND PROVIDE CLEARANCE NOTED. ALL CHANGES IN PIPING SHOWN TO BE DOCUMENTED ON REQUIRED "AS-BUILT DRAWINGS".
- MAINTAIN MINIMUM CLEARANCE OF 3 FEET FROM EDGE OF STRUCTURES TO CLOSEST EDGE OF PIPELINE ADJACENT AND PARALLEL TO EDGE OF STRUCTURE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- THE CONTRACTOR SHALL PROVIDE TAPE, FITTINGS, PLUGS, AND OTHER DEVICES FOR USE IN FILLING, FLUSHING, TESTING, ETC. (NO SEPARATE PAY).
- THE CONTRACTOR SHALL ABIDE BY ALL POWER COMPANY RESTRICTIONS INCLUDING ALL RECOMMENDED SAFETY PRECAUTIONS. THE CONTRACTOR SHALL NOT OPERATE ANY EQUIPMENT OR HAVE ANY PERSONS WITHIN 10 FEET (VERTICAL AND HORIZONTALLY) OF ELECTRICAL POWER LINES.
- CONTRACTOR SHALL REFER TO THE CITY OF ROUND ROCK, TEXAS STANDARD DETAIL DRAWINGS FOR ANY DETAILS NOT INCLUDED IN THE CONSTRUCTION DRAWINGS.
- EXISTING PIPING LOCATIONS, ELEVATIONS, PIPE MATERIALS AND JOINT CONSTRUCTION SHOWN ARE OBTAINED FROM DISTRICT RECORD DRAWINGS AND NOT FIELD VERIFIED. CONTRACTOR SHALL FIELD CONFIRM THE INFORMATION OF EXISTING PIPING UTILITIES PRIOR TO COMMENCEMENT OF IMPROVEMENTS WORK.
- ALL ABOVE GROUND EXTERIOR PIPING LESS THAN 4"Ø SHALL BE INSULATED UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- ALL PIPES UNDER SLAB SHALL BE ENCASED IN CONCRETE. ENCASEMENT SHALL EXTEND 5 FEET BEYOND EDGE OF FOUNDATION, AND SHALL BE TIED TO STRUCTURAL FOUNDATION.
- EXCESS SOIL SHALL BE REMOVED AT THE CONTRACTOR'S EXPENSE. NOTIFY THE DISTRICT IF THE DISPOSAL SITE IS INSIDE THE DISTRICT'S JURISDICTIONAL BOUNDARIES.
- ALL AREAS DISTURBED OR EXPOSED DURING CONSTRUCTION SHALL BE REVEGETATED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. REVEGETATION OF ALL DISTURBED AREAS OR EXPOSED AREAS SHALL CONSIST OF SODDING OR SEEDING, AT THE CONTRACTOR'S OPTION.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSPECT TEMPORARY EROSION CONTROLS ON A DAILY BASIS. ADJUST THE CONTROLS AND/OR REMOVE ANY SEDIMENT BUILDUP AS NECESSARY.
- CONTRACTOR WILL BE RESPONSIBLE FOR KEEPING ROADS AND DRIVES ADJACENT TO AND NEAR THE SITE FREE FROM SOIL, SEDIMENT AND DEBRIS. CONTRACTOR WILL NOT REMOVE SOIL, SEDIMENT OR DEBRIS FROM THE OTHER GOING ON CONSTRUCTION SITE DUE TO THE CITY OF GEORGETOWN PROJECT AT RAW WATER INTAKE SITE, OR ANY AREA OR VEHICLE BY MEANS OF WATER, ONLY SHOVELING AND SWEEPING WILL BE ALLOWED. CONTRACTOR WILL BE RESPONSIBLE FOR DUST CONTROL FROM THE SITE.
- THERE ARE SOME PRIVATE PROPERTIES CLOSE TO THE WELL SITE, CONTRACTOR SHALL BE RESPONSIBLE FOR NOISE AND SAFETY CONTROL FROM THE SITE. REFER TO SPECIFICATION 01 11 00 FOR ADDITIONAL DETAILS.
- CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES IN THE COMMON WORK AREA WITH THE CITY OF GEORGETOWN SOUTH LAKE WTP PROJECT. CONTRACTOR – PLW WATERWORKS. CONTACT JOÃO LOPES FARIAS, AREA MANAGER, AT 346-372-0393 OR EMAIL: JLOPES@PLWUS.COM.

UTILITY CONSTRUCTION

- PROVIDE SHEETING, SHORING, AND BRACING OF EXCAVATIONS WHERE REQUIRED TO PROPERLY AND SAFELY COMPLETE THE WORK AS SHOWN. CONSTRUCT SHEETING, SHORING, AND BRACING TO PREVENT THE EXCAVATION FROM EXTENDING BEYOND SPECIFIED OR INDICATED LIMITS AND TO PROTECT ADJACENT STRUCTURES OR IMPROVEMENTS. THE SHEETING, SHORING, AND BRACING THAT IS USED TO PROTECT WORKMEN AND THE PUBLIC SHALL COMPLY TO OSHA, STATE OF TEXAS, FEDERAL REGULATIONS, DEEMED AS APPLICABLE AND CONCERNING TRENCHING, TUNNELING, OR OTHER EXCAVATIONS.

SURVEY AND BENCH MARK REFERENCE

- ALL DIMENSIONS OF EXISTING FEATURES SHOWN ARE APPROXIMATE AND ARE TO BE VERIFIED BY THE CONTRACTOR. HORIZONTAL OR VERTICAL ALIGNMENT CHANGES SHALL BE APPROVED BY THE ENGINEER.
- SURVEY AND BENCHMARK INFORMATION IS SHOWN ON SHEET C-1 AND C-2.
- BEARINGS ARE BASED ON THE STATE PLANE COORDINATE SYSTEM OF TEXAS, SOUTH CENTRAL ZONE (4204), NAD 83.
- TOPOGRAPHIC FEATURES WERE COLLECTED USING CONVENTIONAL AND GPS METHODS. ON SITE CONTROL POINT AND BENCHMARK ELEVATIONS WERE ESTABLISHED USING DIFFERENTIAL LEVELING.

LIMITS OF CONSTRUCTION

- CONTRACTOR SHALL LIMIT OPERATIONS TO WITHIN THE CONFINES OF THE CONSTRUCTION WORK LIMITS SHOWN.

GEOTECHNICAL

- A GEOTECHNICAL INVESTIGATION WAS CONDUCTED FOR THE WELL SITE BY BALCONES GEOTECHNICAL, LLC, REPORT NO. 0122-049 DATED 03-27-2023.
- A GEOTECHNICAL INVESTIGATION WAS CONDUCTED FOR THE RAW WATER INTAKE SITE CONSTRUCTION AREA BY HOLT ENGINEERING, INC, REPORT NO. 09-25819 DATED 10-03-2019.

TRANSFER OF SERVICES

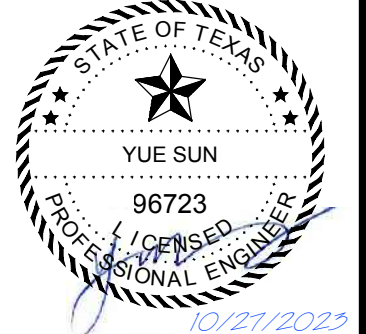
- ALL SERVICES ARE TO BE TRANSFERRED BETWEEN LINES WITH A MINIMUM DISRUPTION OF SERVICE. ALL EXISTING LINES MUST BE MAINTAINED IN SERVICE UNTIL SERVICE TRANSFER IS READY.
- CONTRACTOR SHALL HAND DIG WITHIN ONE (1) FOOT OF UNDERGROUND UTILITIES (PUBLIC OR PRIVATE).

DEMOLITION

- THE OWNER HAS THE RIGHT OF FIRST REFUSAL TO THE EQUIPMENT BEING DEMOLISHED. THE CONTRACTOR SHALL DELIVER THE EQUIPMENT WHICH THE OWNER WISHES TO KEEP AT LOCATION DESIGNATED BY THE OWNER WITHIN THE DISTRICT LIMITS AND/OR AREAS SERVED.

AREA CLASSIFICATION AND RATING

- SEE ELECTRICAL DRAWINGS FOR AREA CLASSIFICATIONS. ALL ITEMS, HOISTINGS, CONNECTIONS, MOUNTINGS AND RATINGS SHALL COMPLY WITH THE AREA THEY ARE IN OR CONNECTED TO.



					BY
					REVISION
					DATE
					NO.

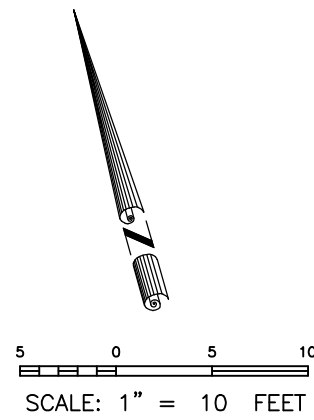
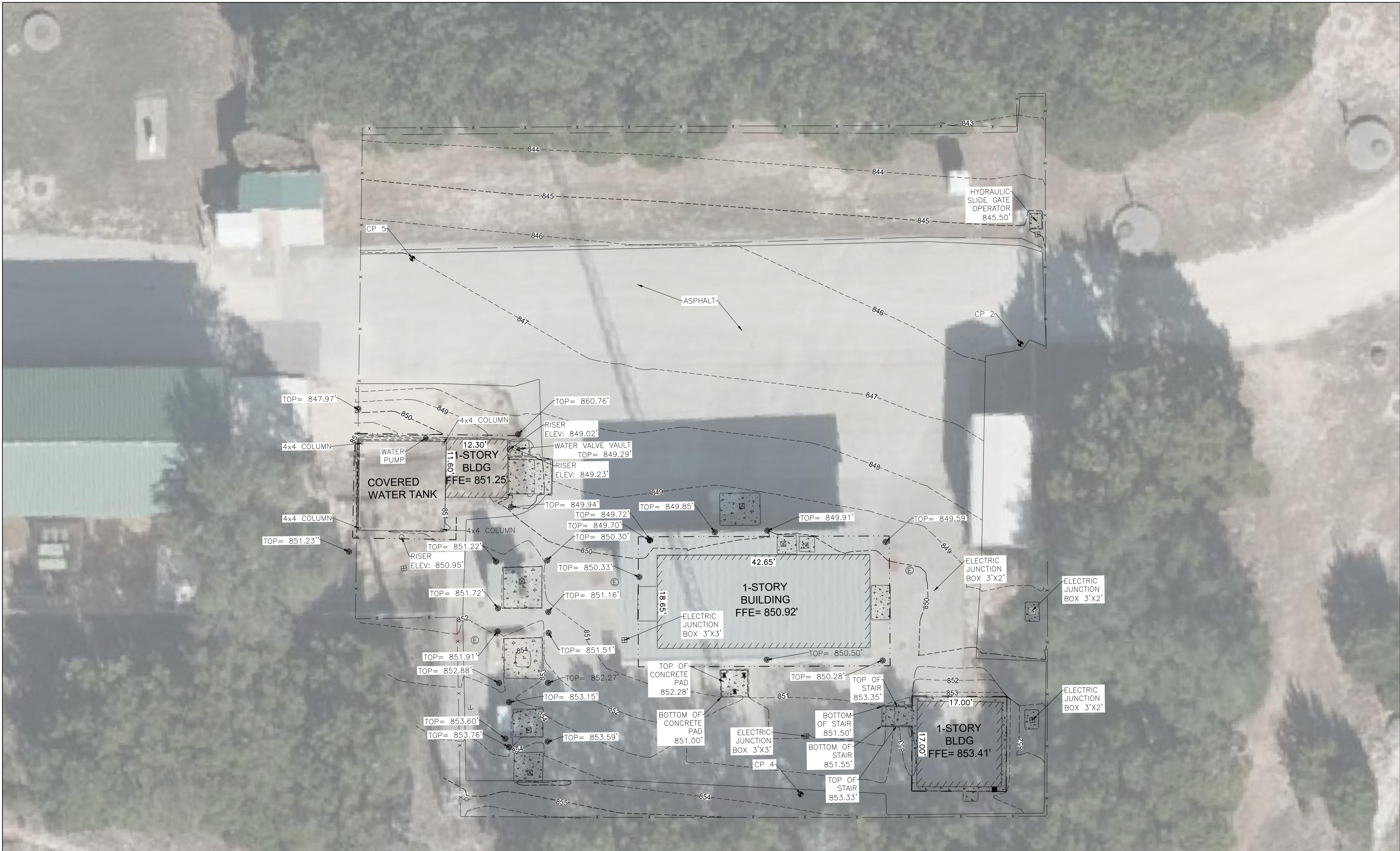


BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

GENERAL  
DRAWING INDEX AND  
GENERAL NOTES

VERIFY SCALE 0 1	
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE	
DESIGNED	X. YI
DRAWN	J. GIBSON
CHECKED	X. YI
REVIEWED	Y. SUN
Seq.	of
Dwg. No.	XXX G-2
2023-0002-00	





- GENERAL NOTES:**
- THE BASIS OF BEARING OF THIS SURVEY IS GRID NORTH AS OBSERVED BY GPS, TEXAS COORDINATE SYSTEM OF 1983 (NAD83), CENTRAL ZONE (FIPS 4203).
  - HORIZONTAL AND VERTICAL CONTROL WAS DERIVED FROM STATIC OBSERVATION AND OPUS SOLUTION USING THE ESTABLISHED CONTROL CP1, 1/2" IRON ROD WITH ARDURRA CAP.
  - CONTOUR LINES SHOWN ARE AT 1-FOOT INTERVALS.

HORIZONTAL AND VERTICAL CONTROL				
PT.	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 1	10215782.128	3113123.299	854.765	SET 1/2" IRON ROD WITH ARDURRA CAP
CP 2	10215817.083	3113514.576	845.886	SET MAG NAIL WITH ARDURRA WASHER
CP 3	10215872.827	3113214.532	846.115	SET MAG NAIL WITH ARDURRA WASHER

**LEGEND:**

ELECTRIC MANHOLE  
ELECTRIC METER  
TRANSFORMER  
JUNCTION BOX  
POWER POLE  
GUY WIRE  
WATER VALVE  
WATER PUMP  
GROUND WIRE COVER  
BUILDING OVERHANG  
TOP OF SLOPE  
BOTTOM OF SLOPE  
FENCE

CONTROL POINT

CONCRETE

10/21/2023

NO.	DATE	REVISION	BY

3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053

Brushy Creek  
Municipal Utility District

BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

CIVIL  
RAW WATER INTAKE  
TOPOGRAPHIC SURVEY

VERIFY SCALE  
0 1

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

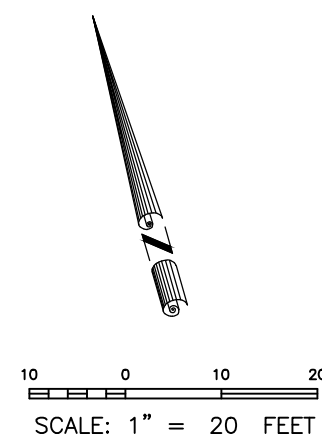
DESIGNED \_\_\_\_\_  
DRAWN PMM  
CHECKED \_\_\_\_\_  
REVIEWED \_\_\_\_\_

Seq. \_\_\_\_\_ of XXX

Dwg. No. **C-1**

2023-0002-00





**GENERAL NOTES:**

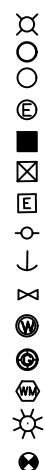
- 1) THE BASIS OF BEARING OF THIS SURVEY IS GRID NORTH AS OBSERVED BY GPS, TEXAS COORDINATE SYSTEM OF 1983 (NAD83), CENTRAL ZONE (PIPS 4203).
- 2) HORIZONTAL AND VERTICAL CONTROL WAS DERIVED USING THE ESTABLISHED CONTROL CP125, CITY OF ROUND ROCK CONCRETE MONUMENT CORR 01-006.
- 3) TOPOGRAPHIC FEATURES WERE COLLECTED USING CONVENTIONAL AND GPS METHODS.
- 4) CONTOUR LINES SHOWN ARE AT 1-FOOT INTERVALS.

BORING COORDINATES			
BORE	X	Y	Depth
B-1	10164865.868	3123854.311	25'
B-2	10164606.771	3123568.655	25'

HORIZONTAL AND VERTICAL CONTROL				
PT.	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 125	10163939.36	3121366.01	767.50'	CITY OF ROUND ROCK SURVEY MONUMENT 01-006
TBM 126	10164863.78	3123523.17	768.47'	TBM RAIL ROAD SPIKE ON POWER POLE
CP 1	10164782.55	3123861.75	767.28'	SET 60D NAIL
CP 2	10164890.95	10164890.95	767.47'	SET 60D NAIL

**LEGEND:**

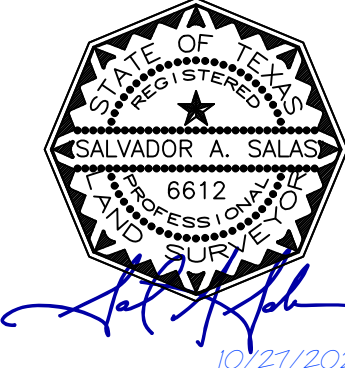
FIRE HYDRANT  
RISER  
BOLLARD  
ELECTRIC MANHOLE  
ELECTRIC METER  
TRANSFORMER  
ELECTRIC BOX  
POWER POLE  
GUY WIRE  
WATER VALVE  
WATER PUMP  
GROUND WIRE COVER  
WATER METER  
WELL  
BORE HOLE



CONTROL POINT  
TEMPORARY  
BENCHMARK

CONCRETE

PIPE LINE  
POWERLINE UNDERGROUND  
TOP OF SLOPE  
BOTTOM OF SLOPE  
WATERLINE  
GASLINE



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

CIVIL  
WELL SITE AT SAM BASS FIELD  
TOPOGRAPHIC SURVEY

VERIFY SCALE	
0	1
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE.	
DESIGNED	_____
DRAWN	PMM
CHECKED	_____
REVIEWED	_____
Seq.	of XXX
Dwg. No.	C-2
2023-0002-00	





- GENERAL NOTES:
1. THERE ARE NO TREES LOCATED WITHIN THE LIMITS OF CONSTRUCTION.
  2. THE IMPERVIOUS AREA WILL INCREASE BY 55 SF. THE INCREASE OF STORMWATER RUNOFF IS NEGLIGIBLE.
  3. THE TOTAL AREA OF EARTH DISTURBANCE IS 196.40 SF.

CONSTRUCTION NOTES:

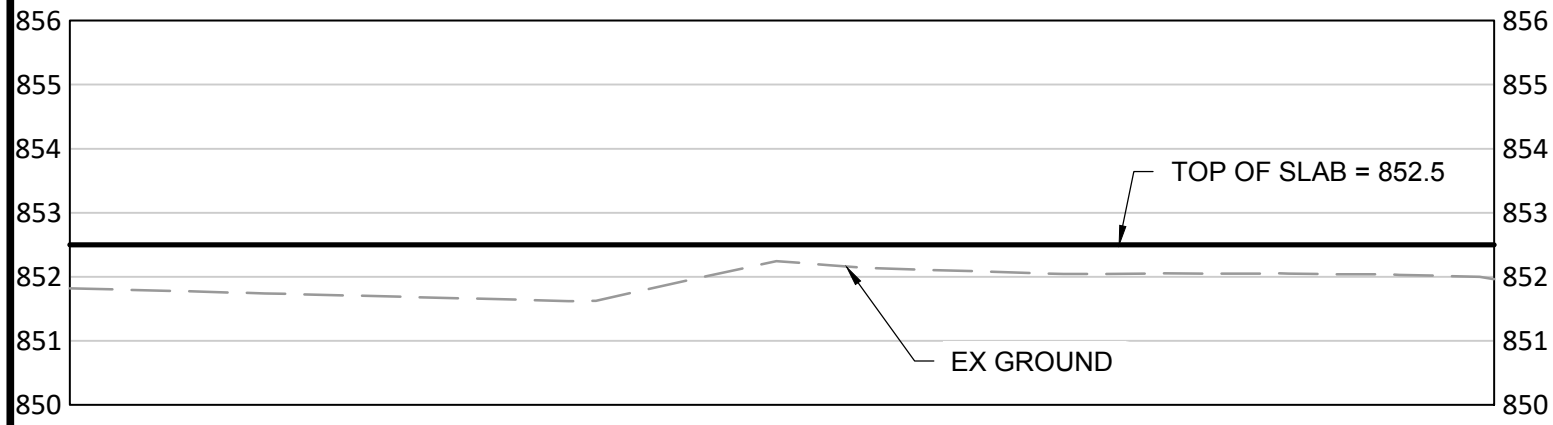
1. ALIGN WEST SIDE OF GENERATOR FOUNDATION WITH THE EXIST. BLDG WEST SIDE.
2. SAWCUT EXISTING PAVEMENT AS SHOWN PRIOR TO REMOVAL.
3. EXCAVATE HMAC AND ALL BROWN SILTY CLAY AND ANY ORGANIC MATERIAL WITHIN THE STRUCTURE FOOTPRINT AND AT LEAST 4' OUTSIDE THE FOOTPRINT.
4. SCARIFY THE EXCAVATED, PRE-FILL SUBGRADE AT LEAST 8" AND RECOMPACT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX-114-E. KEEP MOISTURE CONTENT WITHIN OPTIMUM TO +3 PERCENT OF OPTIMUM.
5. BACKFILL WITH CRUSHED LIMESTONE DERIVATIVE BASE MATERIAL (SELECT FILL) CONFORMING TO THE FOLLOWING:

RETAINED ON 2-1/2" SCREEN	0%
RETAINED ON 7/8" SCREEN	5% - 50%
RETAINED ON 3/8" SCREEN	25% - 65%
RETAINED ON No. 4 MESH	35% - 75%
RETAINED ON No. 40 MESH SIEVE	60% - 90%

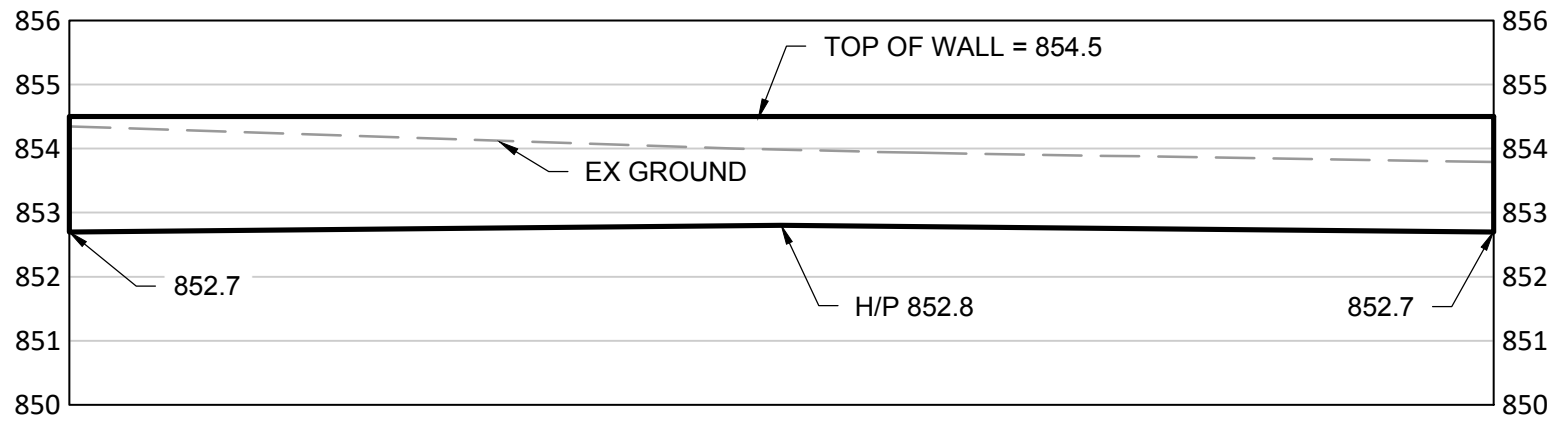
MATERIAL PASSING THE No. 40 SIEVE SHALL MEET THE FOLLOWING PLASTICITY REQUIREMENTS:

PASSING No. 40 SIEVE	MAXIMUM PLASTICITY INDEX	MINIMUM PLASTICITY INDEX
25% - 40%	15	3
10% - 25%	20	4

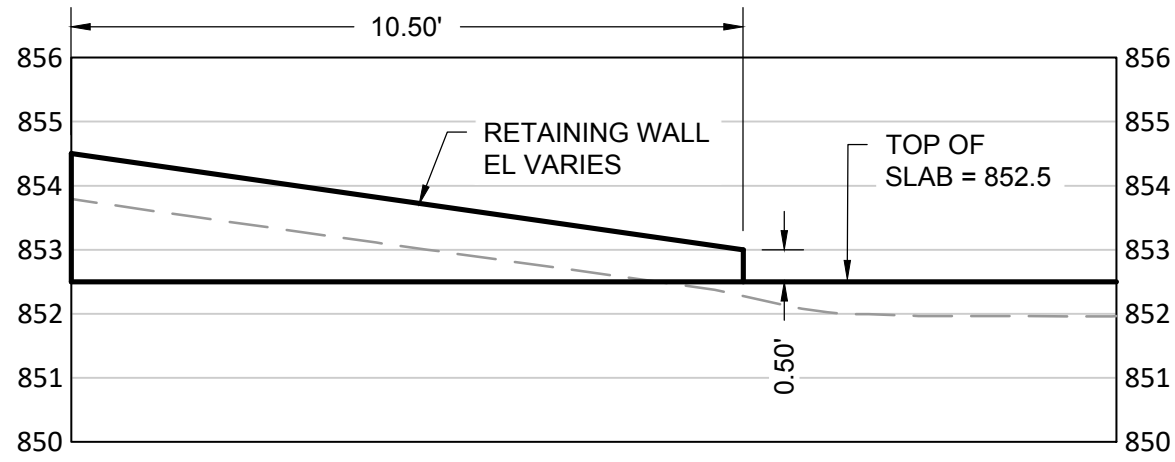
6. PLACE FILL MATERIAL IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACT TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX 113-E. MAINTAIN MOISTURE CONTENT WITHIN 2% OF OPTIMUM.
7. REMOVE HMAC AND EXCAVATED MATERIALS FROM PROJECT SITE AND DISPOSE OFFSITE PER SPECIFICATION SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
8. AFTER COMPLETION OF THE GENERATOR TESTING, REPAIR REMOVED HMAC. FURNISH AND INSTALL FULL DEPTH 6" TYPE "D" HMAC PER CITY OF GEORGETOWN STANDARD SPECIFICATION, SECTION S01 - HOT MIX CONCRETE PAVEMENT.
9. SLOPE NEW HMAC AWAY FROM NEW CONCRETE FOUNDATION.
10. RE-GRADE DISTURBED AREAS TO PROVIDE POSITIVE STORMWATER DRAINAGE AWAY FROM STRUCTURE AND RESTORE EXISTING VEGETATION AFTER COMPLETION OF ALL CONSTRUCTION WORK.



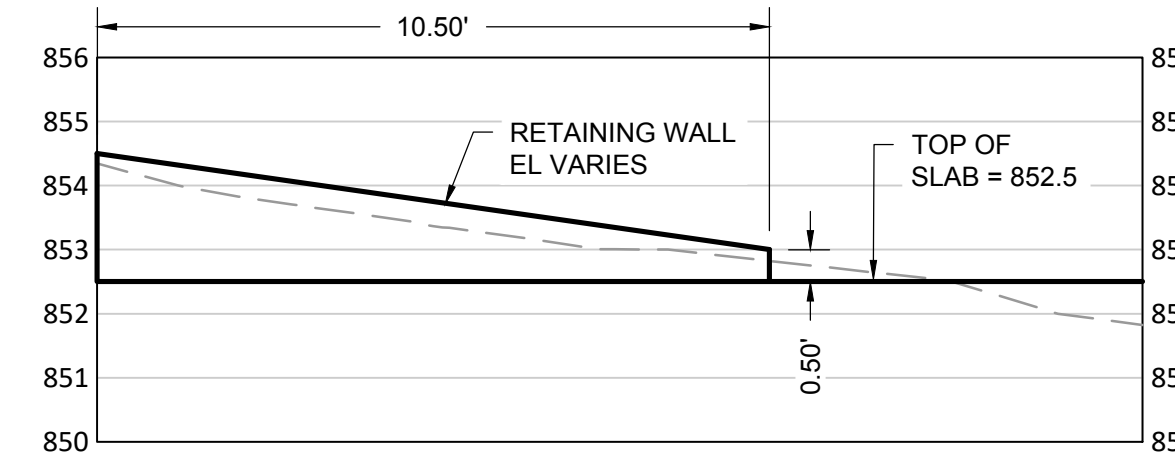
NORTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



SOUTH SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



EAST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



WEST SIDE GENERATOR PAD  
SCALE: 1"=3' HORZ / 1"=3' VERT



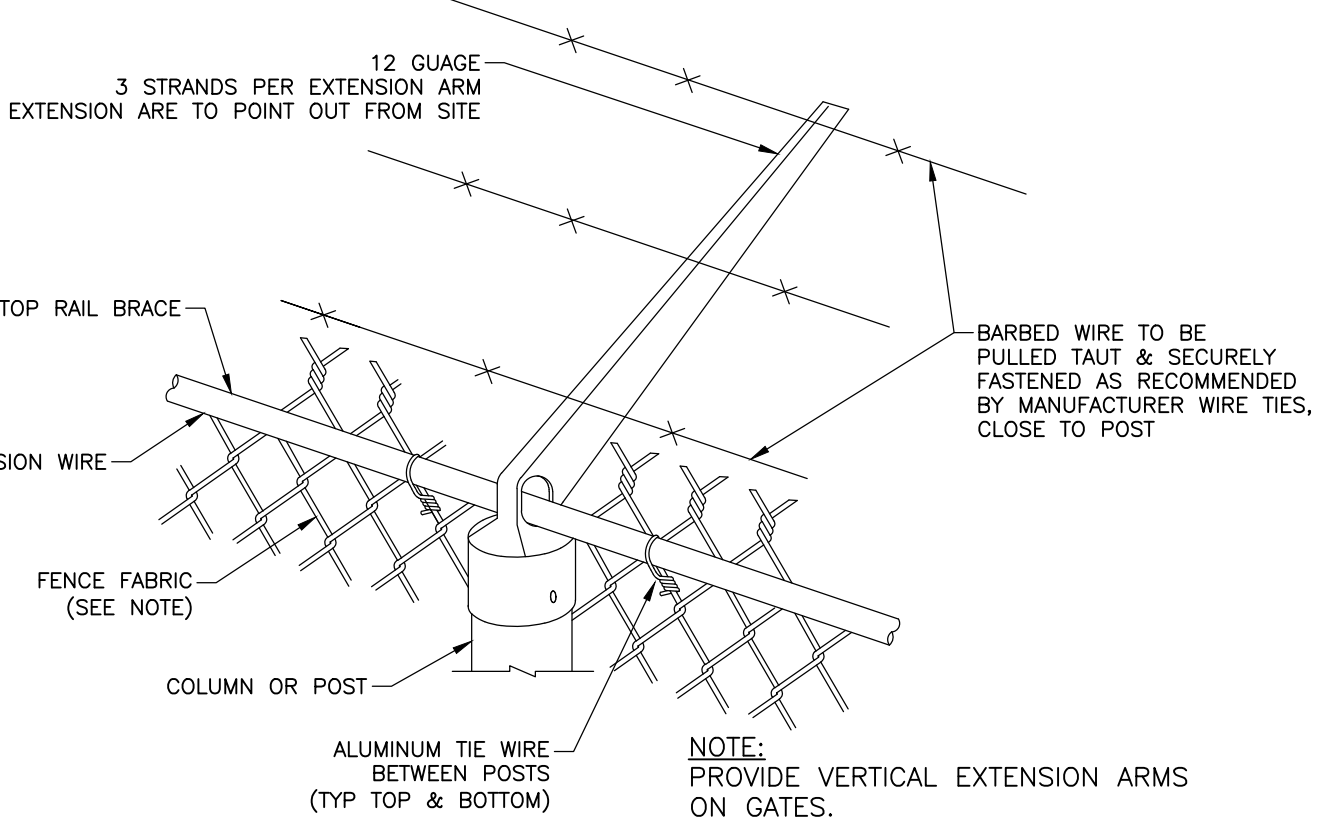
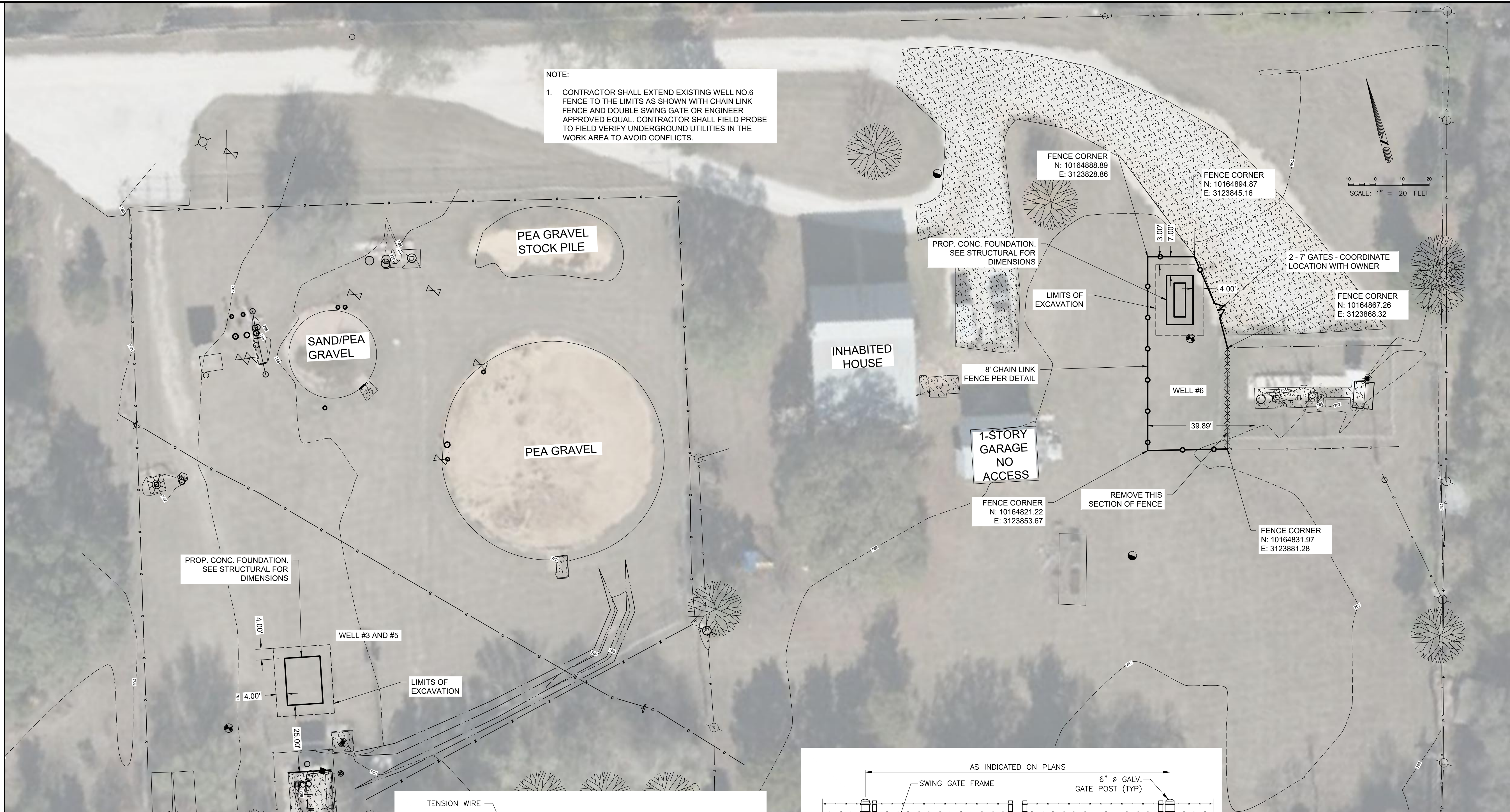
NO.	DATE	REVISION	BY



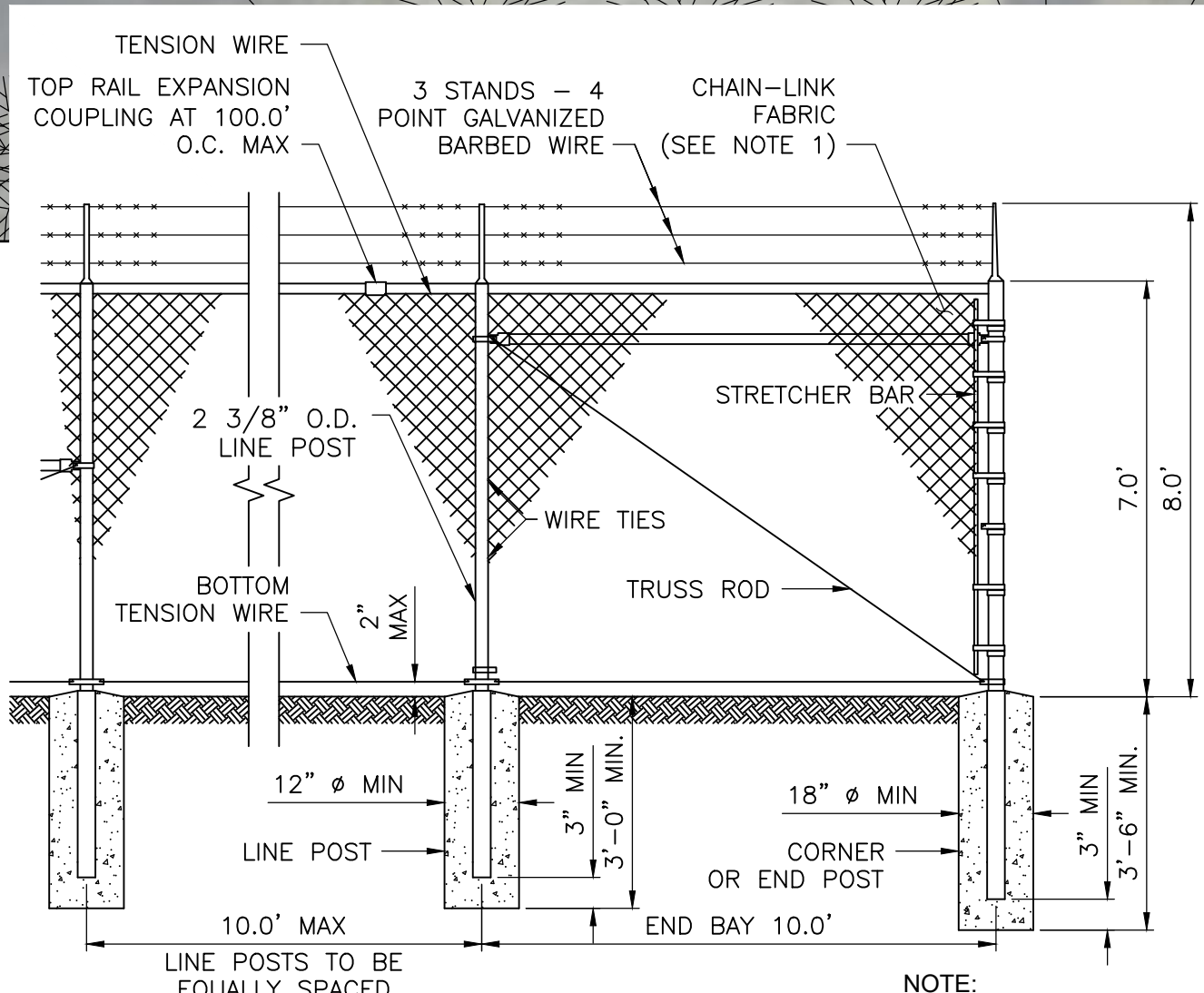
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
CIVIL  
RAW WATER INTAKE  
SITE & DEMO PLAN - GENERATOR E-5 PAD - INTAKE SITE

DESIGNED	J. LEVITT
DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN
Seq.	of XXX
Dwg. No.	C-3
2023-0002-00	



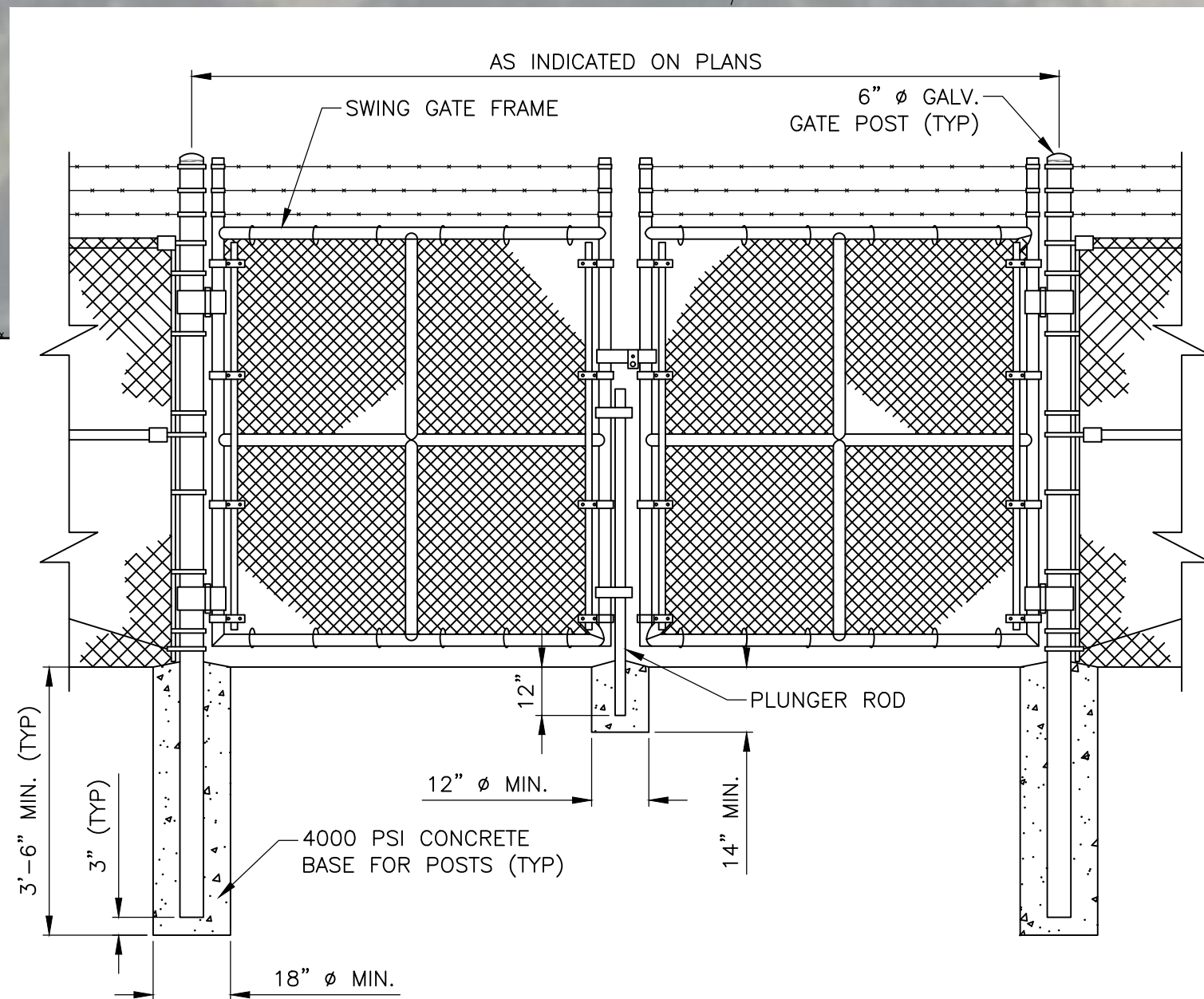


**EXTENSION WIRE FOR BARBED WIRE**  
**N.T.S.**



**FENCE DETAIL**  
**N.T.S.**

- 2" PATTERN CHAIN LINK FENCING FABRIC OF NO.9 STEEL WIRE, HOT-DIPPED GALV. AFTER WEAVING



**DOUBLE SWING GATE FENCE DETAIL**  
**N.T.S.**

**CONSTRUCTION NOTES:**

- EXCAVATE ALL REDDISH BROWN TO TAN FAT CLAY AND ANY ORGANIC MATERIAL WITHIN THE STRUCTURE FOOTPRINT DOWN TO THE LIMESTONE AND AT LEAST 4' OUTSIDE THE FOOTPRINT.
- SCARIFY THE EXCAVATED, PRE-FILL SUBGRADE AT LEAST 8" AND RECOMPACT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX-114-E. KEEP MOISTURE CONTENT WITHIN OPTIMUM TO +3 PERCENT OF OPTIMUM.
- BACKFILL WITH CRUSHED LIMESTONE DERIVATIVE BASE MATERIAL (SELECT FILL) CONFORMING TO THE FOLLOWING:

RETAINED ON 2-1/2" SCREEN	0%
RETAINED ON 7/8" SCREEN	5% - 50%
RETAINED ON 3/8" SCREEN	25% - 65%
RETAINED ON No. 4 MESH	35% - 75%
RETAINED ON No. 40 MESH SIEVE	60% - 90%

MATERIAL PASSING THE No. 40 SIEVE SHALL MEET THE FOLLOWING PLASTICITY REQUIREMENTS:

PASSING No. 40 SIEVE	MAXIMUM PLASTICITY INDEX	MINIMUM PLASTICITY INDEX
25% - 40%	15	3
10% - 25%	20	4

- PLACE FILL MATERIAL IN MAXIMUM 8-INCH LOOSE LIFTS AND COMPACT TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY TxDOT TEST METHOD TEX 113-E. MAINTAIN MOISTURE CONTENT WITHIN 2% OF OPTIMUM.
- OUTSIDE OF THE STRUCTURE, THE SELECT FILL MATERIAL SHOULD BE CAPPED, OR COVERED WITH THE ONSITE GENERATED CLAY CAP AT LEAST TWELVE INCHES (12") THICK AND VEGETATED WITH BERMUDA SOD. SLOPE CAP TO DRAIN AWAY FROM STRUCTURE.
- REMOVE EXCESS EXCAVATED MATERIALS FROM PROJECT SITE AND DISPOSE OFFSITE PER SPECIFICATION SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- TOP OF FOUNDATION SHALL BE A MIN. OF 6 INCHES ABOVE THE EXISTING GROUND.



NO.	DATE	REVISION	BY

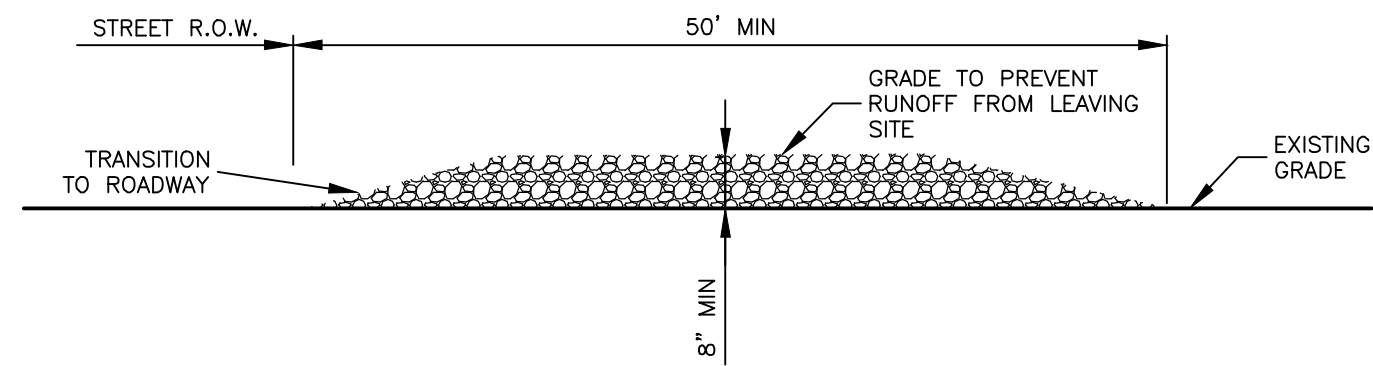


BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

CIVIL  
WELL SITE AT SAM BASS FIELD  
SITE & DEMO PLAN - GENERATOR E-11 PAD - WELL SITE

DESIGNED	J. LEVITT
DRAWN	PM
CHECKED	Y. SUN
REVIEWED	Y. SUN
Seq.	of XXX
Dwg. No.	C-4
2023-0002-00	



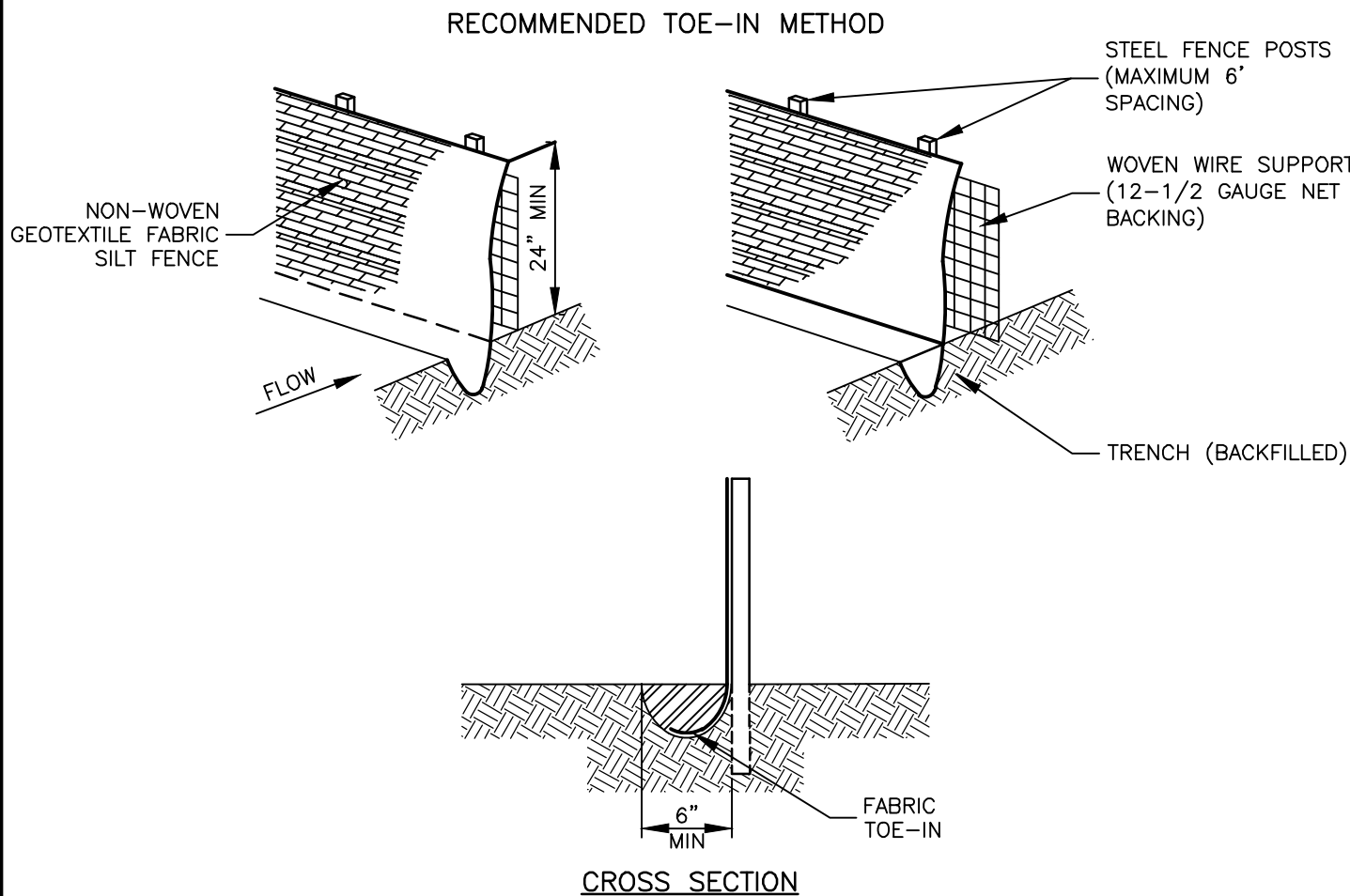


CROSS SECTION

NOTES:


1. STONE SIZE SHALL BE 3" - 8" OPEN GRADED ROCK.
2. THICKNESS OF CRUSHED STONE PAD TO BE NOT LESS THAN 8".
3. LENGTH SHALL BE A MINIMUM OF 50' FROM ACTUAL RUNOFF, AND WIDTH NOT LESS THAN FULL WIDTH OF INGRESS/EGRESS.
4. ENTRANCE SHALL BE PROPERLY GRADED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.
5. THIS ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY BY CONTRACTOR.
6. AS NECESSARY, WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY. IF WASHING OR CLEANING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATERCOURSE USING APPROVED METHODS.

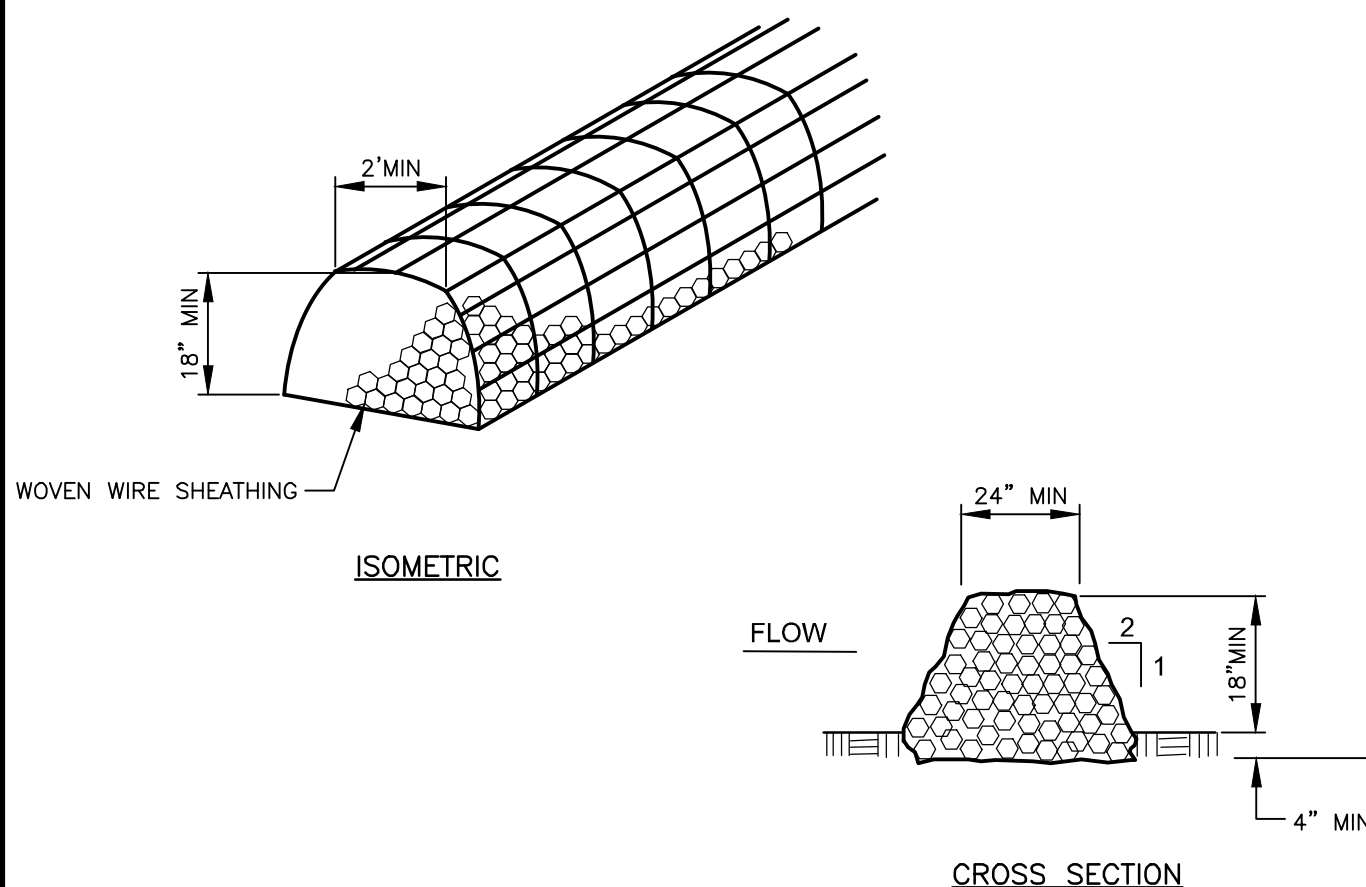
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APPROVED		EC-09
03-25-11	STABILIZED CONSTRUCTION ENTRANCE DETAIL	 CITY OF ROUND ROCK TEXAS
DATE		
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL (NOT TO SCALE)		



NOTES:


1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST MUST BE EMBEDDED A MIN. OF ONE (1') FOOT.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G. PAVEMENT) WEIGHT FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
3. THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN IS SECURELY FASTENED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES. THE SILT SHALL BE DISPOSED OF IN AN APPROVED SITE AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.
8. SILT FENCE SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

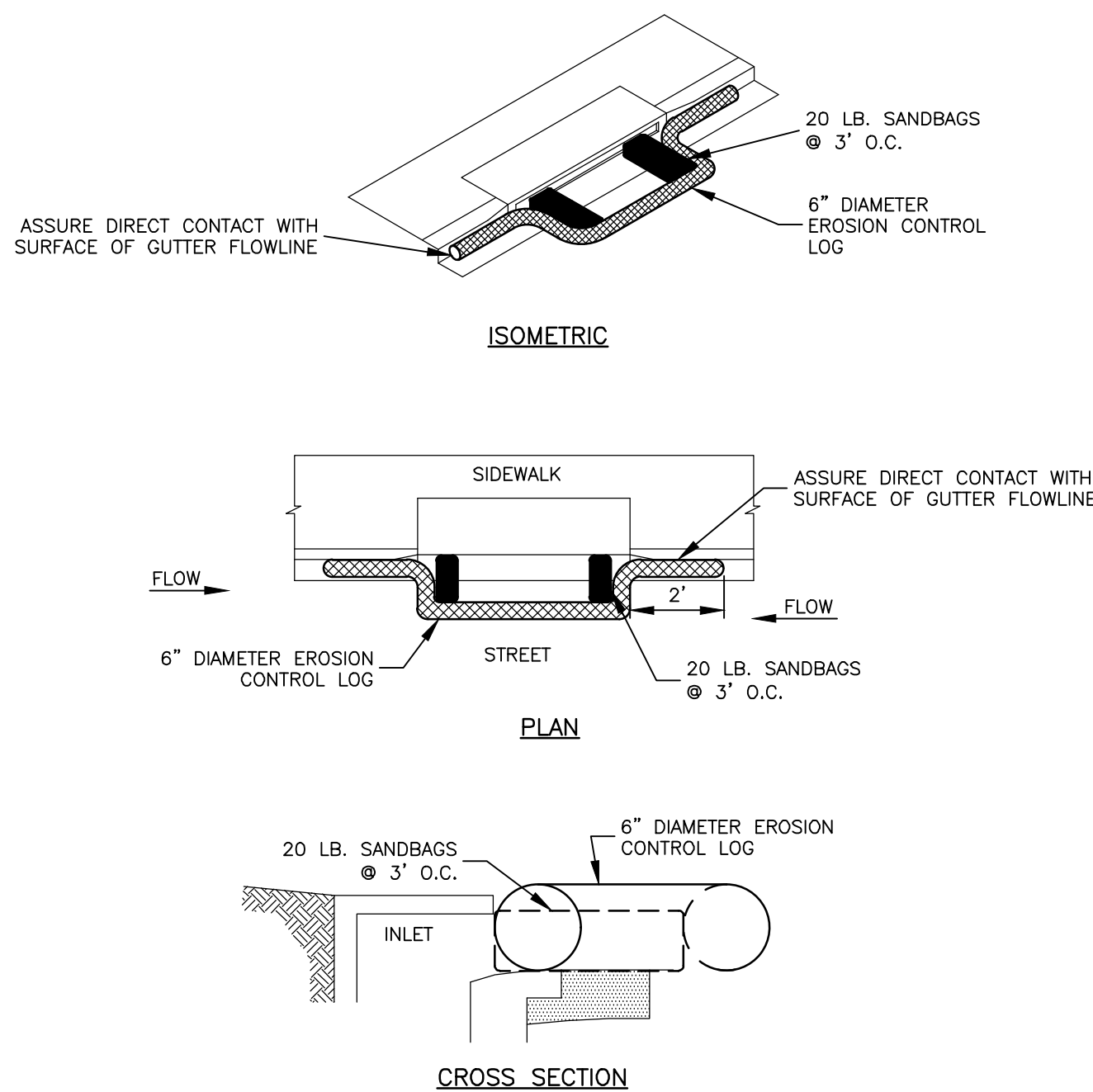
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS APPROVED 03-25-11 DATE THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)	CITY OF ROUND ROCK  SILT FENCE DETAIL	DRAWING NO. EC-10 
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NOTES:


1. USE ONLY OPEN GRADED ROCK (3 to 5") DIAMETER FOR ALL CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM 1" OPENING AND MINIMUM WIRE DIAMETER OF 20 GAUGE.
3. THE ROCK BERM SHALL BE INSPECTED DAILY OR AFTER EACH RAIN, AND THE STONE AND/OR FABRIC COVERED BY THE SHEATHING REPLACED WHEN THE STRUCTURE BEGINS TO FUNCTION AS INTENDED, DUE TO SEDIMENT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. IF SEDIMENT REACHES A DEPTH OF 6", THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF ON AN APPROVED SITE AND IN A MANNER THAT WILL NOT CREATE A SEDIMENTATION PROBLEM.
5. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SEDIMENT SHALL BE REMOVED AND

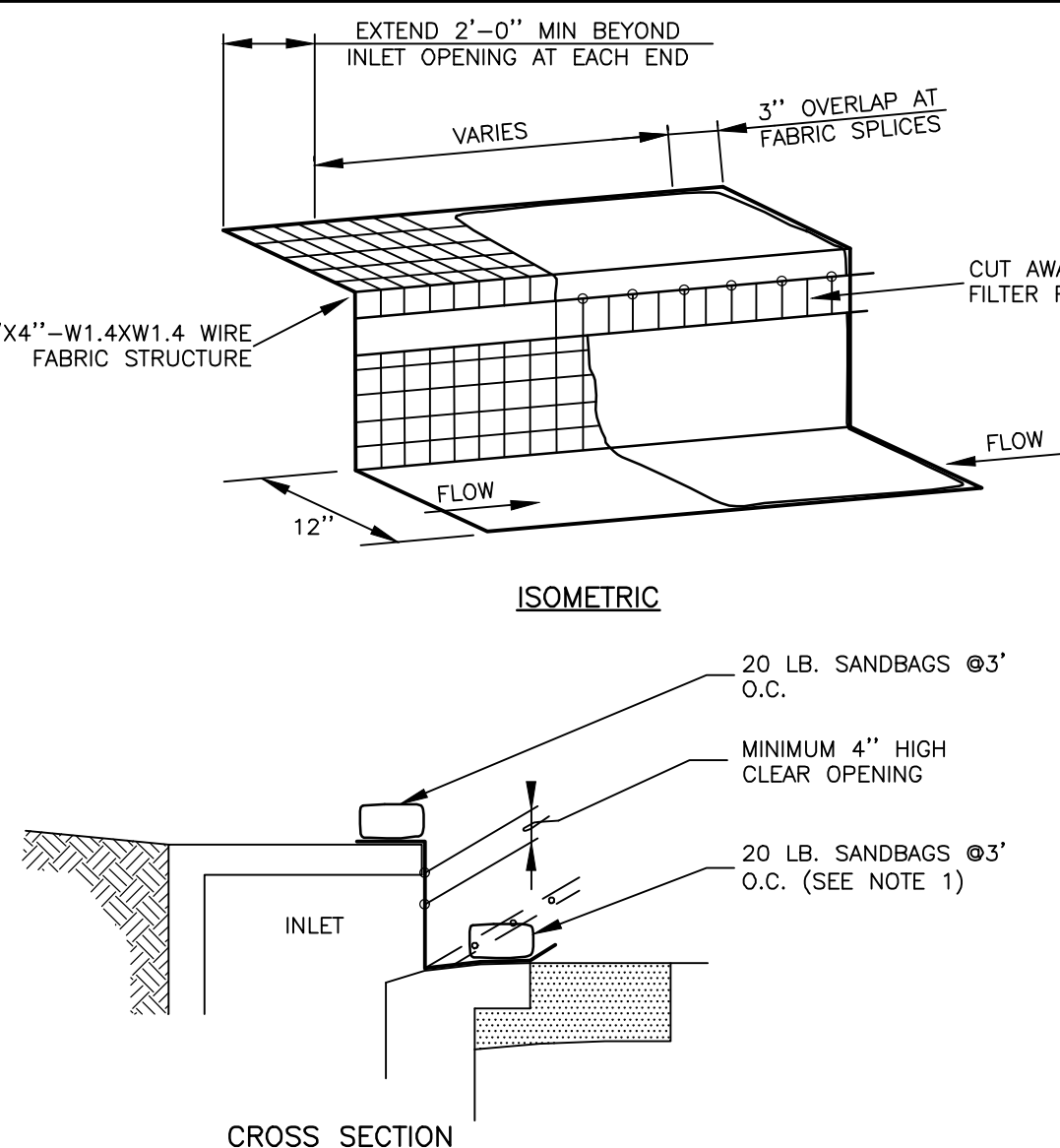
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO. EC-12
APPROVED 03-25-11 DATE		 ROUND ROCK, TEXAS "WHERE THE FUTURE BEGINS"
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL (NOT TO BE USED)	ROCK BERM DETAIL	



**NOTES:**

1. EROSION CONTROL LOG CONTAINMENT MESH SHALL BE 100% BIODEGRADABLE, PHOTODEGRADABLE OR RECYCLABLE; AND FILL MATERIAL SHALL CONSIST OF MULCH, ASPEN EXCELSEIF FIBERS, CHIPPED SITE VEGETATION, COCONUT FIBERS, 100% RECYCLABLE FIBERS, OR ANY OTHER ACCEPTABLE MATERIAL EXCLUDING STRAW AND HAY.
2. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTH REACHES 2".
3. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND IMMEDIATELY REMOVE THE INLET PROTECTIONS IF THE STORM WATER BEGINS TO OVERTOP THE CURB.
4. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

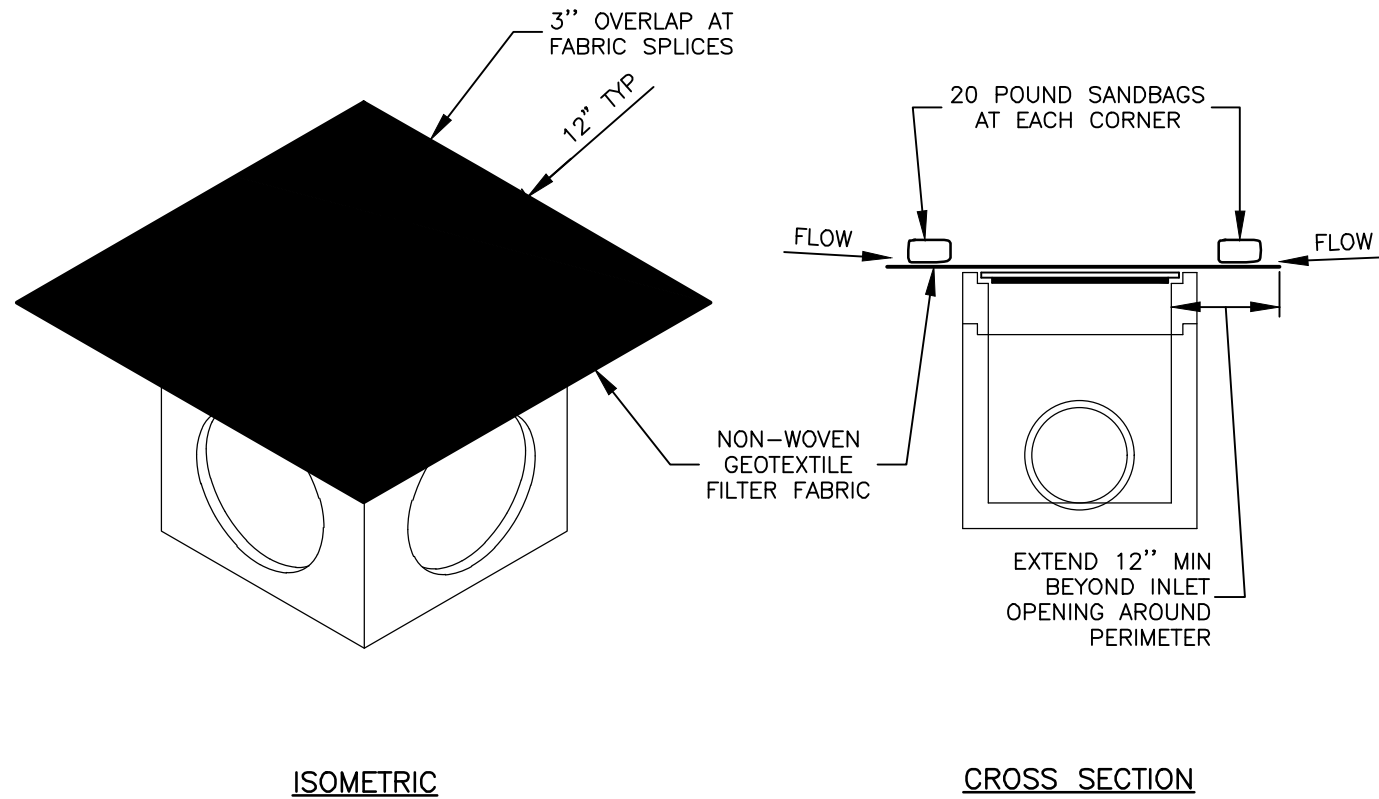
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO. EC-13
APPROVED 03-25-11 DATE		 TEXAS DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)	CURB INLET PROTECTION WITH EROSION CONTROL LOG DETAIL	



## NOTES


1. WHERE MINIMUM CLEARANCES CAUSE TRAFFIC TO DRIVE IN THE GUTTER, THE CONTRACTOR MAY SUBSTITUTE A 1" X 4" BOARD SECURED WITH CONCRETE NAILS 3" O.C. NAILED INTO THE GUTTER IN LIEU OF SANDBAGS TO HOLD THE FILTER DIKE IN PLACE. UPON REMOVAL, CLEAN ANY DIRT/DEBRIS FROM NAILING LOCATIONS, APPLY CHEMICAL SANITIZING AGENT AND APPLY NON-SHRINK GROUT FLUSH WITH SURFACE OF GUTTER.
2. A SECTION OF FILTER FABRIC SHALL BE REMOVED AS SHOWN ON THIS DETAIL OR AS DIRECTED BY THE INSPECTOR OR HIS DESIGNATED REPRESENTATIVE. FABRIC MUST BE SECURED TO WIRE BACKING WITH CLIPS OR HOG RINGS AT THIS LOCATION.
3. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTH REACHES 2".
4. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND REMOVE THE INLET PROTECTION WHEN THE STORM-WATER BEGINS TO OVERTOP THE CURB.
5. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

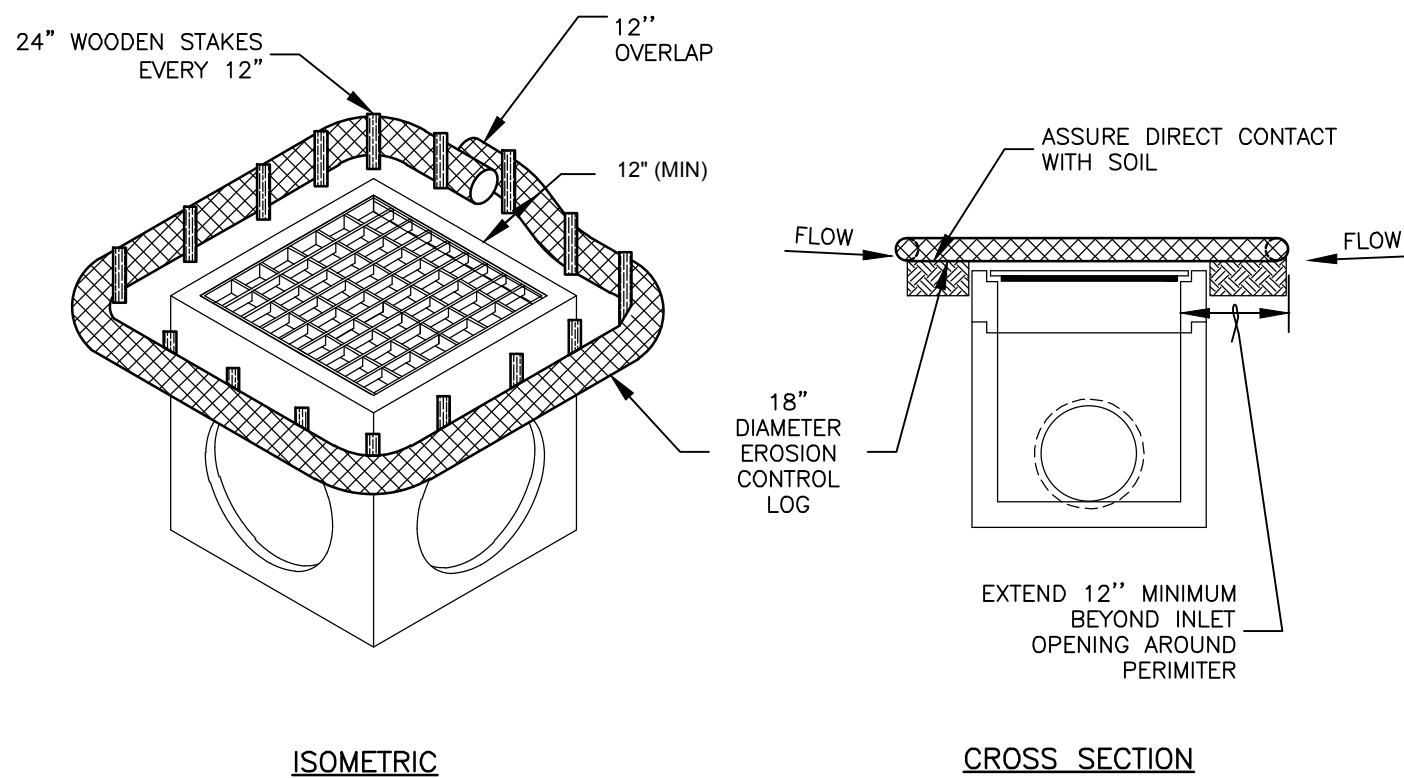
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS APPROVED 03-25-11 DATE THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)	CITY OF ROUND ROCK CURB INLET PROTECTION DETAIL	DRAWING NO: EC-14 
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NOTES:

1. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTH REACHES 2".
2. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND IMMEDIATELY CLEAN THE INLET PROTECTION IF EXCESSIVE PONDING OCCURS.
3. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

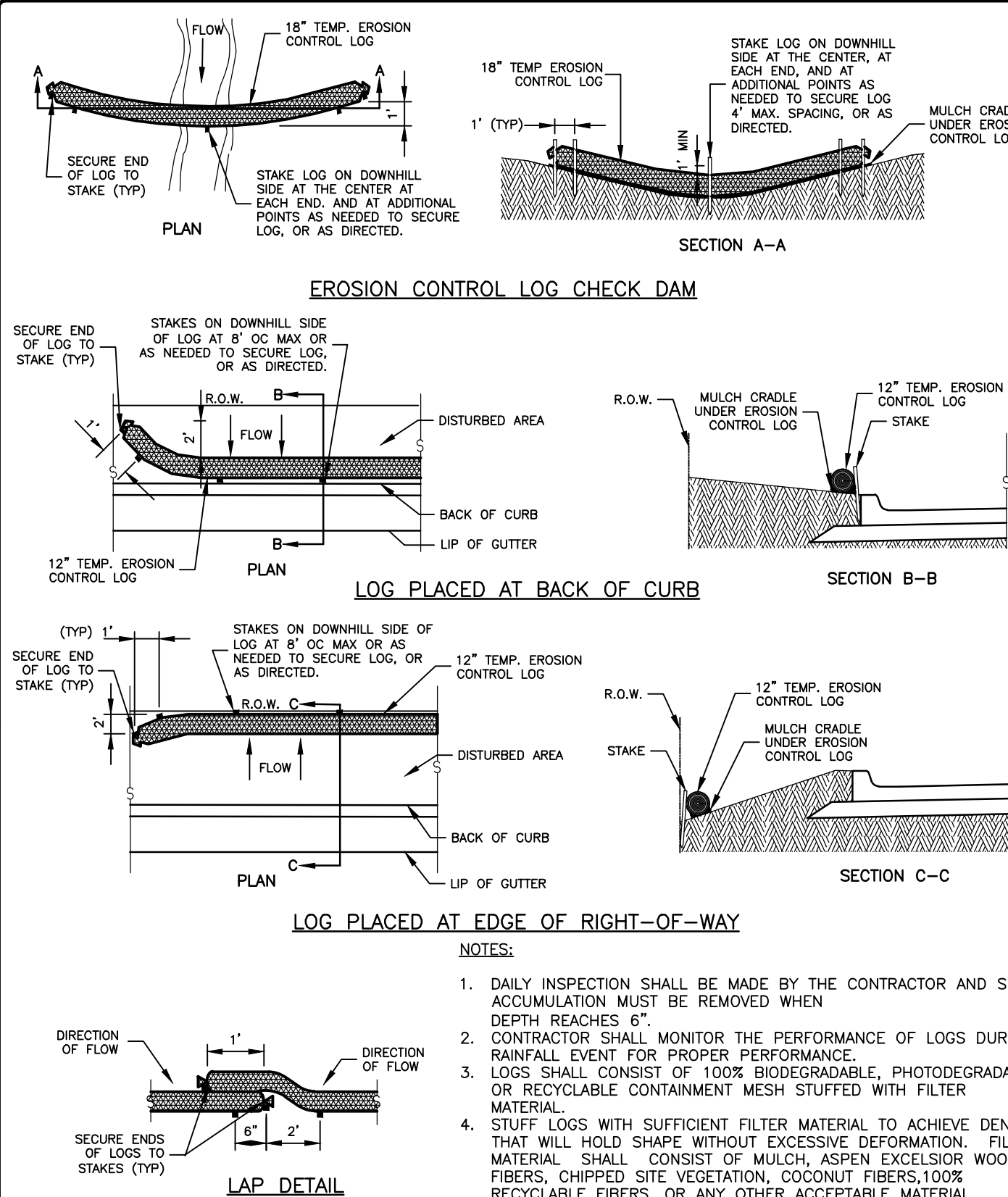
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO. EC-15
APPROVED 03-25-11 DATE		 CITY OF ROUND ROCK TEXAS "Small Town Spirit"
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)	AREA INLET PROTECTION DETAIL	



NOTES

1. EROSION CONTROL LOG CONTAINMENT MESH SHALL BE 100% BIODEGRADABLE, PHOTODEGRADABLE, OR RECYCLABLE; AND FILL MATERIAL SHALL CONSIST OF MULCH, ASPEN EXCLOSIFIBERS, CHIPPED SITE VEGETATION, COCONUT FIBERS, 100% RECYCLABLE FIBERS, OR ANY OTHER ACCEPTABLE MATERIAL EXCLUDING STRAW AND HAY.
2. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN THE DEPTH IS 6" OR MORE.
3. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF INLET PROTECTION DURING EACH RAINFALL EVENT AND IMMEDIATELY CLEAN THE INLET PROTECTION IF EXCESSIVE PONDING OCCURS.
4. INLET PROTECTIONS SHALL BE REMOVED AS SOON AS THE SOURCE OF SEDIMENT IS STABILIZED.

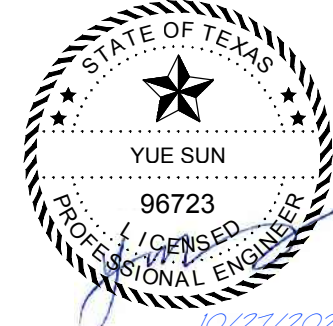
RECORD SIGNED COPY ON FILE AT PUBLIC WORKS APPROVED 03-25-11 DATE THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO BE REPRODUCED)	CITY OF ROUND ROCK AREA INLET PROTECTION WITH EROSION CONTROL LOG DETAIL	DRAWING NO. EC-16 
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NOTES:

1. DAILY INSPECTION SHALL BE MADE BY THE CONTRACTOR AND SILT ACCUMULATION MUST BE REMOVED WHEN DEPTHS REACH 6".
2. CONTRACTOR SHALL MONITOR THE PERFORMANCE OF LOGS DURING RAINFALL EVENT FOR PROPER PERFORMANCE.
3. LOGS SHALL CONSIST OF 100% BIODEGRADABLE, PHOTODEGRADABLE OR RECYCLABLE CONTAINMENT MESH STUFFED WITH FILTER MATERIAL.
4. STUFF LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE DENSITIES THAT WILL HOLD SHAPE WITHOUT EXCESSIVE DEFORMATION. FILTER MATERIAL SHALL BE A MINIMUM OF 1/2" DRAIN EXCLUDER WOOD FIBERS, CHIPPED SILET VEGETATION, COCONUT FIBERS, 100% RECYCLABLE FIBERS, OR ANY OTHER ACCEPTABLE MATERIAL, EXCLUDING STRAW AND HAY.
5. STAPLES SHALL BE 1/2" DRAIN WOOD, 4" LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG OR AS DIRECTED.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS	CITY OF ROUND ROCK	DRAWING NO. EC-17
APPROVED  03-25-11  DATE		 ROUND ROCK, TEXAS FORM 1001-001
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)	EROSION CONTROL LOG DETAIL	






## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

CIVIL  
EROSION AND SEDIMENTATION  
CONTROL DETAILS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED	<u>X. YI</u>
DRAWN	<u>J. GIBSON</u>
CHECKED	<u>Y. SUN</u>
REVIEWED	<u>Y. SUN</u>

Seq. of  
XX XXX

Dwg. No.	C-5
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2023-0002-00



## **GENERAL CONDITIONS**

- ## DESIGN CRITERIA

1.	2015 INTERNATIONAL BUILDING CODE (IBC)	
2.	REINFORCED CONCRETE:	
	WATER RETAINING ENVIRONMENTAL STRUCTURES: ACI 350-06 "CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES"	
	ALL OTHER STRUCTURES: ACI 318-14 "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"	
3.	STRUCTURAL STEEL: AISC MANUAL OF STEEL CONSTRUCTION 14TH EDITION	
4.	ALUMINUM: ADM1-2015, ALUMINUM DESIGN MANUAL	
6.	LIVE LOADS:	
	-PROCESS RELATED STRUCTURES:	
	WALKWAYS, STAIRWAYS AND LANDINGS:	100 PSF
	ELEVATED SLABS AT PROCESS AREAS:	200 PSF
	SLABS ON GRADE	300 PSF
7.	WIND DESIGN CRITERIA: (ASCE 7, 2010)	
	RISK CATEGORY	IV
	ULTIMATE DESIGN WIND SPEED, $V_{ULT}$	119 MPH
	NOMINAL DESIGN WIND SPEED, $V_{ASD}$	90 MPH
	EXPOSURE CATEGORY	C
8.	SEISMIC DESIGN CRITERIA:	
	SITE CLASS	B
	SHORT PERIOD MCE SPECTRAL	
	RESPONSE ACCELERATION, $S_S$	0.062
	1-SECOND PERIOD MCE SPECTRAL	
	RESPONSE ACCELERATIONS, $S_1$	0.035
	SEISMIC DESIGN CATEGORY	A
	DESIGN SHORT PERIOD MCE SPECTRAL	
	RESPONSE ACCELERATION, $S_{0S}$	0.042
	DESIGN 1-SECOND PERIOD MCE SPECTRAL	
	RESPONSE ACCELERATION, $S_{01}$	0.023

## CONCRETE (CAST-IN-PLACE)

- ## REINFORCING STEEL

1. REINFORCEMENT SHALL CONFORM TO ASTM A615, GRADE 60 REQUIREMENTS. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A315 REQUIREMENTS. ALL ACCESSORIES SHALL BE IN CONFORMANCE WITH ACI 315 REQUIREMENTS.
2. REINFORCING STEEL SHALL HAVE THE FOLLOWING CLEAR COVER UNLESS OTHERWISE NOTED:
  - a. CONCRETE CAST AGAINST EARTH 3"
  - b. FORMED SURFACE IN CONTACT WITH SOIL, SEWAGE, WATER OR EXPOSED TO WEATHER 2"
3. LAP SPLICES SHALL BE AS SHOWN ON THE DRAWINGS. FOR LAP SPLICES NOT SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN ENGINEERS APPROVAL.
4. THE CONTRACTOR SHALL PREPARE PLACING DRAWINGS AND SCHEDULES IN CONFORMANCE WITH ACI 315 REQUIREMENTS.

1. ALUMINUM DESIGN, DETAILING, FABRICATION, AND ERECTION SHALL CONFORM TO THE LATEST EDITION OF THE ALUMINUM DESIGN MANUAL.
2. ALUMINUM IN CONTACT WITH OR EMBEDDED IN CONCRETE OR MASONRY SURFACES SHALL BE COATED WITH A HEAVY COATING OF ALKALI RESISTANCE BITUMINOUS PAINT.
3. ALL BOLTS USED IN CONNECTIONS WITH ALUMINUM MEMBERS SHALL BE STAINLESS STEEL A316, UNLESS NOTED OTHERWISE.
4. ALL WELDING OF ALUMINUM STRUCTURES SHALL CONFORM TO "STRUCTURAL WELDING CODE - ALUMINUM", AWS D1.2, LATEST EDITION.

## STAINLESS STEEL

1. STAINLESS STEEL PLATES, SHEETS AND STRUCTURAL SHAPES SHALL BE IN ACCORDANCE TO ASTM A240.
2. STAINLESS STEEL MATERIALS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:
  - a. EXTERIOR AND SUBMERGED USE: TYPE 316, TYPE 316L (WHERE WELDED)
3. ALL WELDING OF STRUCTURAL STAINLESS STEEL SHALL CONFORM TO "STRUCTURAL WELDING CODE - STAINLESS STEEL", AWS D1.6, LATEST EDITION.
4. STAINLESS STEEL BOLTS, NUTS AND WASHERS SHALL BE TYPE 316 IN ACCORDANCE TO ASTM F593 UNLESS NOTED OTHERWISE.











## FOUNDATIONS

1. GEOTECHNICAL REPORT "BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS" PREPARED BY BALCONES GEOTECHNICAL, REPORT NUMBER 0122-049, DATED MARCH 27, 2023. ANY INTERPRETATION OF THE CONTENTS OF THE GEOTECHNICAL REPORT IS THE RESPONSIBILITY OF THE CONTRACTOR.

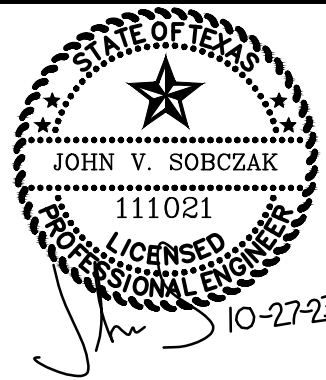
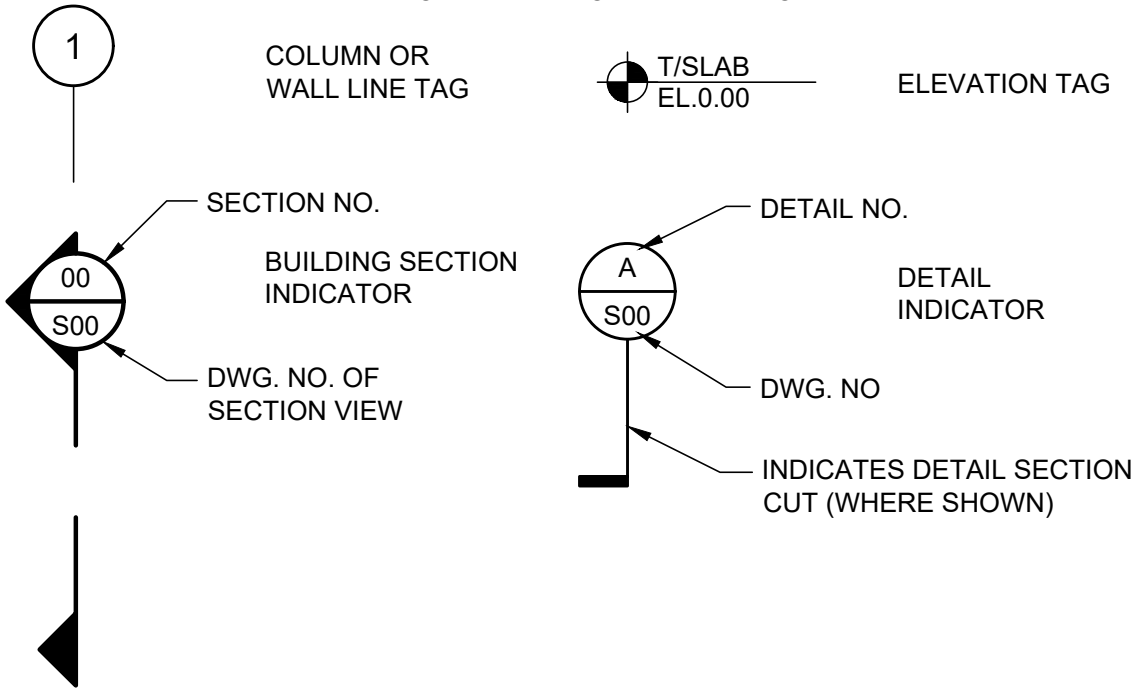
STRUCTURAL LEGEND APPLIES TO "S" SHEETS ONLY

@	AND	FG	FINISHED GRADE	FOOT
AT	AT	FT	FOOT	PROJ
#	NUMBER	FTG	FOOTING	PSF
ADDTL	ADDITIONAL	FV	FIELD VERIFY	FOOT
ALUM	ALUMINUM	GA	GAGE	PSI
BLD	BUILDING	GALV	GALVANIZED	POUNDS PER SQUARE
BM	BEAM	HK	HOOK	INCH
BOT	BOTTOM	HORIZ	HORIZONTAL	PVC
CIP	CAST-IN-PLACE	HP	HIGH POINT	R
CJ	CONTROL JOINT	ID	INSIDE DIAMETER	REINF
CL	CENTER LINE	JT	JOINT	REQD
CLR	CLEAR	LB(S)	POUND(S)	SCHED
COL	COLUMN	LONG	LONGITUDINAL	SCHEDULE(D)
CONC	CONCRETE	LP	LOW POINT	SIM
CONN	CONNECTION	MANUF	MANUFACTURER	SJ
CONST JT	CONSTRUCTION JOINT	MATL	MATERIAL	SMS
CONT	CONTINUOUS	MAX	MAXIMUM	SMS
DIA	DIAMETER	MECH	MECHANICAL	SQ
DEG	DEGREE(S)	MFR	MANUFACTURER	SS
DWG	DRAWING	MIN	MINIMUM	STD
DWL	DOWEL(S)	MISC	MISCELLANEOUS	STL
(E)	EXISTING	MTL	METAL	STEEL
EA	EACH	NO	NUMBER	T/
EF	EACH FACE	NTS	NOT TO SCALE	T&B
EJ	EXPANSION JOINT	OC	ON CENTER	THK
EL	ELEVATION	OD	OUTSIDE DIAMETER	THRU
ELEC	ELECTRICAL	OH	OPPOSITE HAND	TOC
EMBED	EMBEDMENT	OPNG	OPENING	TOS
EQ	EQUAL	PCS	PIECES	TYP
EW	EACH WAY	PERP	PERPENDICULAR	UNO
EXIST	EXISTING	PL	PLATE	OTHERWISE
EXP	EXPANSION	PLF	POUND PER LINEAR	VERT
				WT
				WFW
				WEIGHT
				WELED WIRE FABRIC

STRUCTURAL LEGEND APPLIES TO "S" SHEETS ONLY

	EARTH FILL		CONCRETE
	UNDISTURBED EARTH		EXISTING CONCRETE
	COMPACTED GRANULAR FILL		DEMOLITION
	GROUT OR SAND (AS NOTED)		STEEL
	GRATING		PRECAST CONCRETE

SYMBOLS APPLY TO "S" SHEETS ONLY






3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-100



711 N. Orange Ave, Suite A  
Winter Park, FL 32789  
Ph: 321.972.4989  
TBPE Firm Registration No. F-18930



ROUND ROCK, TEXAS  
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

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STRUCTURAL  
GENERAL STRUCTURAL NOTES,  
ABBREVIATIONS, SYMBOLS AND  
DETAILS

VERIFY SCALE

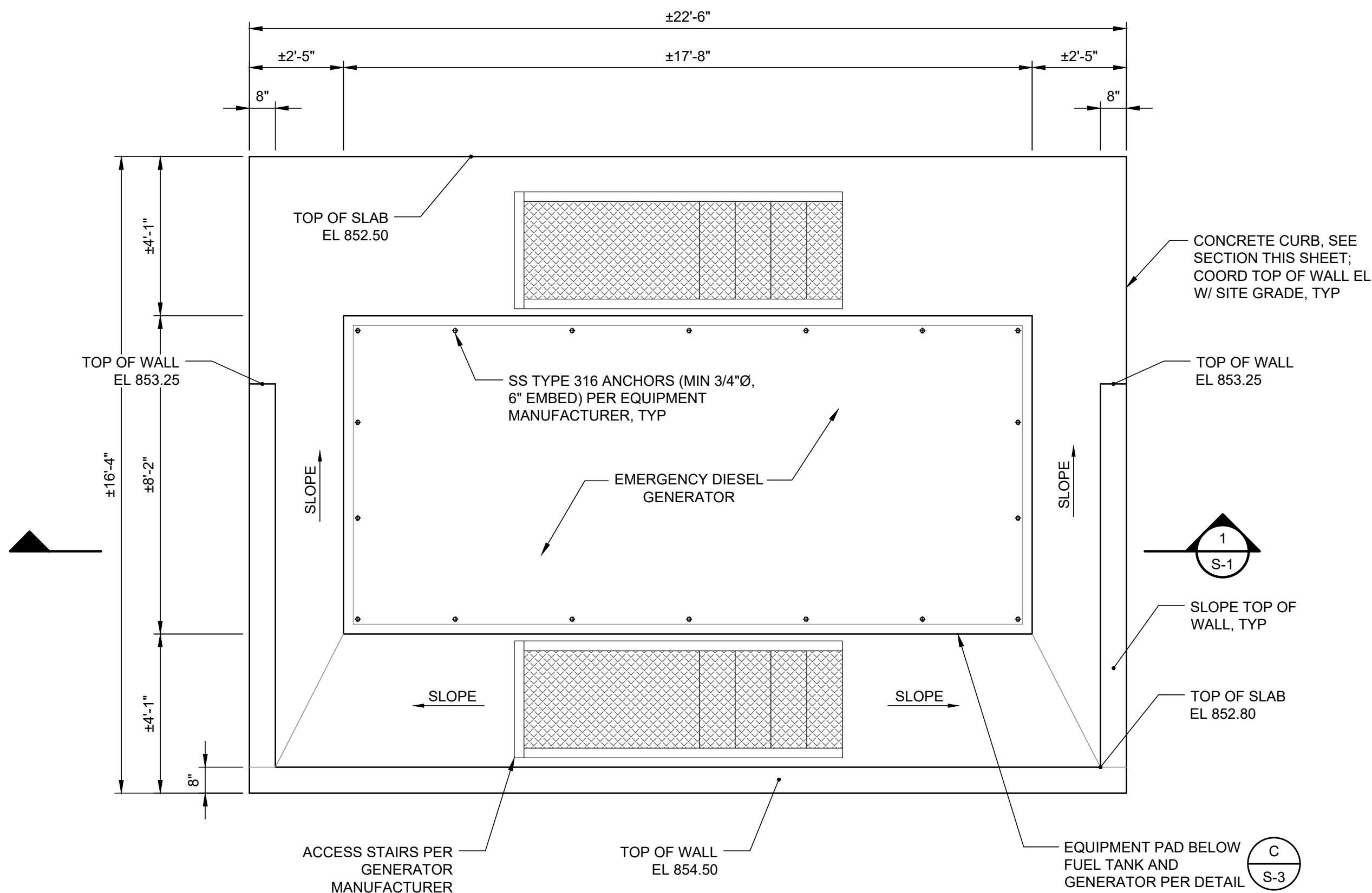
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DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED	JVS
DRAWN	JAM
CHECKED	DSM
REVIEWED	

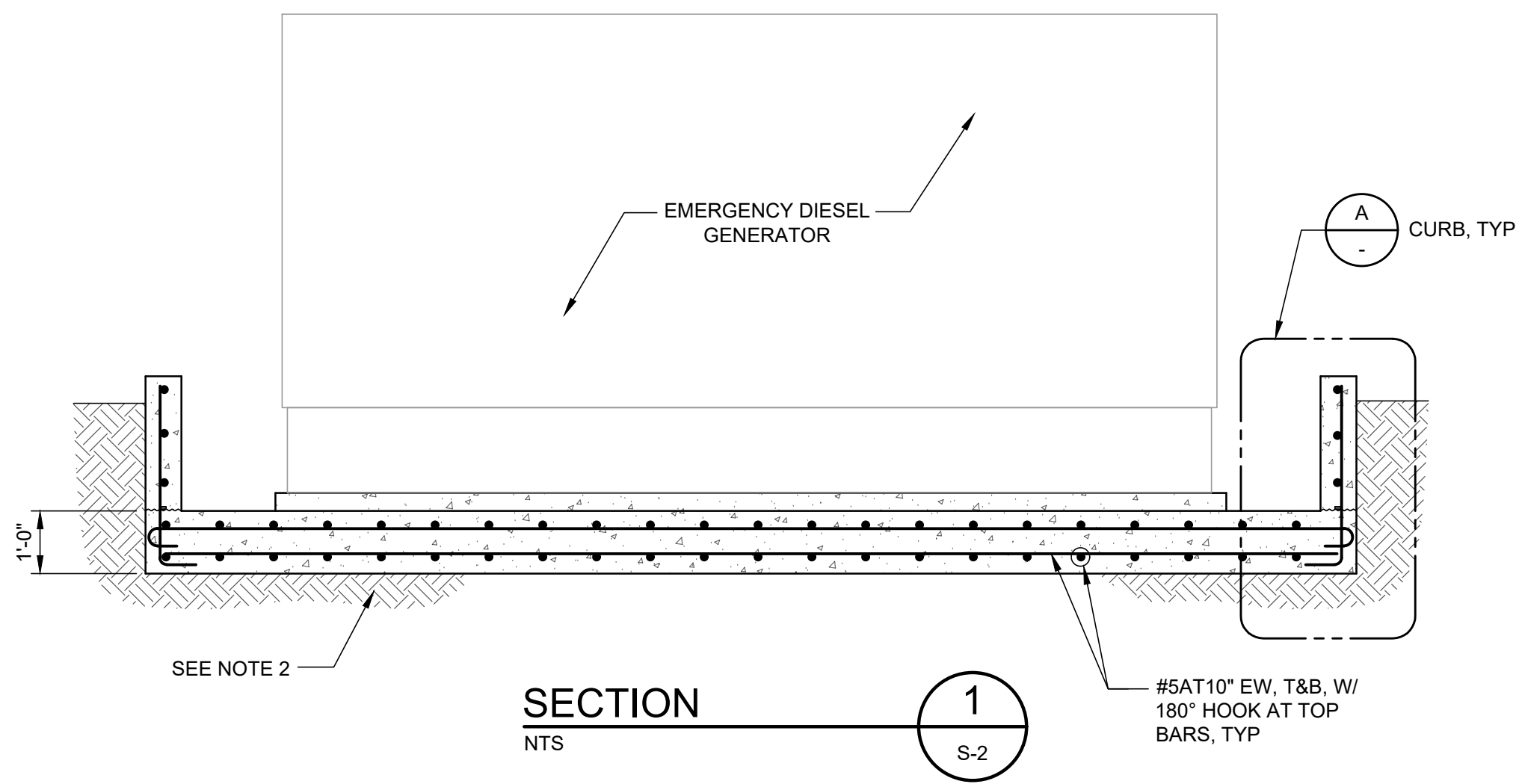
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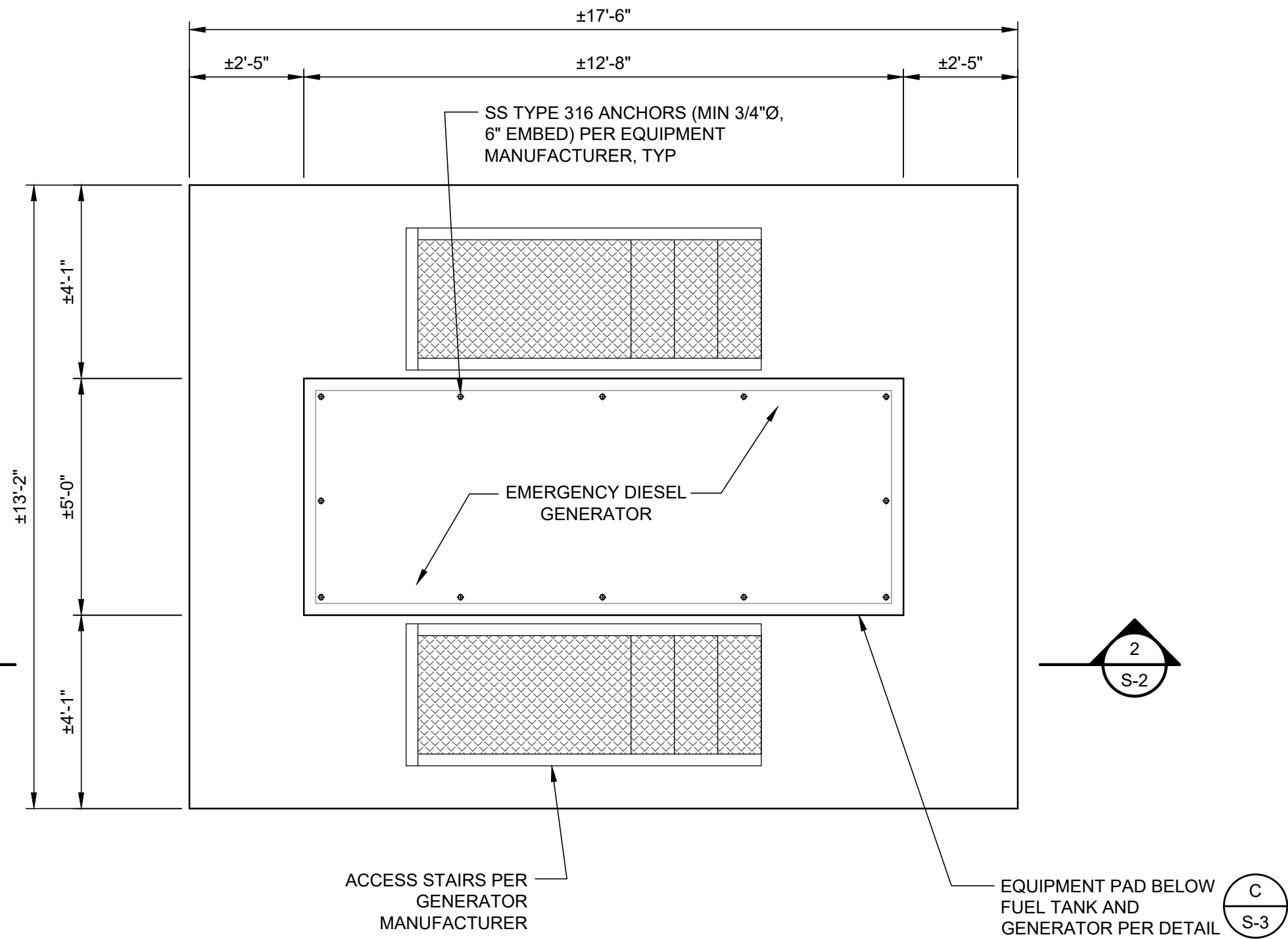
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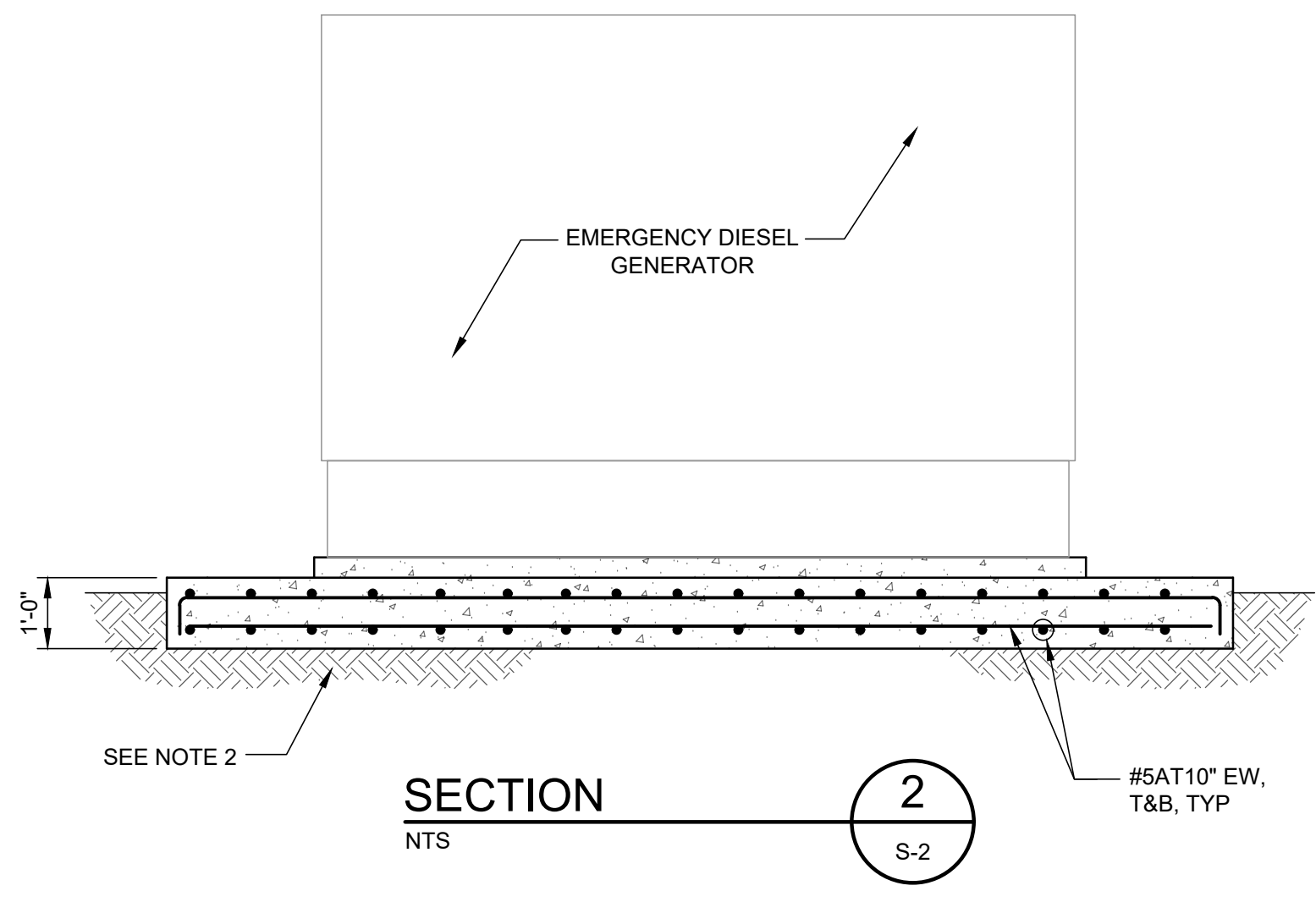
RAW WATER INTAKE GENERATOR FOUNDATION  
PLAN  
NTS



SECTION  
NTS



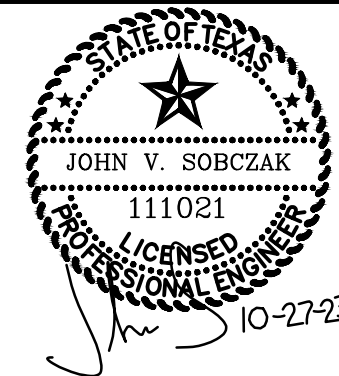
WELLS #3 & #5 GENERATOR FOUNDATION  
PLAN  
NTS



SECTION  
NTS

NOTES:

1. THE CONTRACTOR SHALL COORDINATE ANY SLAB PENETRATION OR OPENINGS REQUIRED WITH THE EQUIPMENT MANUFACTURER DURING SHOP DRAWING REVIEW. PROVIDE ADDITIONAL REINFORCEMENT AT PENETRATIONS OR OPENINGS IN ACCORDANCE WITH THE PROJECT STANDARD DETAILS.
2. CONTRACTOR SHALL REMOVE ALL EXISTING FAT CLAYEY SOIL BELOW PROPOSED FOUNDATIONS TO A DEPTH OF 5FT AND BACKFILL AND COMPACT WITH SELECT FILL. SEE THE GEOTECHNICAL REPORT FOR SELECT FILL DEFINITION, COMPACTION AND PREPARATION REQUIREMENTS.
3. CONTRACTOR SHALL SLOPE ALL SLABS TO PROVIDE POSITIVE DRAINAGE.



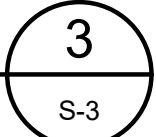
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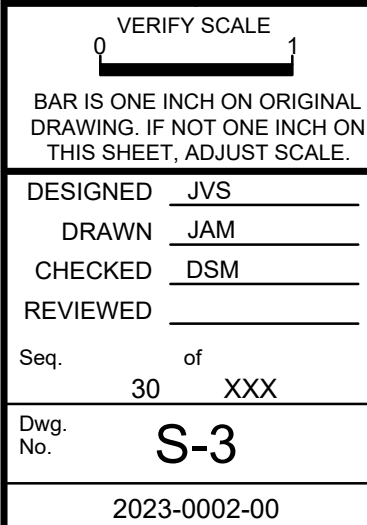
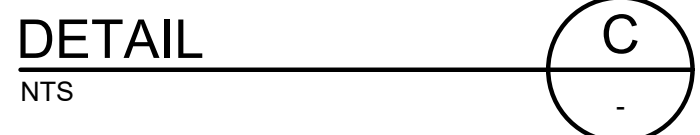
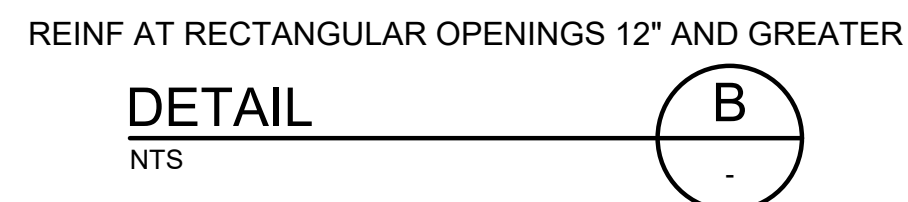
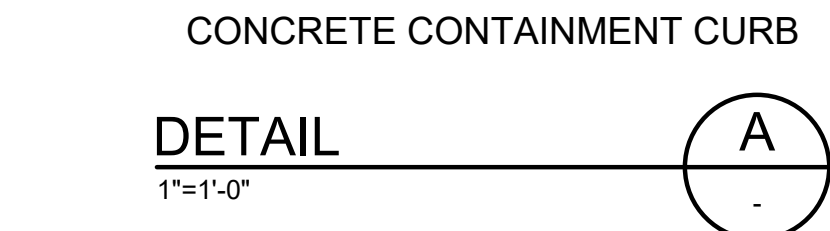
ROUND ROCK, TEXAS  
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
STRUCTURAL  
GENERATOR FOUNDATION PLANS AND  
SECTIONS

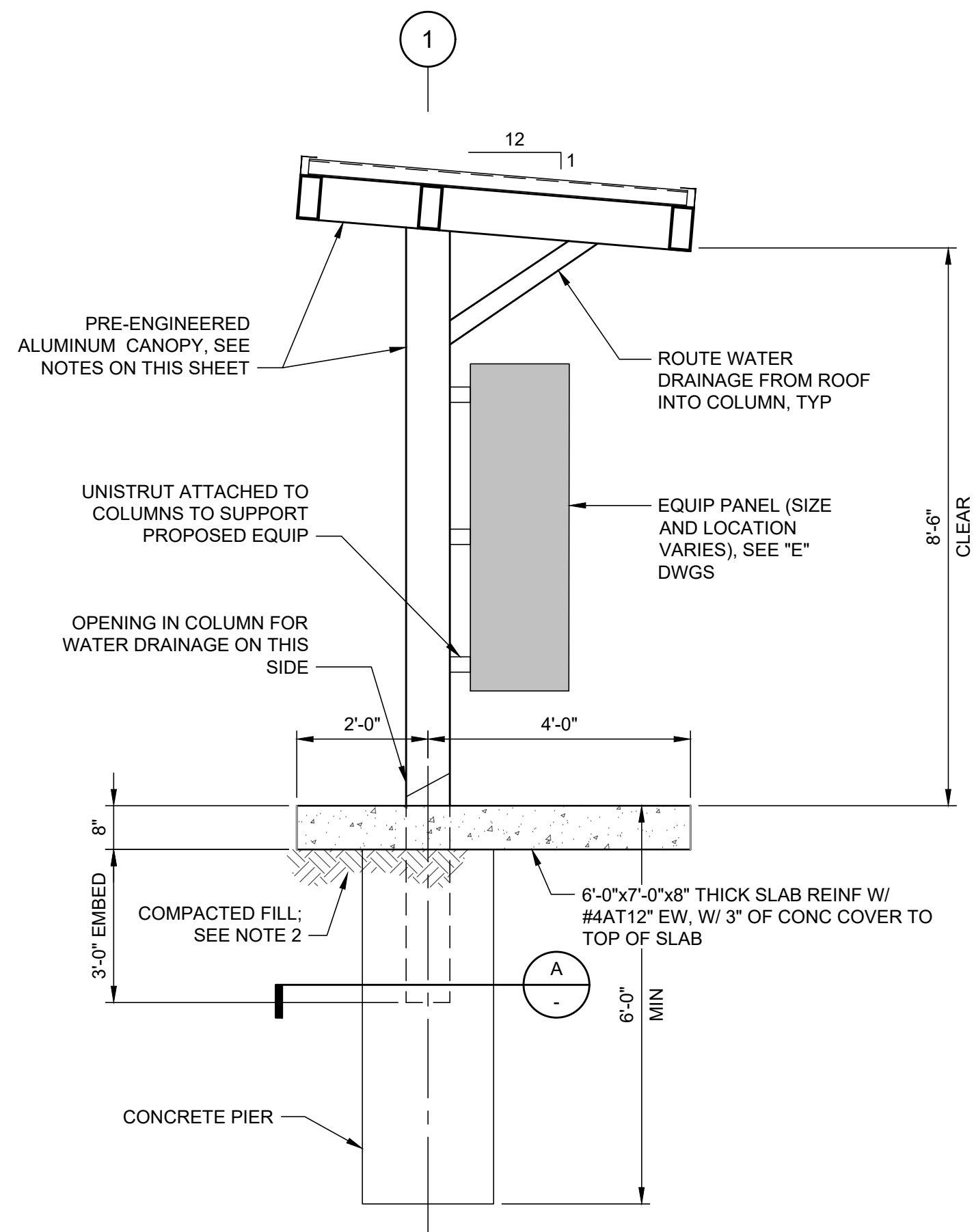
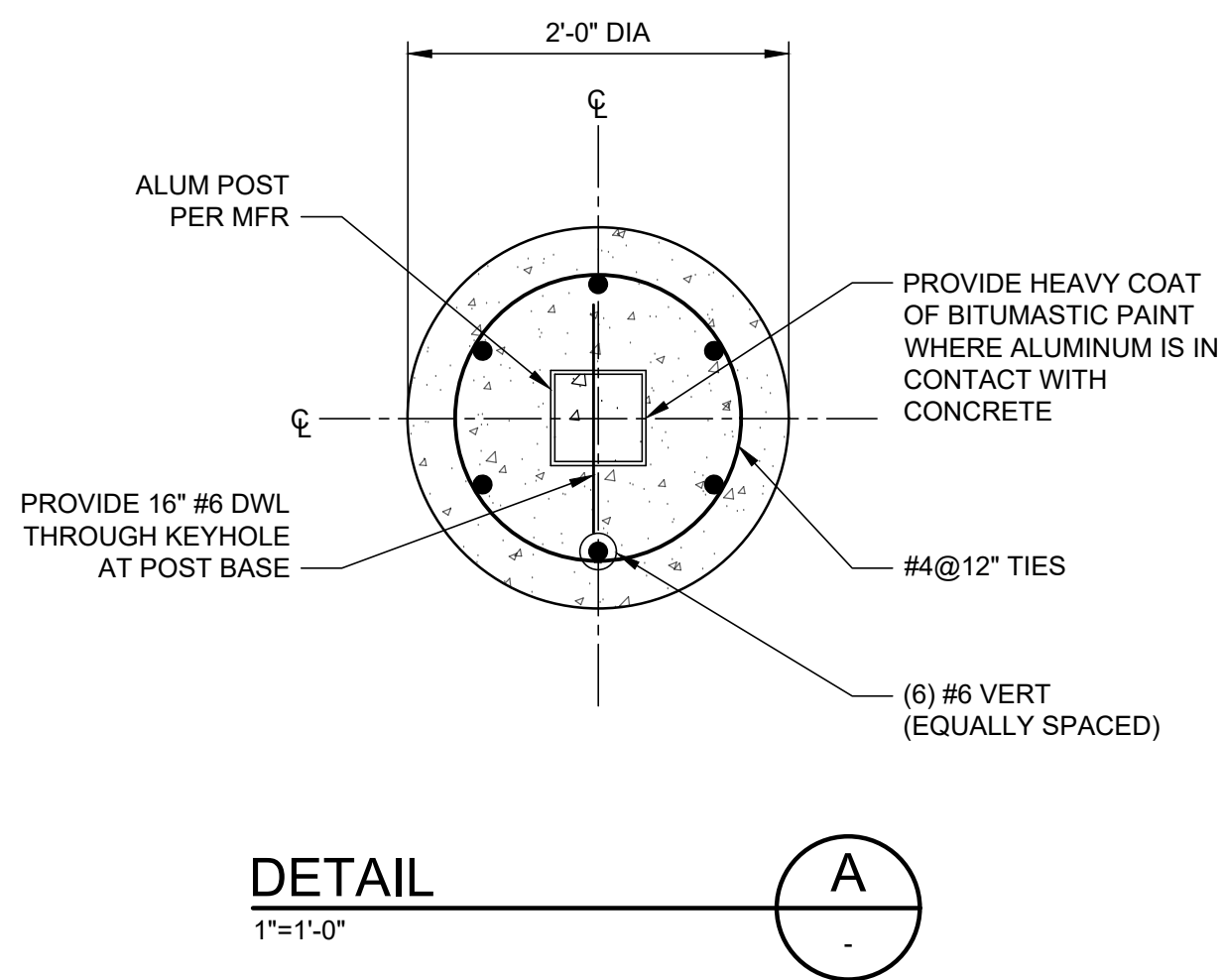
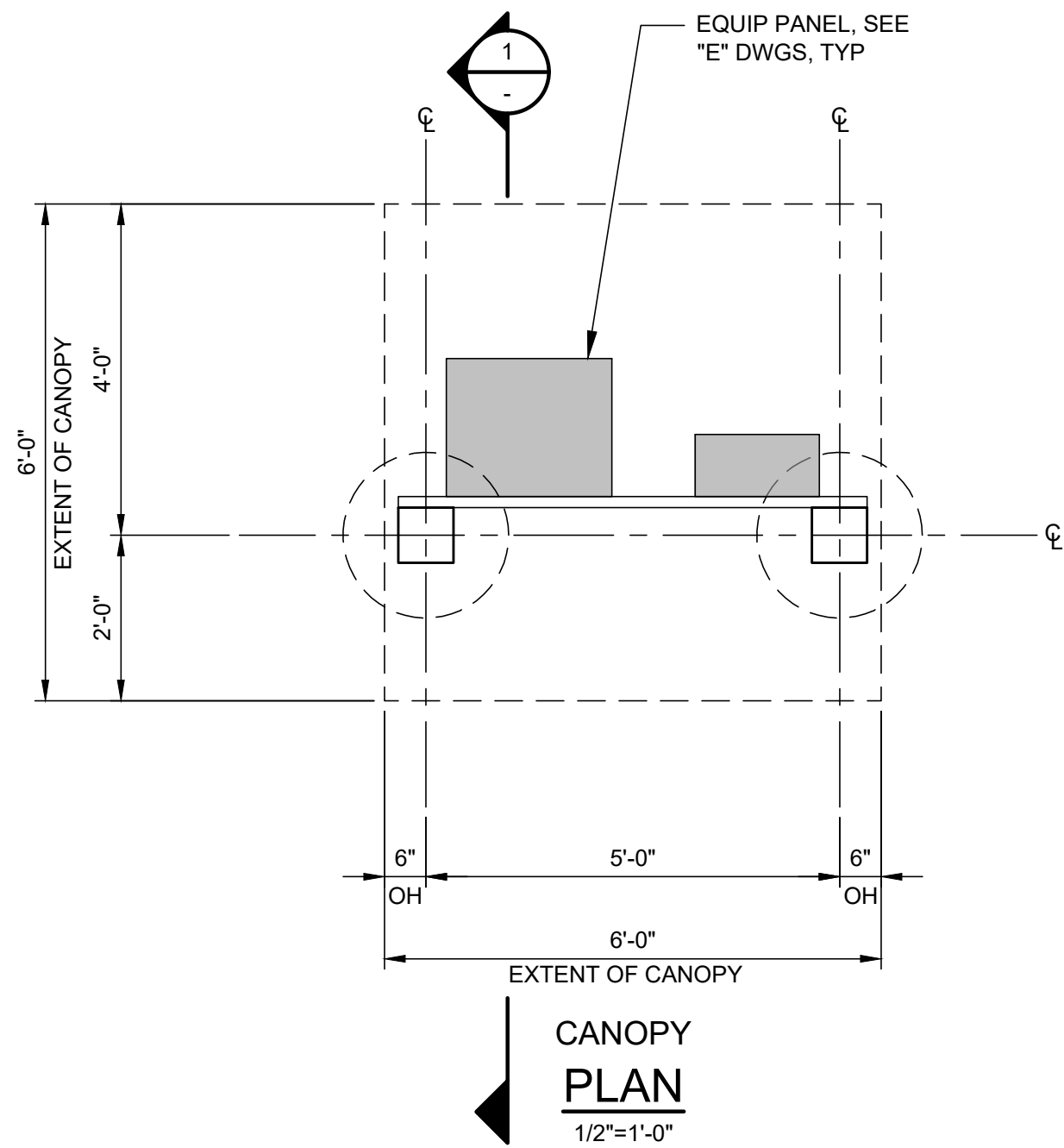
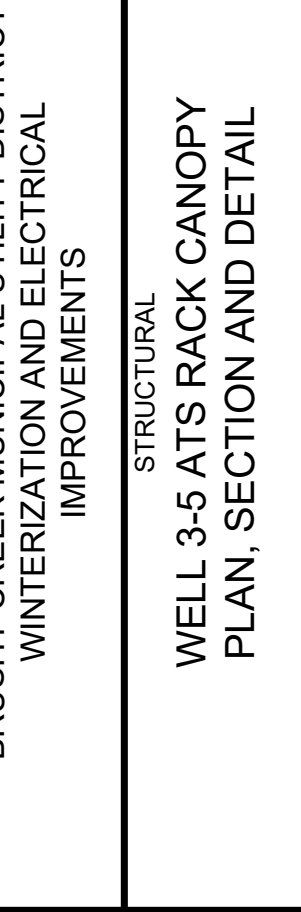
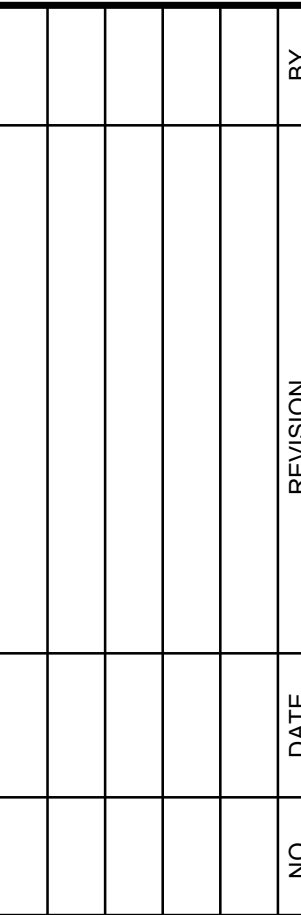
DESIGNED	JVS
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Seq.	29 of XXX
Dwg. No.	S-2
2023-0002-00	





1. THE CONTRACTOR SHALL COORDINATE ANY SLAB PENETRATION OR OPENINGS REQUIRED WITH THE EQUIPMENT MANUFACTURER DURING SHOP DRAWING REVIEW. PROVIDE ADDITIONAL REINFORCEMENT AT PENETRATIONS OR OPENINGS IN ACCORDANCE WITH THE PROJECT STANDARD DETAILS.
2. CONTRACTOR SHALL REMOVE ALL EXISTING FAT CLAYEY SOIL BELOW PROPOSED FOUNDATIONS TO A DEPTH OF 5FT AND BACKFILL AND COMPACT WITH SELECT FILL. SEE THE GEOTECHNICAL REPORT FOR SELECT FILL DEFINITION, COMPACTION AND PREPARATION REQUIREMENTS.





**NOTES:**

1. COORDINATE WITH THE "C" SHEETS ON LOCATION AND ORIENTATION OF THE PROPOSED CANOPY. COORDINATE WITH THE "E" SHEETS REGARDING PROPOSED EQUIPMENT.
2. CONTRACTOR SHALL REMOVE ALL EXISTING FAT CLAYEY SOIL BELOW PROPOSED FOUNDATIONS TO A DEPTH OF 5FT AND BACKFILL AND COMPACT WITH SELECT FILL. SEE THE GEOTECHNICAL REPORT FOR SELECT FILL DEFINITION, COMPACTION AND PREPARATION REQUIREMENTS.

## **PRE-ENGINEERED ALUMINUM CANOPY**

GENERAL:

FURNISH ALL LABOR, MATERIALS, EQUIPMENT AND INCIDENTALS REQUIRED TO DESIGN, FABRICATE, DELIVER TO JOB SITE AND ERECT THE PRE-ENGINEERED CANOPY AS NOTED AND SHOWN ON THE DRAWINGS.

THE PRE-ENGINEERED CANOPY SHALL CONSIST OF A ROOF DECK, POSTS, BASE PLATES, GUTTERS, DOWNSPOUTS, BEAMS, FLASHING, AND OTHER MISCELLANEOUS FRAMING. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL PLAN DIMENSIONS WITH PRE-ENGINEERED CANOPY DIMENSIONS AND RESOLVING DIMENSIONS AND SPACIAL CONFLICTS WITH EXISTING OR PROPOSED PIPING, GUARDRAIL, FENCING AND EQUIPMENT PRIOR TO SECURING MATERIALS.

## DESIGN AND FABRICATION REQUIREMENTS

DESIGN, FABRICATION, MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH LATEST ALUMINUM DESIGN MANUAL, ERECT CANOPY IN ACCORDANCE WITH MANUFACTURER'S INSTALLATIONS INSTRUCTIONS.

CANOPY SHALL BE DESIGNED BY A STATE OF TEXAS REGISTERED ENGINEER RETAINED BY THE MANUFACTURER IN COMPLIANCE WITH BUILDING CODE REQUIREMENTS AND FOR WIND SPEED AS SPECIFIED ON THIS SHEET. DETAILED SIGNED AND SEALED SHOP DRAWINGS SHALL BE SUBMITTED FOR ENGINEERS REVIEW. DEFLECTION SHALL BE LIMITED TO L/180 FOR ROOF MEMBERS (WIND OR LIVE). LATERAL DRIFT SHALL BE LIMITED TO H/60 (WIND) . DESIGN AND DETAIL STRUCTURE FOR THERMAL EXPANSION AND CONTRACTION.

SPECIALTY ENGINEER TO PREPARE COMPLETE STRUCTURAL DESIGN CALCULATIONS FOR CANOPY MEMBERS. PROVIDE REACTIONS AS REQUIRED TO CONFIRM FOUNDATION DESIGN BY THE ENGINEER OF RECORD.

THE FABRICATOR SHALL DESIGN AND DETAIL ALL PARTS OF CONNECTIONS NOT FULLY DETAILED ON THE DESIGN DRAWINGS. THE NUMBER OF FASTENERS AND OTHER SIMILAR ELEMENTS WHEN SHOWN ON THE DRAWINGS ARE PICTORIAL ONLY.

ALL WELDING TO BE DONE BY HELI-ARC PROCESS.

USE SECTIONS TRUE TO DETAILS WITH CLEAN, STRAIGHT, SHARPLY DEFINED PROFILES AND SMOOTH SURFACES OF UNIFORM COLOR AND TEXTURES, FREE FROM DEFECTS IMPAIRING STRENGTH AND DURABILITY.

METAL ROOF SHALL BE FORMED OR EXTRUDED ALUMINUM SHAPES, INTERLOCKING SELF-FLASHING SECTIONS. SHOP FABRICATE TO LENGTHS AND PANEL WIDTHS REQUIRED FOR FIELD ASSEMBLY. DEPTH OF SECTION TO COMPLY WITH STRUCTURAL REQUIREMENTS.

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.

NUMBER CODE COMPONENTS FOR EASE OF FIELD INSTALLATION.

SUBMIT COLOR CHARTS OF COLORS AVAILABLE FOR POST, TRIM, AND ROOF PANELS, HOWEVER, CONTRACTOR TO INCLUDE THE COST TO CUSTOM COLOR MATCH OWNERS' PREFERRED COLOR.

MATERIALS:

- ALUMINUM EXTRUSIONS: 6063 ALLOY, T-6 TEMPER
- DECK SCREWS: NO. 14x1 INCH (25MM), SELF-TAPPING, TYPE 18-8 STAINLESS STEEL WITH NEOPRENE WASHER.
- TRIM SCREWS: NO. 10x1/2 INCH (13MM), SELF-TAPPING, TYPE 18-8 STAINLESS STEEL.
- RIVETS TO BE SIZE 3/16" BY 1/2" GRIP RANGE ALUMINUM RIVETS WITH ALUMINUM MANDREL.
- OTHER FASTENERS: TYPE 18-8 STAINLESS STEEL, FASTENER TYPE AS RECOMMENDED BY MANUFACTURER FOR SPECIFIC CONDITIONS.
- ALL BOLTS, NUTS AND WASHERS TO BE 18-8 NON-MAGNETIC STAINLESS STEEL.
- TEK SCREWS WILL NOT BE PERMITTED

FINISH:

1. FINISH DESIGNATION PREFIXED BY 'AA' COMPLY WITH SYSTEM ESTABLISHED BY THE ALUMINUM ASSOCIATION FOR DESIGNATION ALUMINUM FINISHES.
2. MECHANICAL FINISH: AA-M12 (MECHANICAL FINISH: NONSPECULAR AS FABRICATED)
3. CLASS I, CLEAR ANODIC FINISH: AA-M12C22A41 (MECHANICAL FINISH, NONSPECULAR AS FABRICATED; CHEMICAL FINISH: ETCHED, MEDIUM MATTE; ANODIC COATING: ARCHITECTURAL CLASS I, CLEAR COATING 0.018MM OR THICKER) COMPLYING WITH AAMA 607.1.

INSTALLATION:

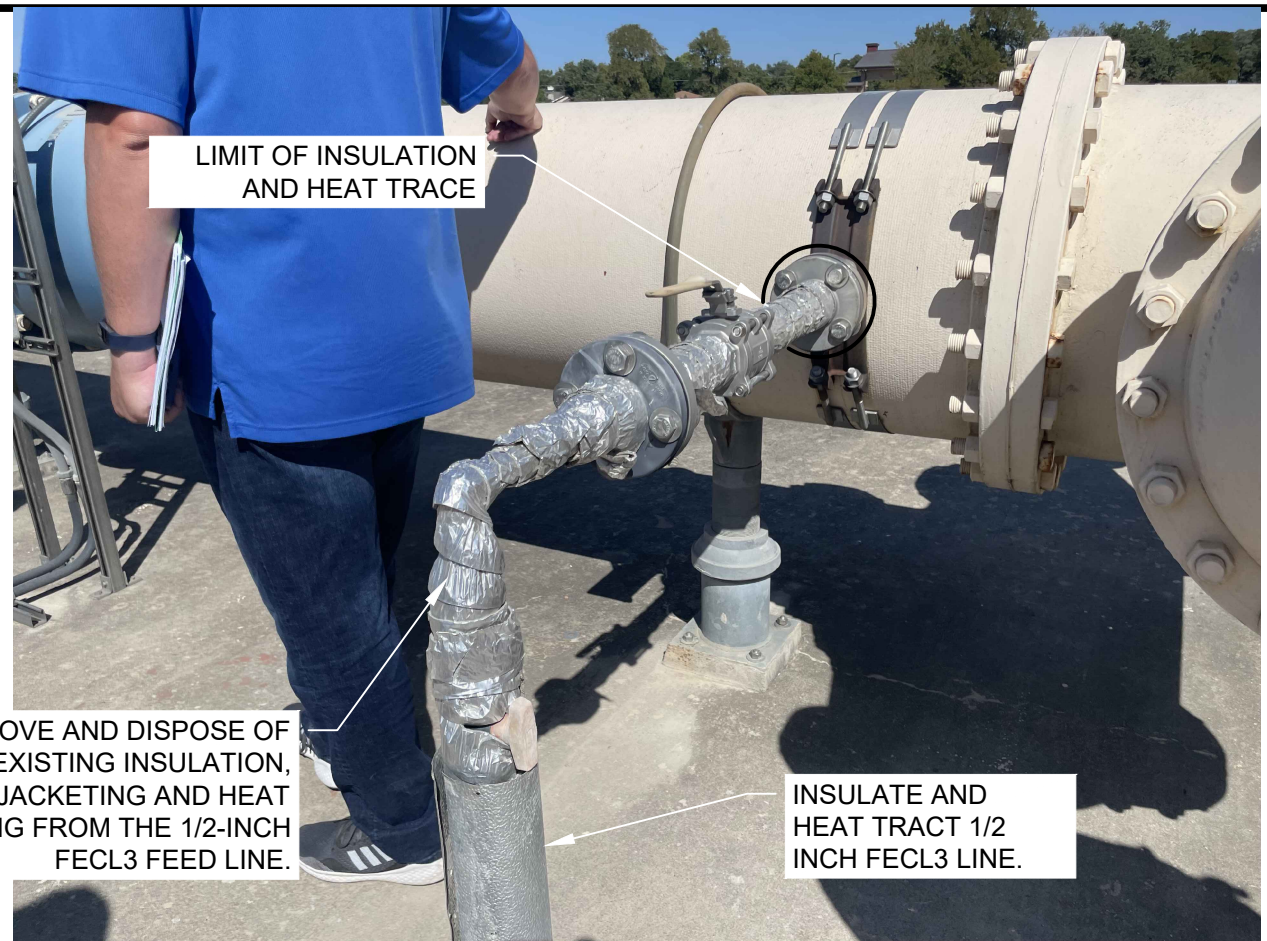
1. WHERE METAL SURFACES COME IN CONTACT WITH NON-COMPATIBLE METALS, KEEP SURFACES FROM DIRECT CONTACT BY USE OF A PERMANENT, NON-DETERIORATING ISOLATION MATERIAL.
2. SET SUPPORTING FRAMES AND STRUCTURAL ELEMENTS TO REQUIRED ELEVATIONS, PROPERLY ALIGNED, PLUMB AND LEVEL.
3. INSTALL CANOPY ROOF SECTIONS, ACCESSORIES, AND RELATED FLASHINGS WATERTIGHT. PROVIDE ROOF SLOPE FOR RAIN DRAINAGE WITHOUT POUNDING WATER. ALIGN AND ANCHOR ROOFING TO STRUCTURAL SUPPORT MEMBERS.

WARRANTY:

MANUFACTURER SHALL WARRANT THE ENTIRE SYSTEM AGAINST DEFECTS IN LABOR AND MATERIALS FOR A PERIOD OF 2 YEARS COMMENCING ON THE DATE OF SUBSTANTIAL COMPLETION. THIS WARRANTY REQUIRES THE MANUFACTURER TO DO ALL THAT IS NECESSARY TO EFFECTIVELY CORRECT ANY DEFICIENCIES IN A TIMELY MANNER AT NO EXPENSE TO THE OWNER.



1. EXPOSED WATER PROCESS LINE, PUMP PIPE HEADER, VALVES AND INSTRUMENTS AS INDICATED ON THE DRAWING SHALL BE INSULATED PER SPECIFICATION 40 42 13- PROCESS PIPING INSULATION. INSULATION AND JACKETING SHALL BE OVERSIZED AT ALL FLANGED FITTINGS AND FLANGE JOINTS.
2. EXPOSED WATER PROCESS LINE, PUMP PIPE HEADER, VALVES AND INSTRUMENTS AS INDICATED IN THE DRAWING SHALL BE HEAT TRACED PER SPECIFICATION 40 41 13.13 - PROCESS PIPING ELECTRICAL RESISTANCE AND HEAT TRACING. REFER TO DRAWINGS E-18.
3. EXPOSED SAMPLE LINES AND CHEMICAL LINES SHALL BE INSULATED AND HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
4. INSULATION AND HEAT TRACE LENGTHS ARE APPROXIMATE. CONTRACT TO FIELD VERIFY FOR FINAL DIMENSION.
5. EXISTING PIPING LAYOUT AND ELEVATIONS WERE OBTAINED FROM RECORD DRAWINGS AND HAVE NOT BEEN FIELD VERIFIED. CONTRACTOR SHALL VERIFY PRIOR TO COMMENCEMENT OF INSTALLING PIPING INSULATION AND HEAT TRACING. SHOULD ANY POTENTIAL CONFLICT BE IDENTIFIED WITH PROPOSED PIPING INSULATION AND HEAT TRACING, CONTRACTOR SHALL NOTIFY THE CITY AND ENGINEER. FIELD ADJUSTMENT SHALL BE MADE UPON APPROVAL BY THE ENGINEER AT NO ADDITIONAL COSTS TO THE OWNER.
6. INSULATE ALL PIPING AND FITTINGS AS NOTED. EXTEND PRESSURE GAUGES, PRESSURE INDICATORS, METER DISPLAYS, VALVE HANDLES, ETC. AS REQUIRED TO ALLOW FOR ACCESS FROM THE OUTSIDE OF THE NEW INSULATION ASSEMBLY.
7. EXTEND AIR RELEASE PIPING, DRAIN PORTS, ETC. OUTSIDE NEW INSULATION ASSEMBLY. DISCHARGE TO A LOCATION TO MINIMIZE NUISANCE DRIPS ON CONCRETE PAD.
8. REFER TO INSULATION MANUFACTURER'S GUIDELINES FOR DETAILS AND REQUIREMENTS ON INSULATING PIPING, FITTINGS, FLANGES, VALVES, ETC. STRICTLY FOLLOW INSULATION MANUFACTURER'S GUIDELINES AND FINAL APPROVED SHOP DRAWING SUBMITTALS.
9. JOINTS ON INSULATION JACKETS SHALL BE LOCATED TO SHED RAINWATER AND PREVENT WATER FROM ENTERING JACKET AND INSULATION.
10. REFER TO SPECIFICATION 40 42 13 - PROCESS PIPING INSULATION FOR ADDITIONAL REQUIREMENTS AND DETAILS.



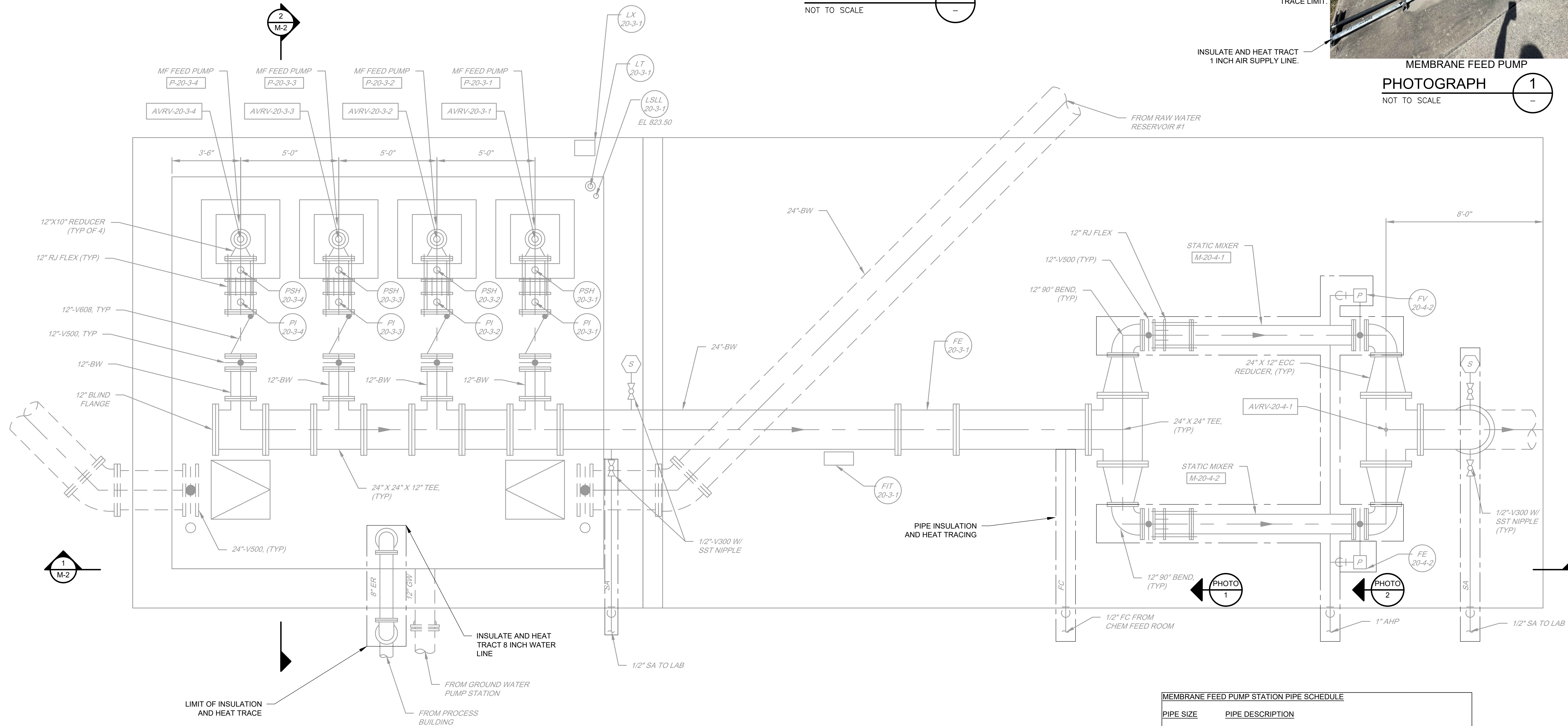
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NOT TO SCALE



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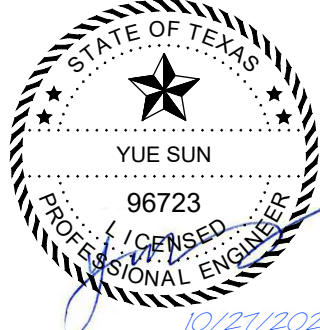
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## PLAN

$$3/8'' = 1'-0''$$

MEMBRANE FEED PUMP STATION PIPE SCHEDULE	
PIPE SIZE	PIPE DESCRIPTION
8-INCH	RETURN WATER FROM PROCESS BUILDING
1-INCH	AIR SUPPLY TO PNEUMATIC ACTUATOR
1/2-INCH	FERRIC CHLORIDE (FECL3) FEED LINE
1/2-INCH	SAMPLE LINE TO LAB AT 24-INCH BLENDED RAW WATER LINE
1/2-INCH	SAMPLE LINE TO LAB AT 24-INCH COAGULATED RAW WATER LINE



3115 Allen Parkway, Suite 300  
Houston, TX 77019  
BPE Firm Registration No. F-100



## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

MECHANICAL  
MF FEED WATER PUMP STATION  
PLAN

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED X. YIDRAWN J. GIBSON

CHECKED Y. SUN

REVIEWED Y. SUN

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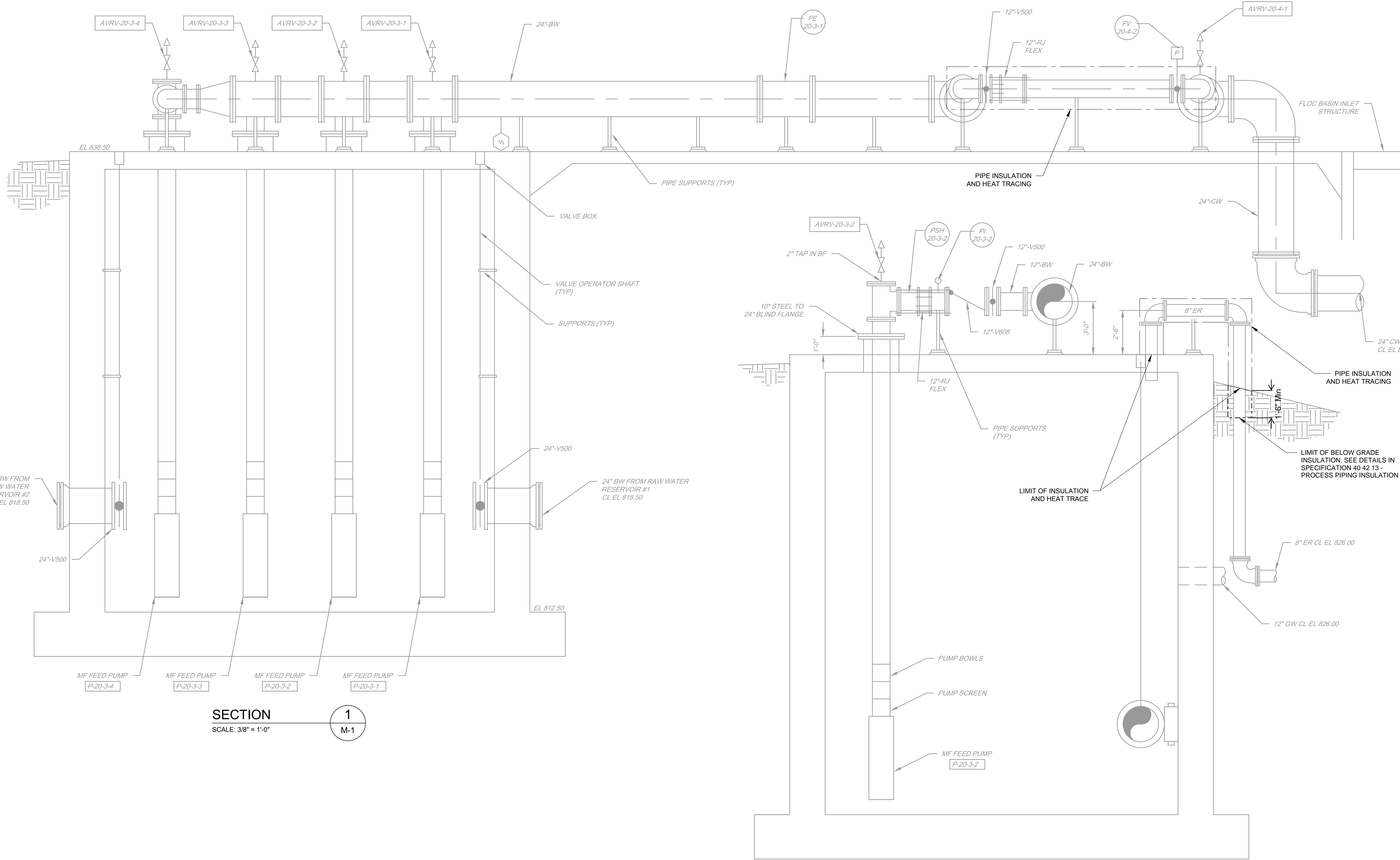
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2023-0002-00



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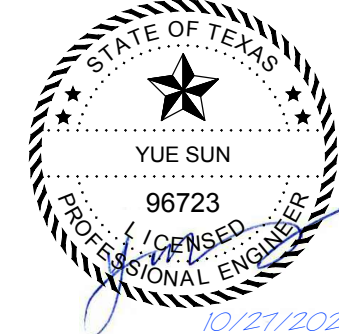
SECTION 1  
SCALE: 3/8" = 1'-0"

1  
M-1

SECTION 2  
SCALE: 3/8" = 1'-0"

2  
M-1

NOTES:  
1. SEE NOTES IN M-1.



NO.	DATE	REVISION	BY



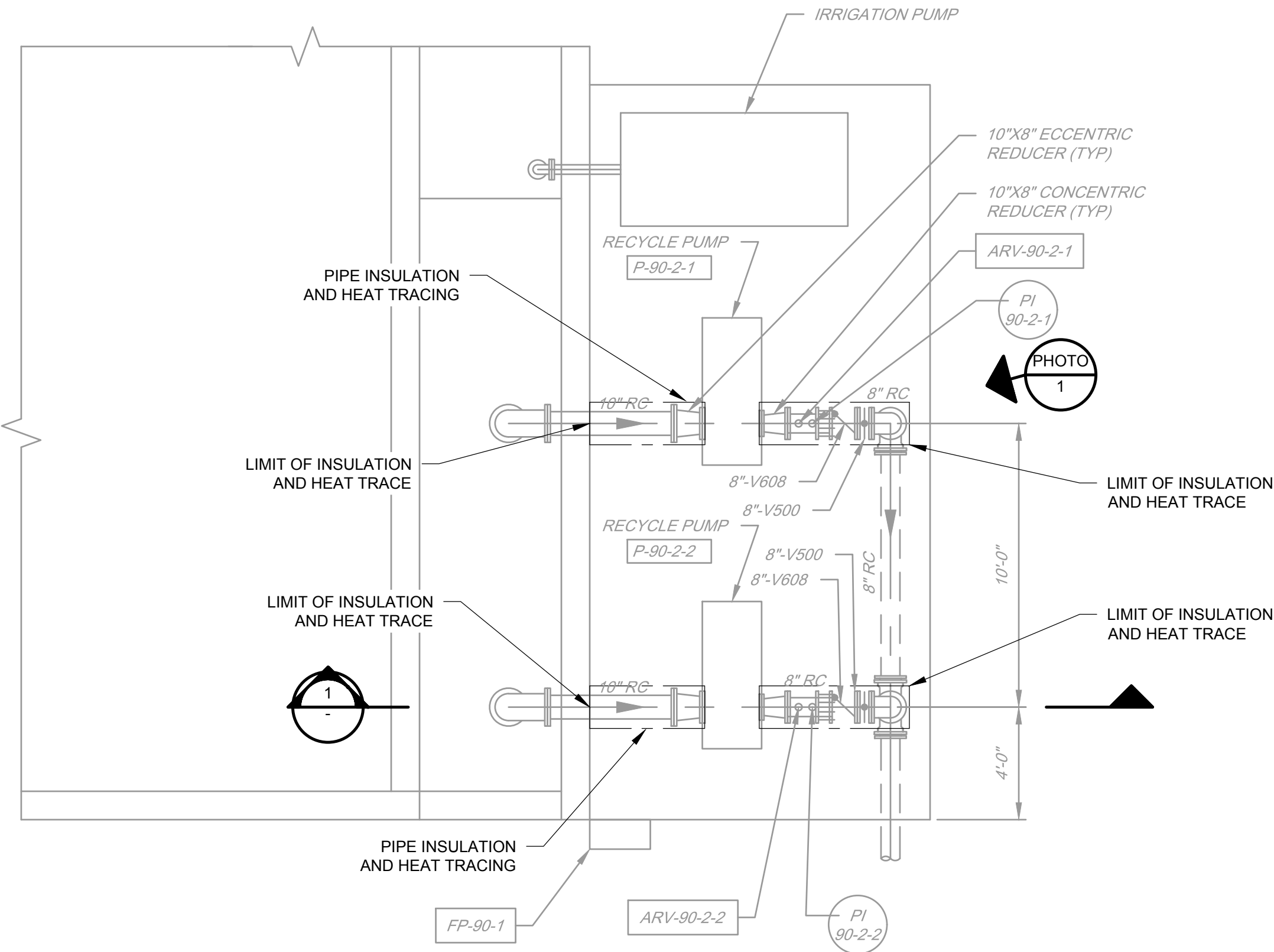
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

MECHANICAL  
MF FEED WATER PUMP STATION  
SECTIONS

DESIGNED	X. YI
DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN
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	2023-0002-00

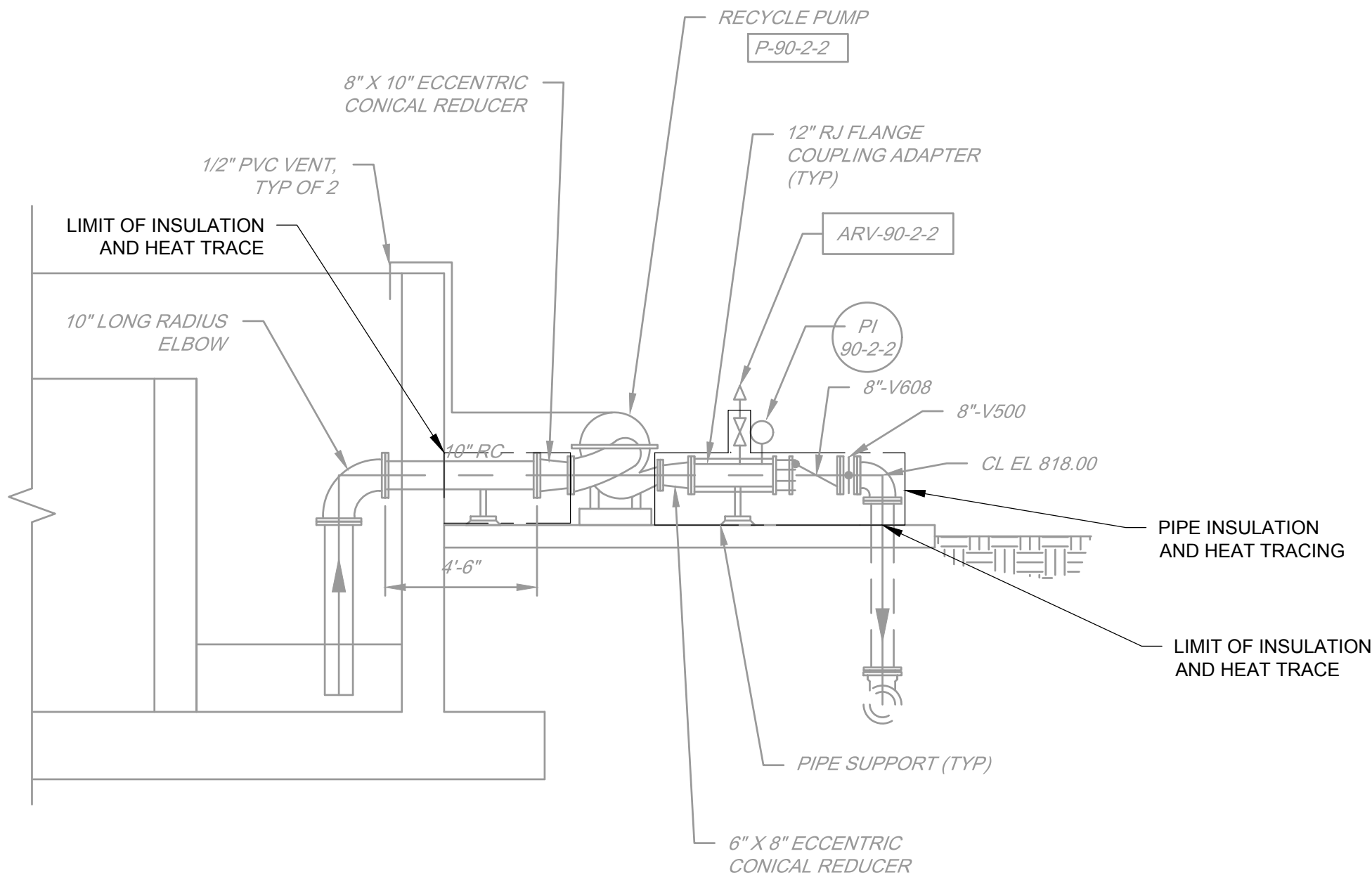


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PLAN

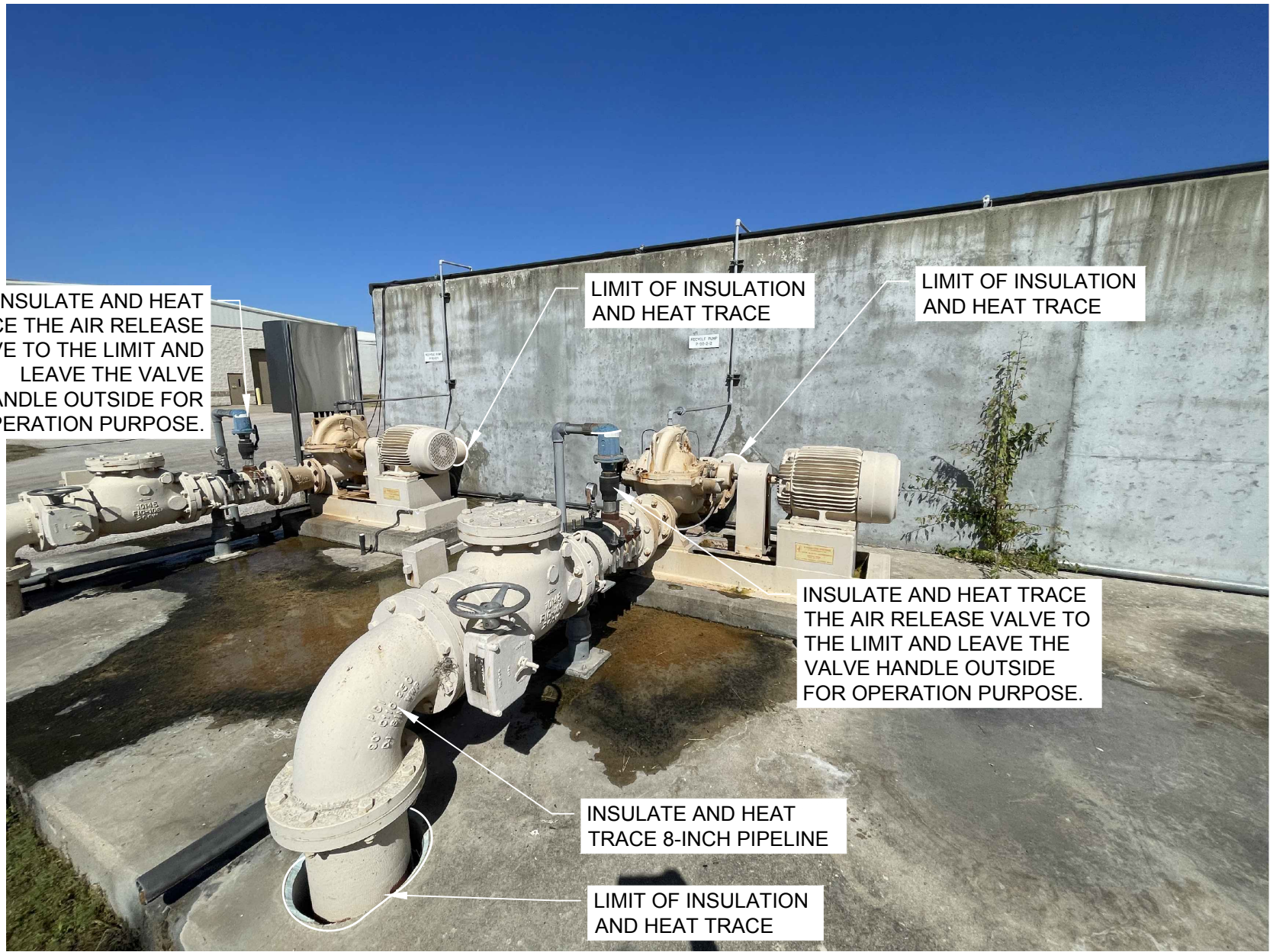
1/4" = 1'-0"



SECTION

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

1



RECYCLE PUMP STATION

PHOTOGRAPH

NOT TO SCALE

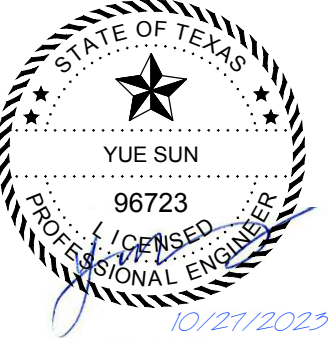
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RECYCLE PUMP STATION PIPE SCHEDULE

PIPE SIZE	PIPE DESCRIPTION
10-INCH	RECYCLE PUMP SUCTION
8-INCH	RECYCLE PUMP DISCHARGE

NOTES:

- SEE NOTES IN M-1.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

MECHANICAL  
RECYCLE BASIN PLAN AND SECTION

VERIFY SCALE  
0 1

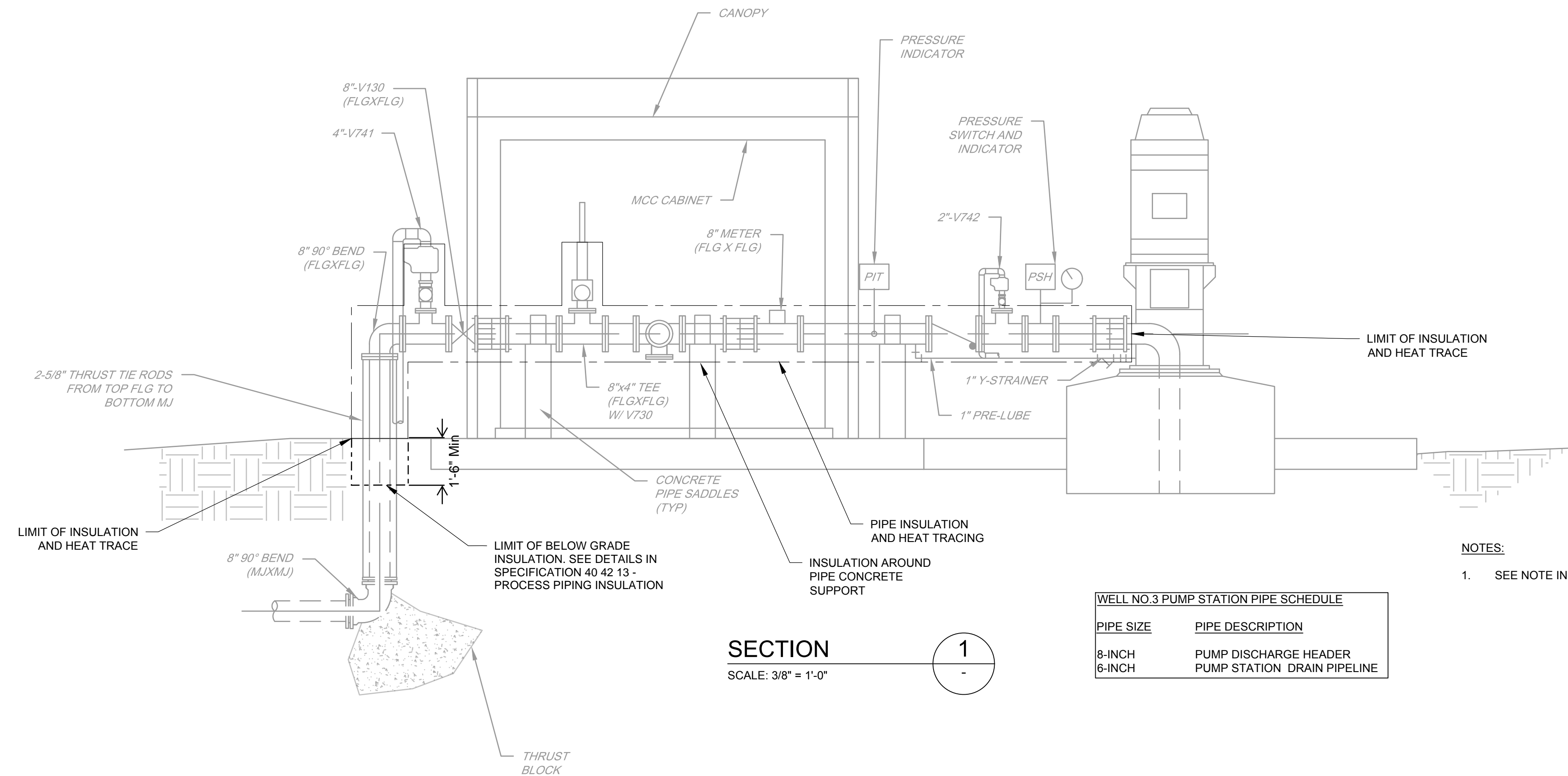
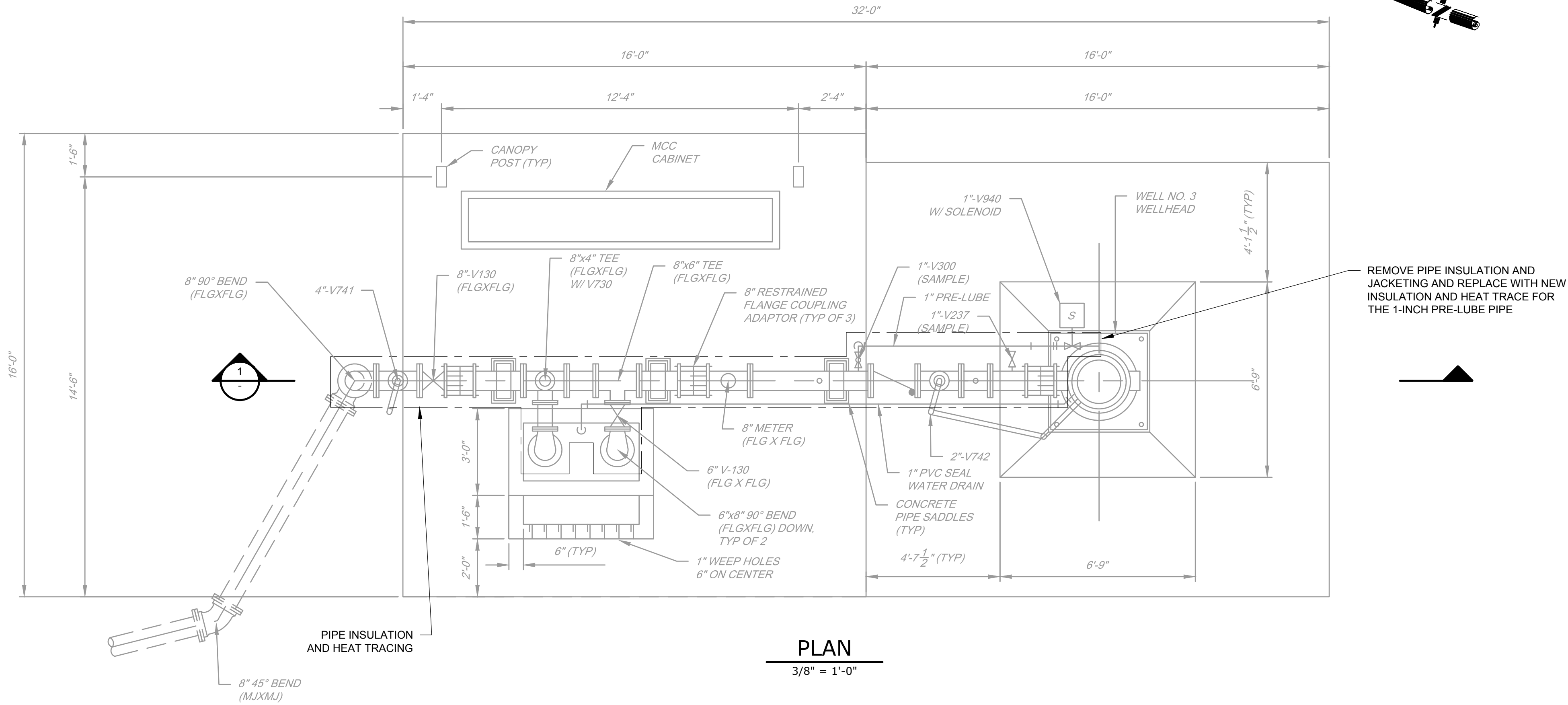
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THIS SHEET, ADJUST SCALE.

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DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN
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Dwg. No.	XX XXX
	M-3

2023-0002-00



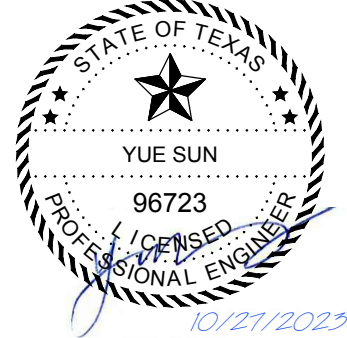
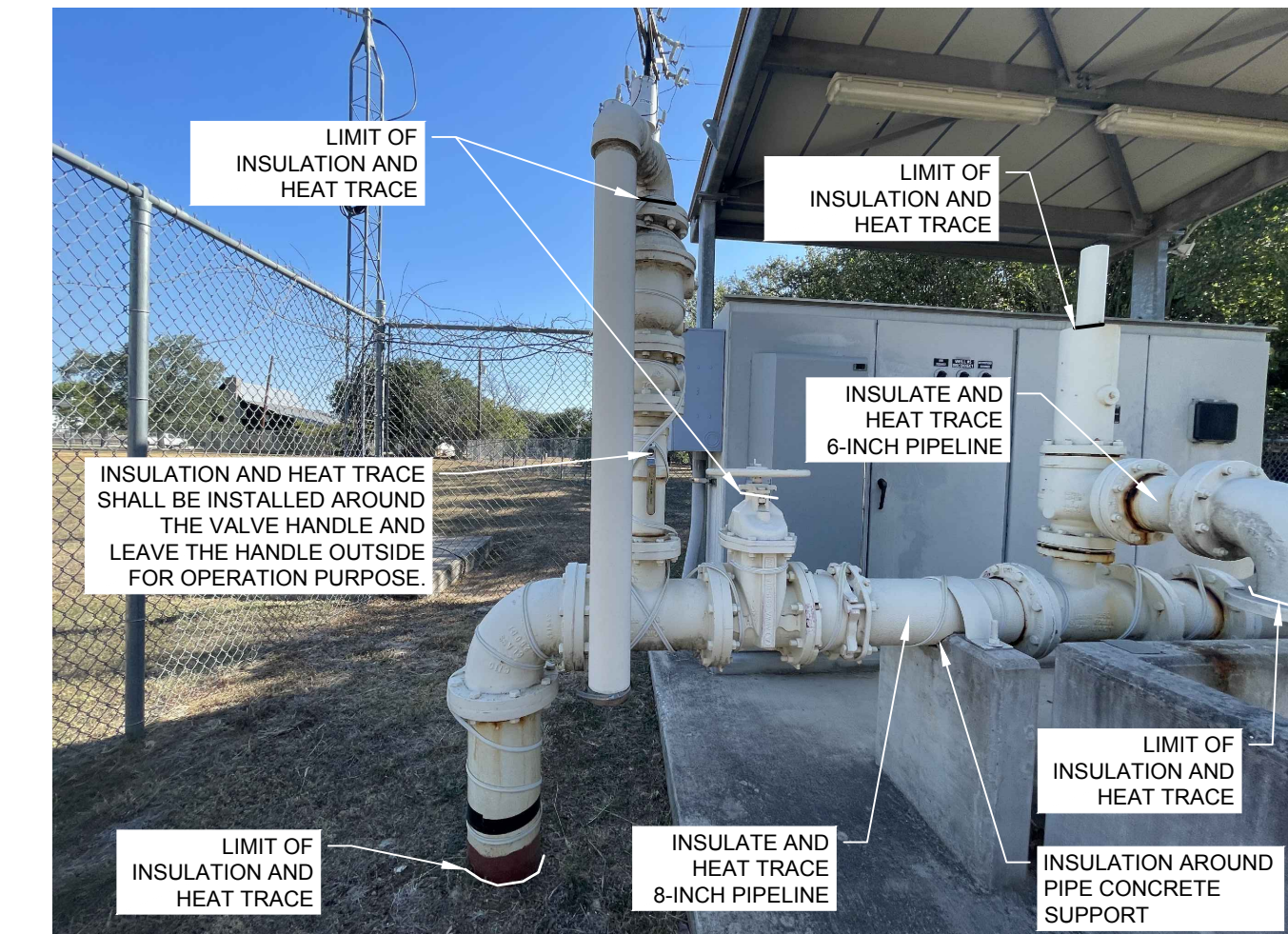
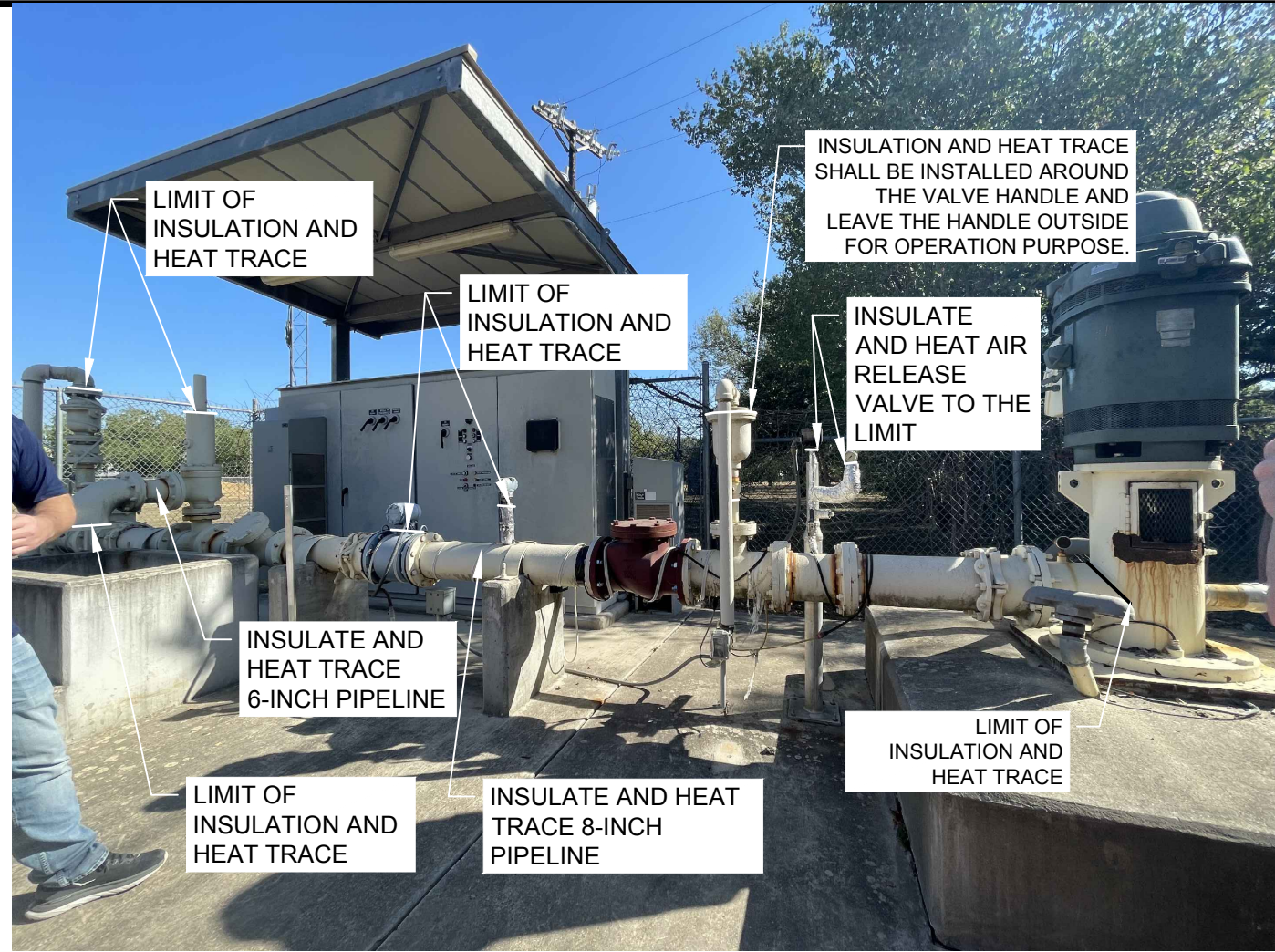
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WELL NO.3 PUMP STATION PIPE SCHEDULE	
PIPE SIZE	PIPE DESCRIPTION
8-INCH	PUMP DISCHARGE HEADER
6-INCH	PUMP STATION DRAIN PIPELINE

- NOTES:
- SEE NOTE IN M-1.

REMOVE AND DISPOSE OF ALL EXISTING INSULATION, JACKETING AND HEAT TRACING FROM THE 1-INCH PRE-LUBE PIPELINE. REPLACE AND INSTALL NEW INSULATION, JACKETING AND HEAT TRACING AS SPECIFIED IN SPECIFICATION 40 42 13 - PROCESS PIPING INSULATION



NO.	DATE	REVISION	BY

**ARDURRA**  
3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



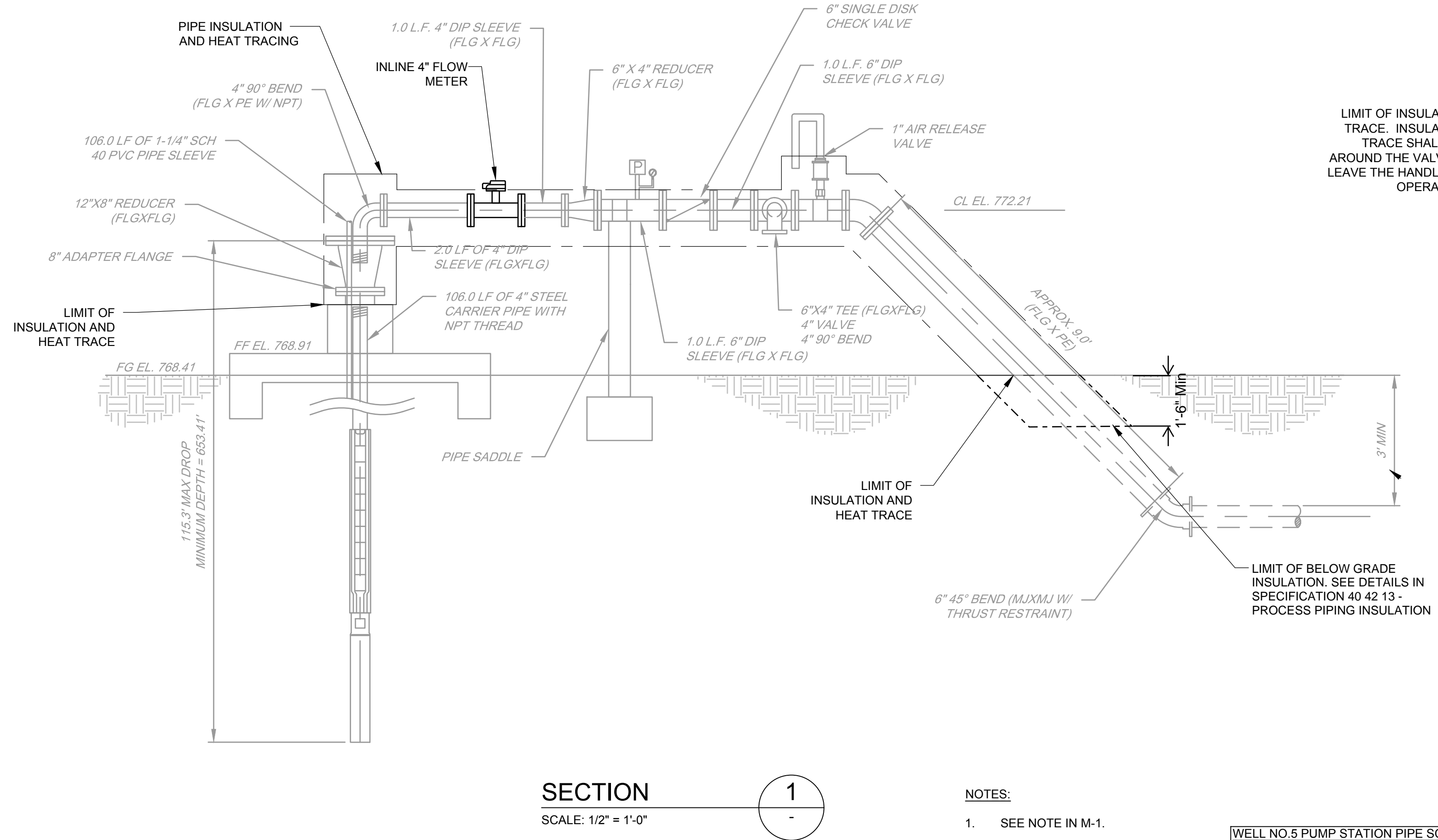
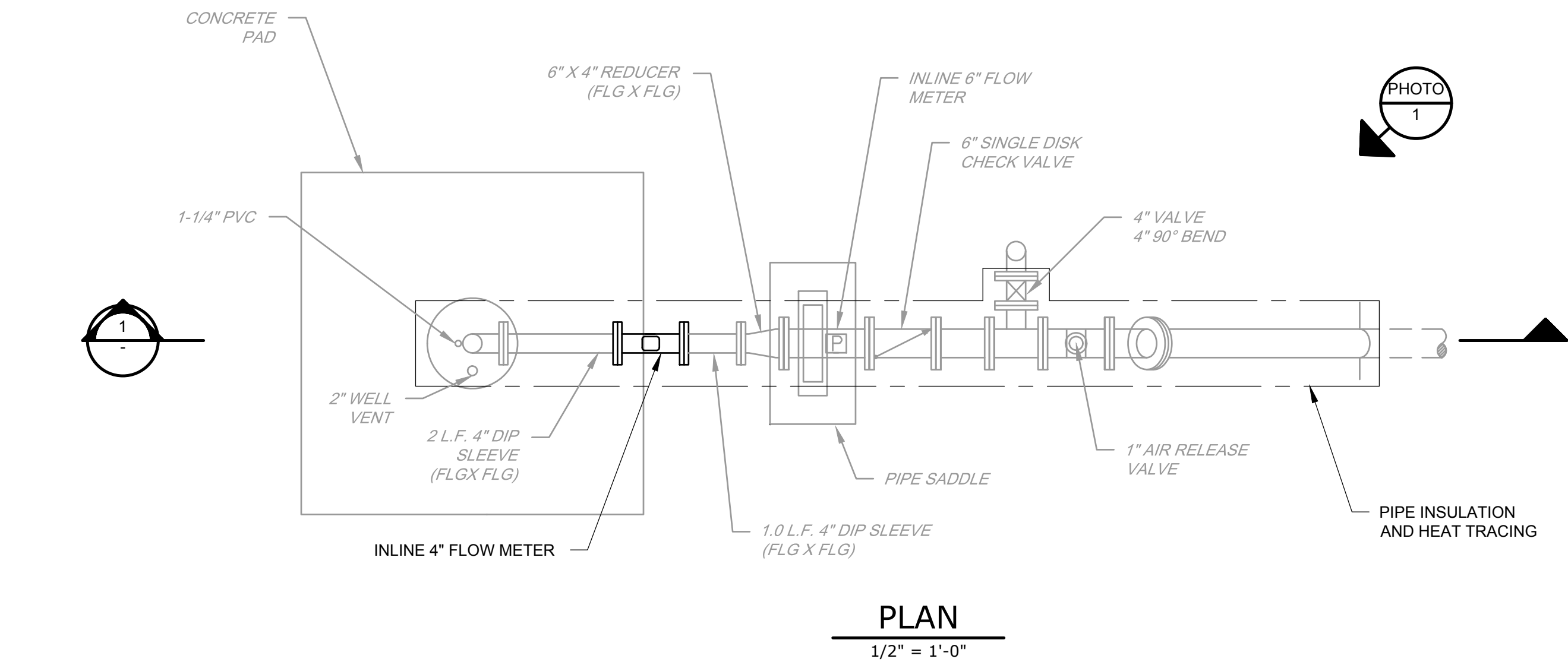
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL IMPROVEMENTS  
MECHANICAL  
WELL NO. 3 PLAN AND SECTION

VERIFY SCALE  
0 1  
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DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN

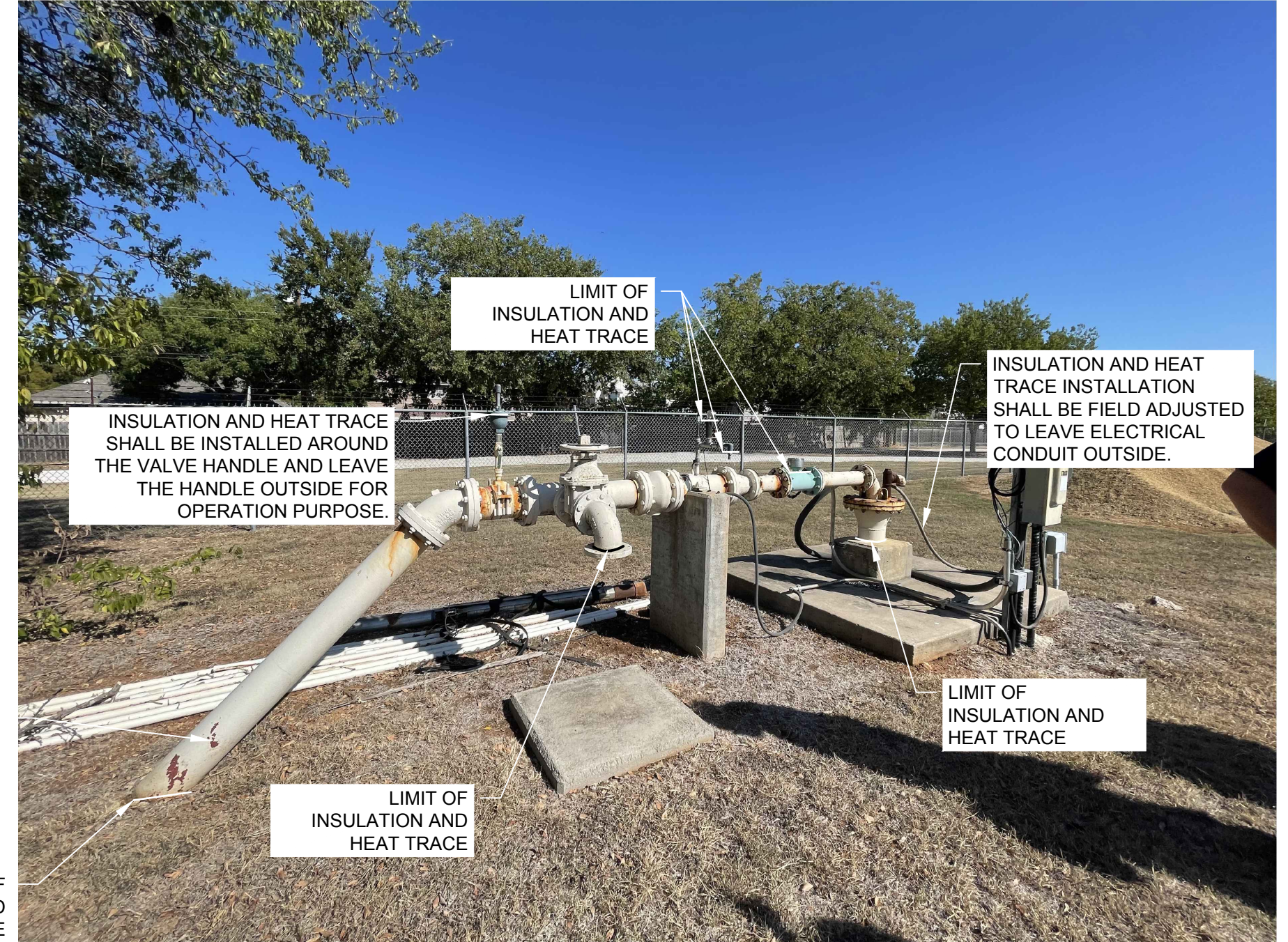
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2023-0002-00





1. SEE NOTE IN M-1.

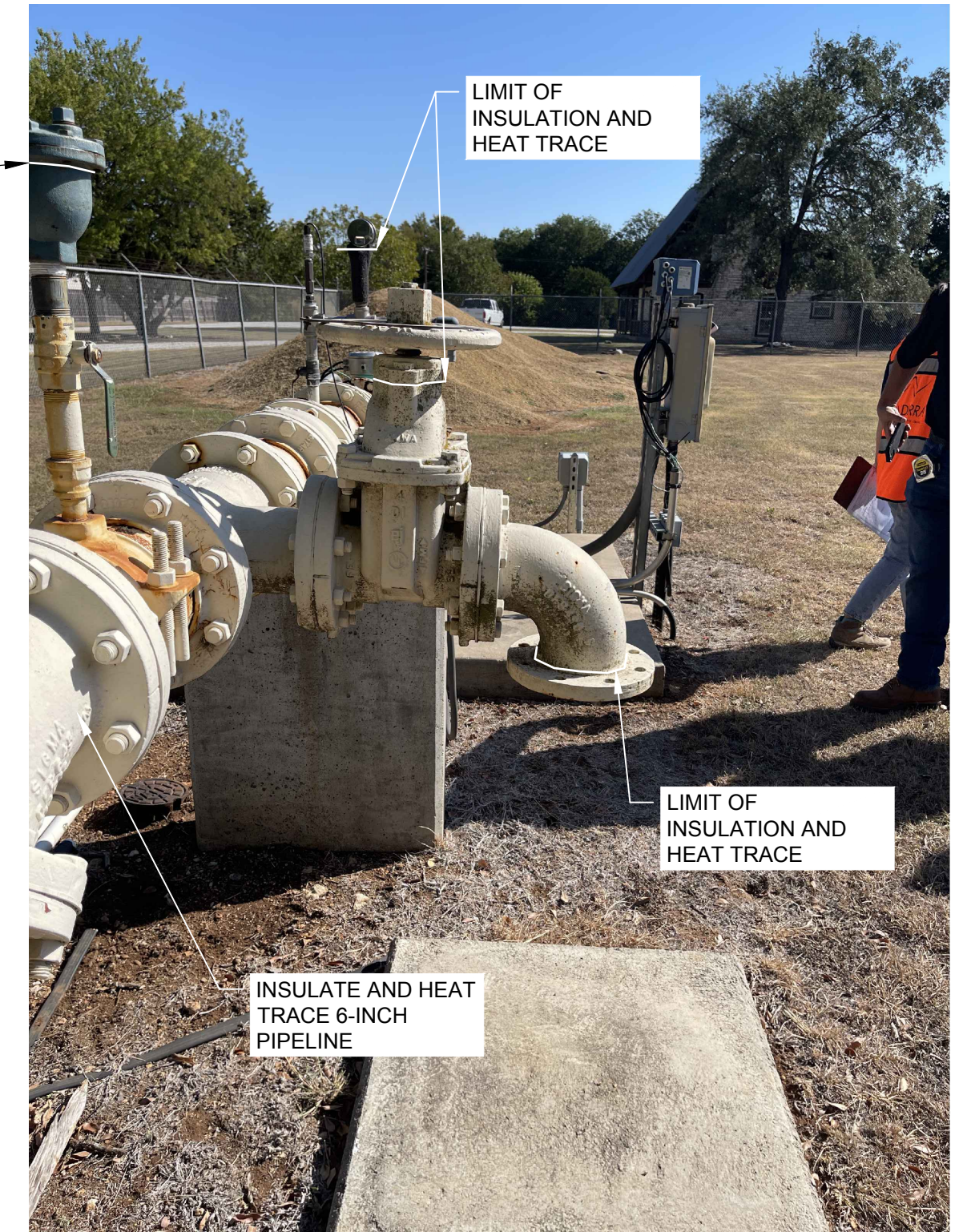
WELL NO.5 PUMP STATION PIPE SCHEDULE	
PIPE SIZE	PIPE DESCRIPTION
6-INCH	PUMP DISCHARGE HEADER
4-INCH	PUMP DISCHARGE HEADER
4-INCH	PUMP STATION DRAIN PIPELINE



WELL NO. 5 PUMP STATION

PHOTOGRAPH 1

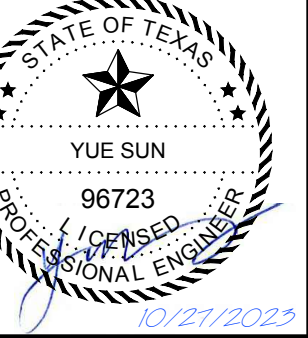
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WELL NO. 5 PUMP STATION

PHOTOGRAPH 2

NOT TO SCALE -

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Houston, TX 77019  
BPE Firm Registration No. F-10053



## WINTERIZATION AND ELECTRICAL IMPROVEMENTS

WELL NO. 5 PLAN AND SECTION

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DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

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DRAWN J. GIBSON

CHECKED Y. SUN

REVIEWED Y. SUN

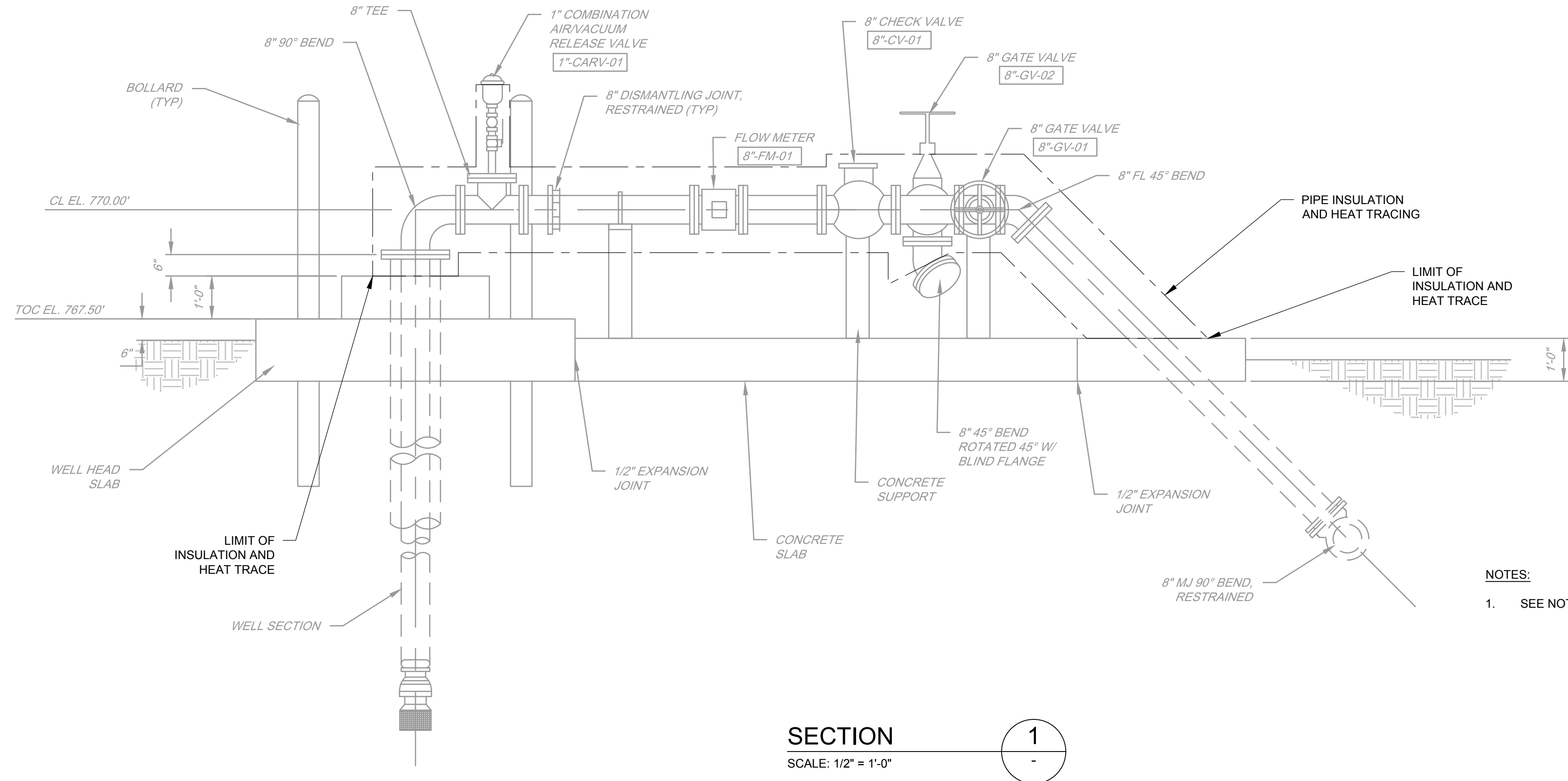
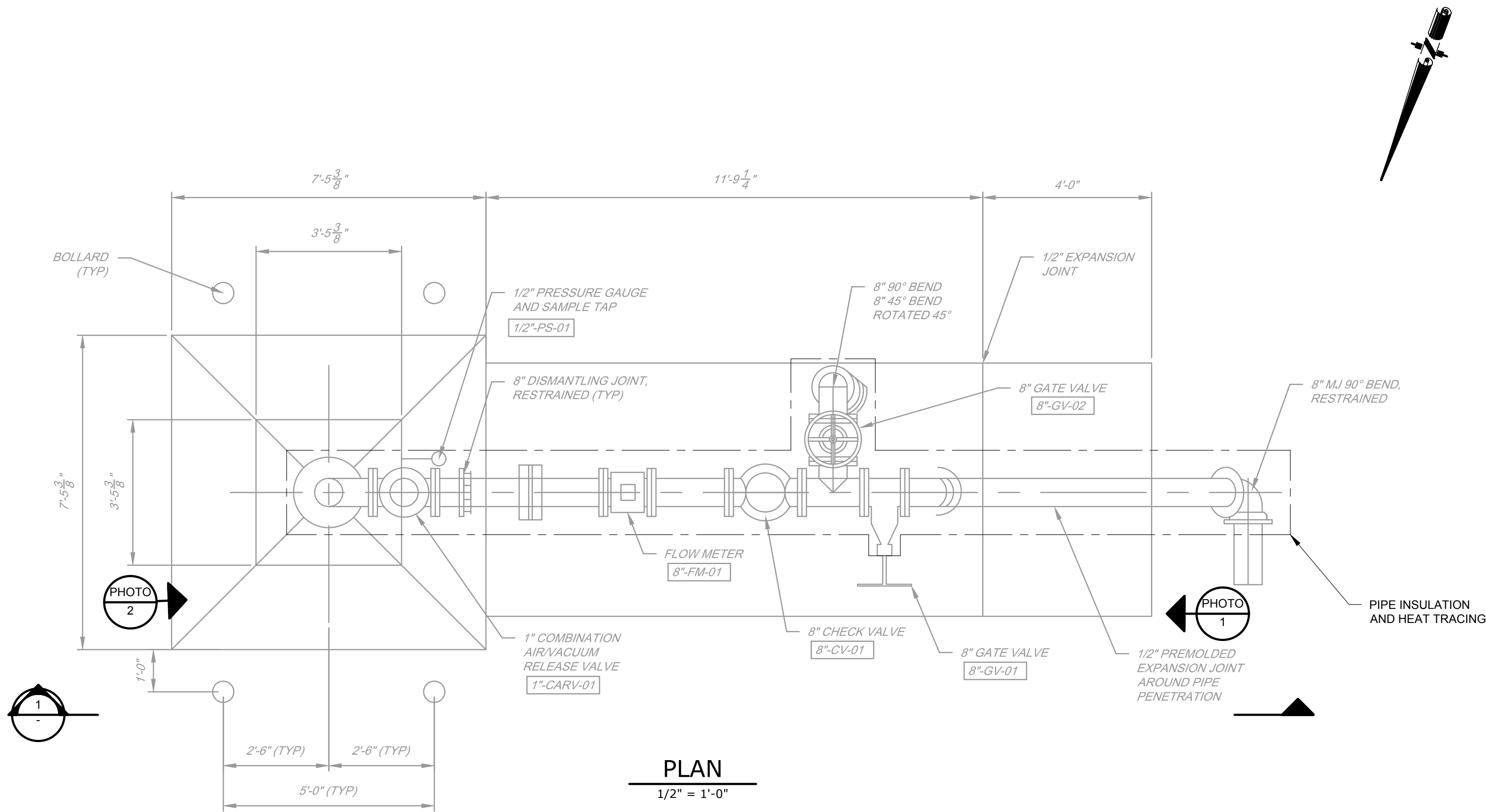
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XX XXX

fwg.  
to. **M-5**

023-0002-00



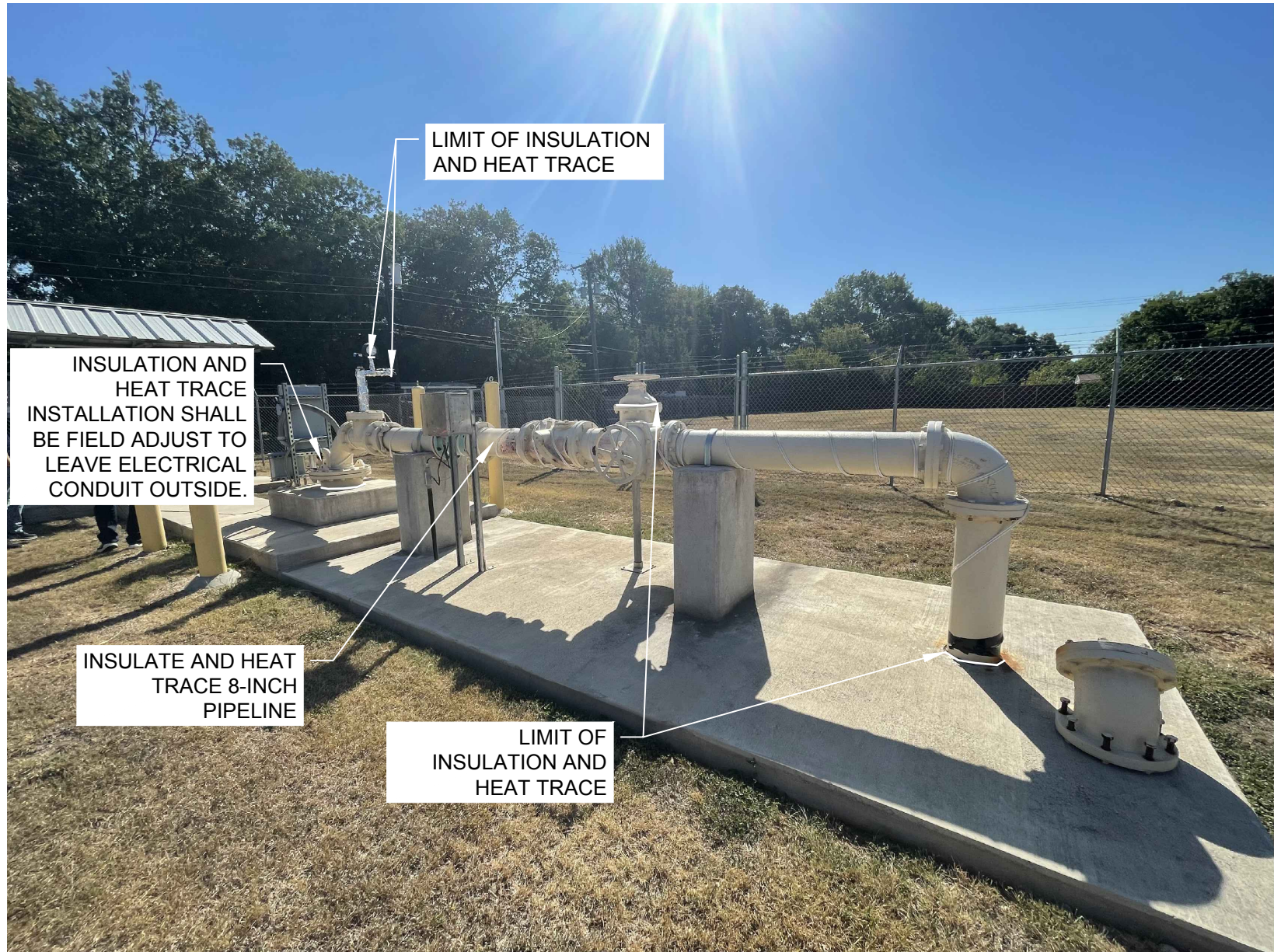
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- NOTES:
- SEE NOTE IN M-1.

WELL NO.6 PUMP STATION PIPE SCHEDULE

PIPE SIZE	PIPE DESCRIPTION
8-INCH	PUMP DISCHARGE HEADER
8-INCH	PUMP STATION DRAIN PIPELINE

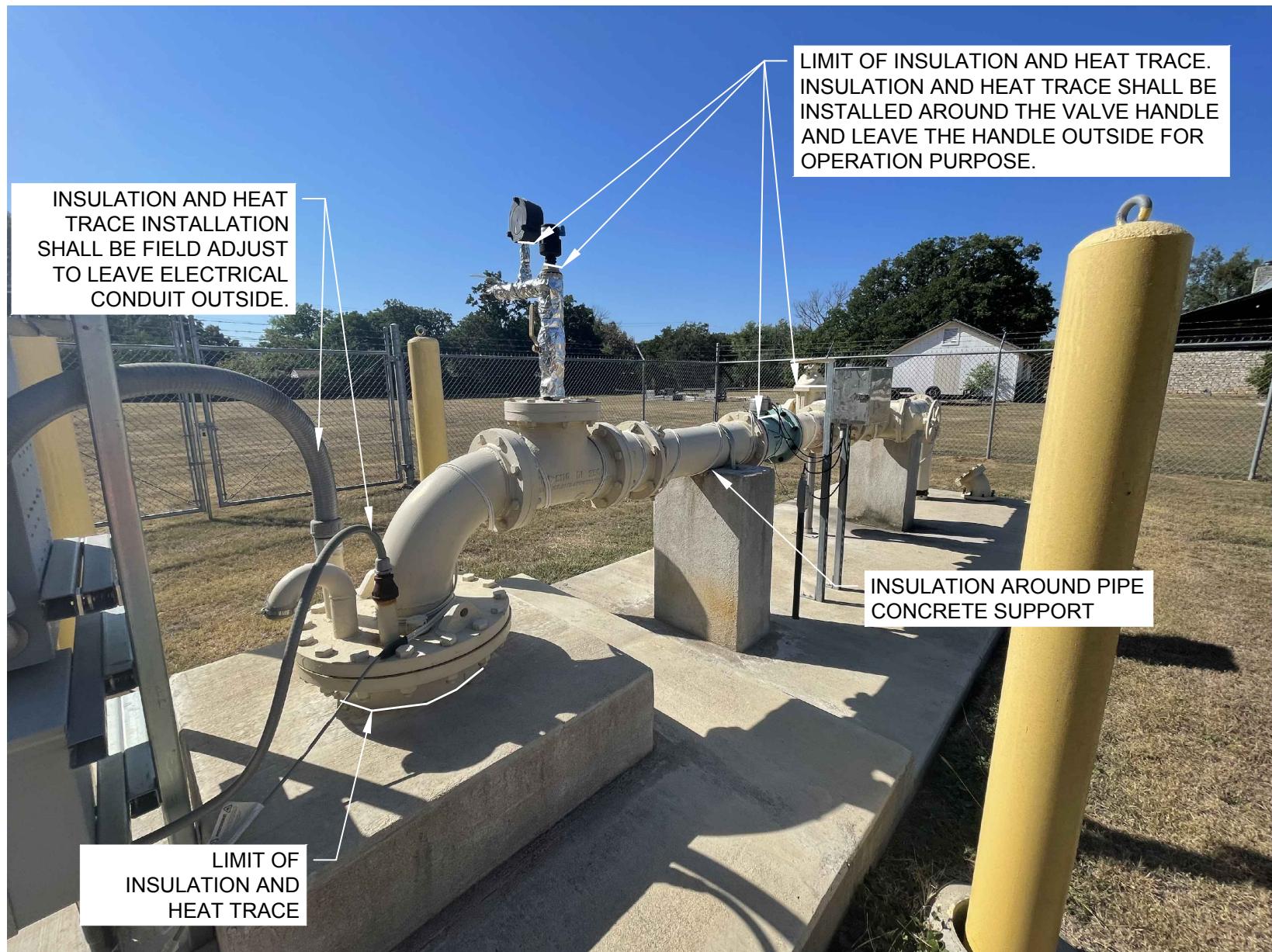


WELL NO. 6 PUMP STATION

PHOTOGRAPH

NOT TO SCALE

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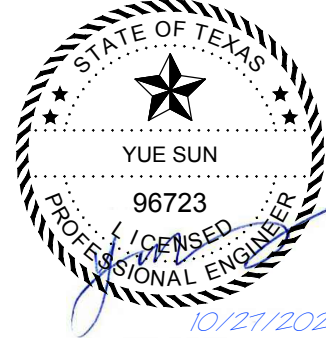


WELL NO. 6 PUMP STATION

PHOTOGRAPH

NOT TO SCALE

2  
-



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

MECHANICAL  
WELL NO. 6 PLAN AND SECTION

DESIGNED	X. YI
DRAWN	J. GIBSON
CHECKED	Y. SUN
REVIEWED	Y. SUN
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Dwg. No.	XX XXX
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	2023-0002-00







PRINTED: 10/26/2023 11:00 AM I:\PROJECT\Brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-2 GENERAL NOTES.dwg    SAVED: 9/1/2023 9:43 AM USER: Ryan Banerjee

GENERAL NOTES:

1. ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
- 1.1. NFPA 70, NATIONAL ELECTRICAL CODE.
- 1.2. NFPA 101, LIFE SAFETY CODE.
- 1.3. NFPA 820, STANDARD FOR FIRE PROTECTION IN WASTEWATER TREATMENT AND COLLECTION FACILITIES.
2. ALL ELECTRICAL CIRCUITS SHALL INCLUDE A GREEN GROUNDING CONDUCTOR SIZED PER NEC.
3. CONDUIT AND DEVICE LOCATIONS ARE SHOWN DIAGRAMMATICALLY ONLY, CONTRACTOR SHALL FIELD LOCATE OR ROUTE AS REQUIRED.
4. ALL CONDUIT SHALL BE INSTALLED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE.
5. ALL PANEL SCHEDULES SHALL BE RETYPED AND LAMINATED TO REFLECT UP TO DATE CONDITIONS. TRACE EXISTING CIRCUITS. ALL PANEL LEGENDS SHALL INDICATE THE PANELS. SOURCE PANEL AND ITS LOCATION.
6. ELECTRICAL EQUIPMENT AND DEVICES SHALL BE PROVIDED WITH PHENOLIC NAMEPLATES. ALL NAMEPLATES SHALL BE MECHANICALLY FASTENED WITH S.S. SCREWS OR RIVETS. THE USE OF ADHESIVE NAMEPLATES SHALL NOT BE ALLOWED.
7. CONTRACTOR SHALL MAINTAIN A SET OF PRINTS AND MARK-UP DURING CONSTRUCTION TO REFLECT "AS-BUILT" CONDITIONS. PRINTS SHALL BE DELIVERED TO THE ENGINEER UPON COMPLETION OF THE PROJECT AS A COMPLETE SET OF RECORD DRAWINGS. IN ADDITION, THE CONTRACTOR SHALL PROVIDE ELECTRONIC COPIES OF ALL UPDATED "AS-BUILT" DRAWINGS IN AUTOCAD .DWG FORMAT.
8. THE CONTRACTOR SHALL PROVIDE PULL BOXES IN POWER CIRCUIT CONDUIT AS REQUIRED, SO AS TO LIMIT THE NUMBER OF BENDS TO A MAXIMUM OF 270 DEGREES OR THREE 90 DEGREE TURNS.
9. PROVIDE CONDUIT EXPANSION FITTINGS AS CONDUIT CROSSES BUILDING EXPANSION JOINTS.
10. ALL SUPPORTING AND FASTENING DEVICES SHALL BE 316 STAINLESS STEEL.
11. CONTRACTOR MAY COMBINE HOMERUNS TO 120V PANELBOARD CIRCUIT PER NEC. COMBINING MORE THAN THREE 120V CIRCUIT WILL NOT BE ALLOWED WITHOUT SUBMITTING NEC DERATING CALCULATIONS.
12. ALL RECEPTACLE BRANCH CIRCUITS OVER 75' IN LENGTH SHALL USE #10 AWG CONDUCTOR (FOR VOLTAGE DROP).
13. CONTRACTOR SHALL PROVIDE 2 SPARE FUSES FOR EACH FUSE INSTALLED INCLUDING ALL EQUIPMENT AND CONTROLS.
14. CONTROL AND POWER CONDUITS SHALL BE SEPARATED BY 12" MIN. AND SHALL BE IN SEPARATE JUNCTION BOXES AND DUCT BANKS. MAINTAIN 12" SEPARATION BETWEEN DUCT BANKS.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR READING ALL PROJECT SPECIFICATIONS AND WILL BE RESPONSIBLE FOR MEETING ALL REQUIREMENTS OUTLINED IN THE SPECIFICATIONS.
16. THE CONTRACTOR SHALL INSPECT THE SITE PRIOR TO BID TO EVALUATE EXISTING CONDITIONS. INSTALLATION OF THE NEW FACILITIES WILL REQUIRE FILED COORDINATION WITH PLANT OPERATIONS TO PERMIT MAINTENANCE OF OPERATION DURING CONSTRUCTION. DURATION OF POWER OUTAGES SHALL BE MINIMUM REQUIRED FOR SAFE INSTALLATION AND SHALL BE SCHEDULED WITH AND APPROVED BY THE OWNER.
17. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO AVOID EXISTING UNDERGROUND UTILITIES INCLUDING PROCESS PIPING, WATER LINES, CHEMICAL FEED PIPING, ELECTRICAL CONDUITS. HAND EXCAVATION SHALL BE REQUIRED IN CONGESTED AREAS WHERE THE EXACT LOCATION OF ALL UTILITIES IS UNKNOWN. LOCATIONS SHOWN FOR THE EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY. NOT ALL OF THE EXISTING UNDERGROUND UTILITIES ARE SHOWN. FIELD ADJUST LOCATIONS OF THE NEW FACILITIES TO ACCOMMODATE THE EXISTING SITE CONDITIONS AND UNDERGROUND UTILITIES.
18. CONTRACTOR SHALL PROVIDE A GROUNDING SYSTEM AS REQUIRED BY THE NEC AND IEEE GREEN BOOK. THE INSTALLED GROUNDING SYSTEM SHALL HAVE A RESISTANCE OF LESS THAN 5 OHMS TO GROUND. PROVIDE A CONTINUOUS #4/0 TINNED COPPER GROUNDING SYSTEM.
19. IF ITEM IS PROPOSED FROM OTHER THAN FIRST NAMED MANUFACTURER AND WILL REQUIRE ADDITIONAL ENGINEERING TO INCORPORATE INTO DRAWINGS, I.E., ADDITIONAL I/O, DIFFERENT OR ADDITIONAL BREAKERS, LARGER CONDUCTOR SIZE OR ADDITIONAL CONDUCTORS, LARGER OR ADDITIONAL CONDUIT(S). CONTRACTOR SHALL BE REQUIRED TO PAY FOR ALL ADDITIONAL ENGINEERING CHARGES AND ADDITIONAL EQUIPMENT, MATERIAL COST, ETC.
20. NAMEPLATES ON ELECTRICAL EQUIPMENT SHALL HAVE P&ID TAG NUMBER AS WELL AS DESCRIPTION OF LOAD BEING SERVED AND EQUIPMENT TAG NUMBER AS A MINIMUM. EQUIPMENT BEING SERVED SHALL HAVE IDENTICAL TAG AS ELECTRICAL GEAR AND BREAKER NOTATION WHICH IS SERVING EQUIPMENT.
21. POWER WIRING FOR ALL HEATING, VENTILATING, AND AIR CONDITIONING EQUIPMENT FURNISHED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS, INCLUDING POWER WIRING FOR 120 VOLT UNIT HEATER MOTORS AND THERMOSTATS. REFER TO HVAC DRAWINGS FOR THE LOCATIONS OF 120 VOLT UNIT HEATER THERMOSTATS AND PROVIDE 3/4-IN C, 2#12 AND 1#12 GND BETWEEN EACH HEATER AND ITS RESPECTIVE CONTROL THERMOSTAT.
22. ENCLOSURE AND CONTROL PANELS SHALL BE THE FOLLOWING:
- 22.1. INDOOR AIR CONDITIONED NON-PROCESS AREAS SHALL BE NEMA 12 WITH NO VENTILATION TO THE OUTSIDE. MAY BE NEMA 1 IN A CLEAN ROOM WITH CARBON FILTERS.
- 22.2. INDOOR PROCESS AREAS SHALL BE NEMA 12.

- 22.3. OUTDOOR ENCLOSURE SHALL BE NEMA 3R OR 4.
- 22.4. ALL CONTROL PANELS SHALL BE UL-508A AND COMPLY WITH ARTICLE 409 OF THE NEC. ALL CONTROL PANELS IN DESIGNATED HAZARDOUS LOCATIONS OR CONTAINING WIRING WHICH IS HAZARDOUS LOCATIONS SHALL BE UL-698A.
- 22.5. CONNECTIONS TO SCREW TYPE TERMINALS ONLY ALLOWED COMPRESSION TYPE TERMINAL ARE NOT AVAILABLE.
- 22.6. ALL CONTROL CABINET WIRING TO THE PLC AND CONTROL DEVICES SHALL BE 16 AWG FOR ANALOG AND 14 AWG FOR DIGITAL AND TERMINATED WITH FERRULES.
- 22.7. ALL CONTROL PANEL SUBMITTALS SHALL CONTAIN SLOTTED HINGED DUCT CALCULATIONS FOR CONDUCTOR FILL. ALL CONTROL PANEL SUBMITTALS SUBMITTED WITHOUT WIRE FILL CALCULATIONS SHALL BE RETURNED INCOMPLETE WITHOUT EVALUATIONS. NO DUCT SHALL CONTAIN MORE THAN 40% FILL BASED ON NEC WIRE FILL STANDARDS. CALCULATIONS SHALL INCLUDE ALL FILED CONDUCTORS DESIGNED TO ENTER THE PANEL IN FIELD TERMINATIONS PORTION OF THE THE PANEL. ALL CONTROL PANELS SHALL CONTAIN DESIGNATED DUCTS FOR INTERNAL WIRING AND A SEPARATE DUCT(S) FOR FIELD WIRING.
- 22.8. ALL KEY INTERLOCKED SET (KIRK KEY) IF PART OF THE DESIGN, MUST BE INSCRIBED TO INDICATE SET LOCATIONS AND KEYED DIFFERENTLY TO PREVENT UNAUTHORIZED BREAKER COMBINATIONS. SPARE BREAKER INTERLOCKED KEYS MUST BE TIGHTLY CONTROLLED TO PREVENT UNAUTHORIZED BREAKER COMBINATIONS.
- 22.9. PANEL DRAWINGS SHALL BE LAMINATED, ATTACHED TO THE DOOR AND IN COLOR. DRAWING SHALL BE PRINTED ON 8.5 X 11 IF 11 X17 IS TOO LARGE TO FIT ON THE DOOR. FULL SET OF ELECTRICAL DRAWINGS PRINTED WITH A LASER PRINTER AND IN COLOR SHALL BE INSERTED IN THE DOOR POCKET. INK JET IS NOT ACCEPTED.
- 22.10. ALL CONTROL PANEL WITH A PLC/HMI/VFD SHALL BE EQUIPPED WITH A PANEL TEMPERATURE SENSOR. TEMPERATURE SENSOR SHALL BE CONNECTED TO SCADA WHERE APPLICABLE.
- 22.11. ALL CONTROL PANELS SHALL BE INSTALLED OUTSIDE OF CLASSIFIED AREAS. REFER TO NFPA 820 FOR THE REQUIRED CLASSIFIED ENVELOPE AROUND THE DIFFERENT STRUCTURES. PROVIDE CONDUIT SEAL OFF AS REQUIRED BY NFPA 70 AT TRANSITIONS BETWEEN CLASSIFIED AND UNCLASSIFIED AREAS.



					BY
					REVISION
					DATE
					NO.



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
GENERAL NOTES

01" = 1'0" VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
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DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

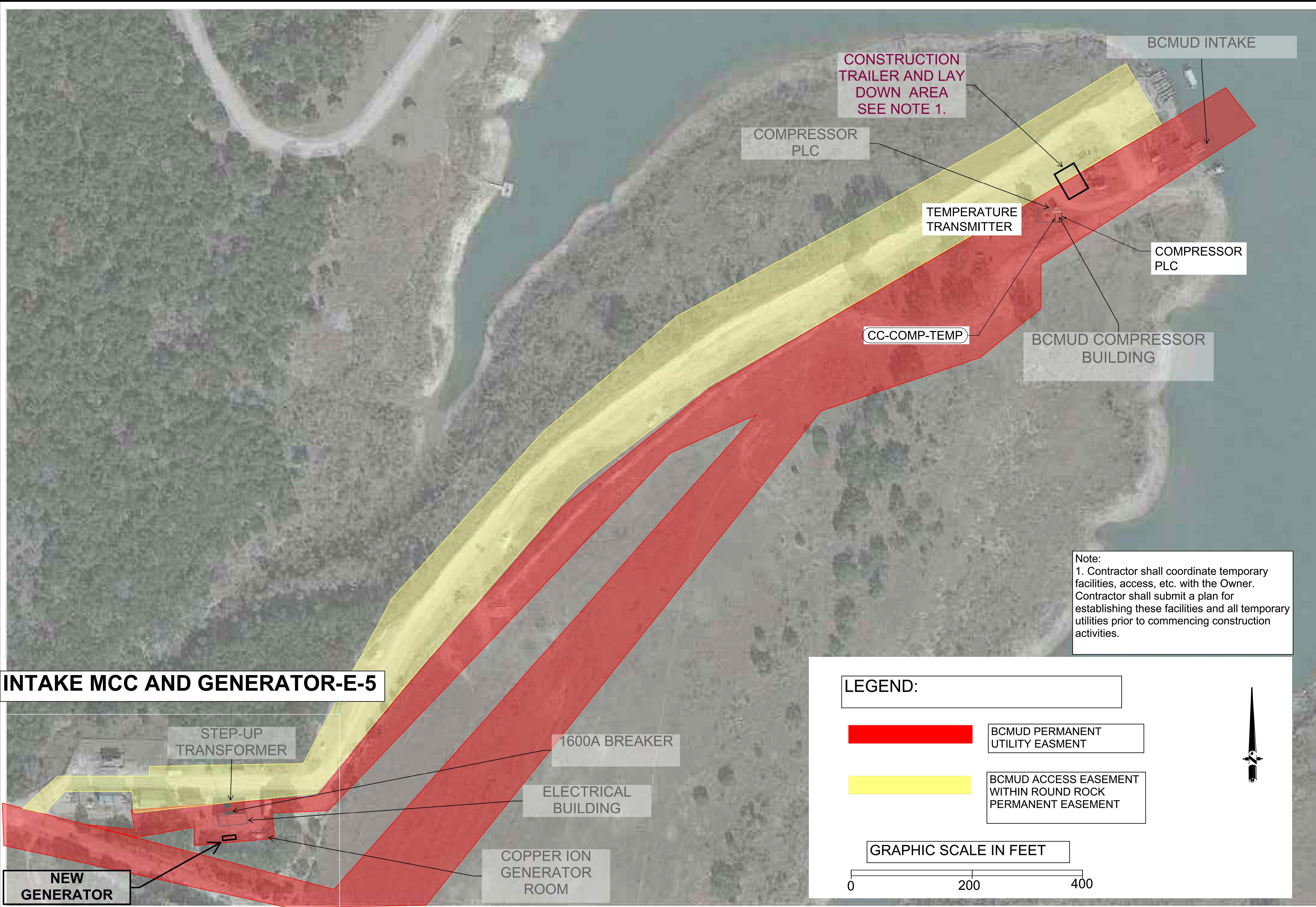
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E-2

2023-0002-00



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STATE OF TEXAS

JAMES E. LANDGRAF

75428

PROFESSIONAL ENGINEER

10/25/2023

NO.	DATE	REVISION	BY

3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053

Brushy Creek  
Municipal Utility District

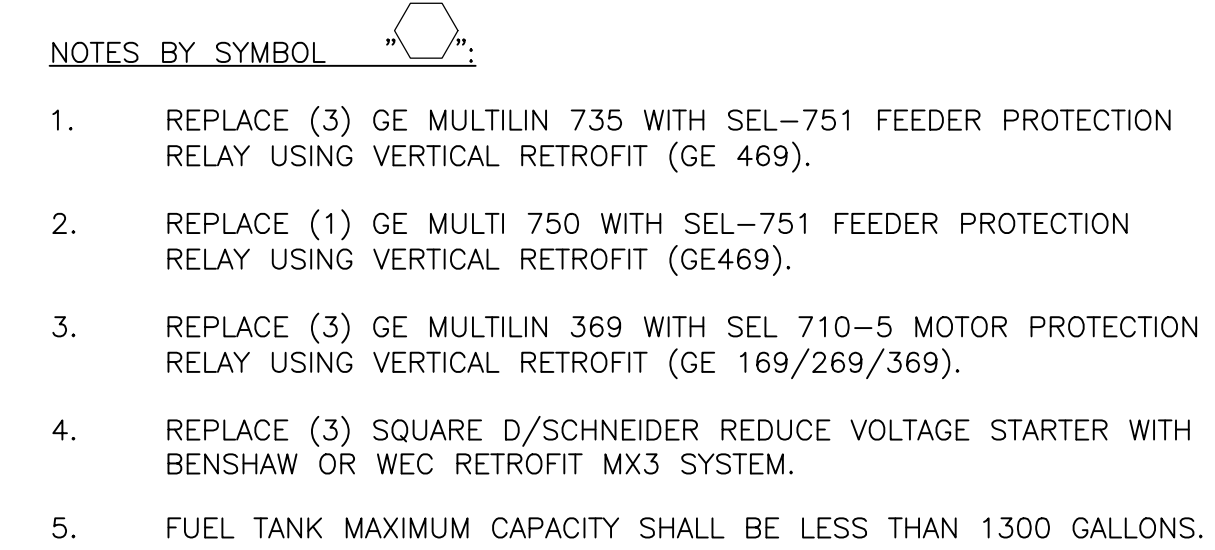
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WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
INTAKE SITE OVERVIEW

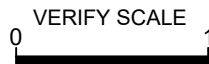
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CHECKED A. RISTOW  
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Dwg. No. E-3  
2023-0002-00



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## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

ELECTRICAL  
INTAKE ONE LINE

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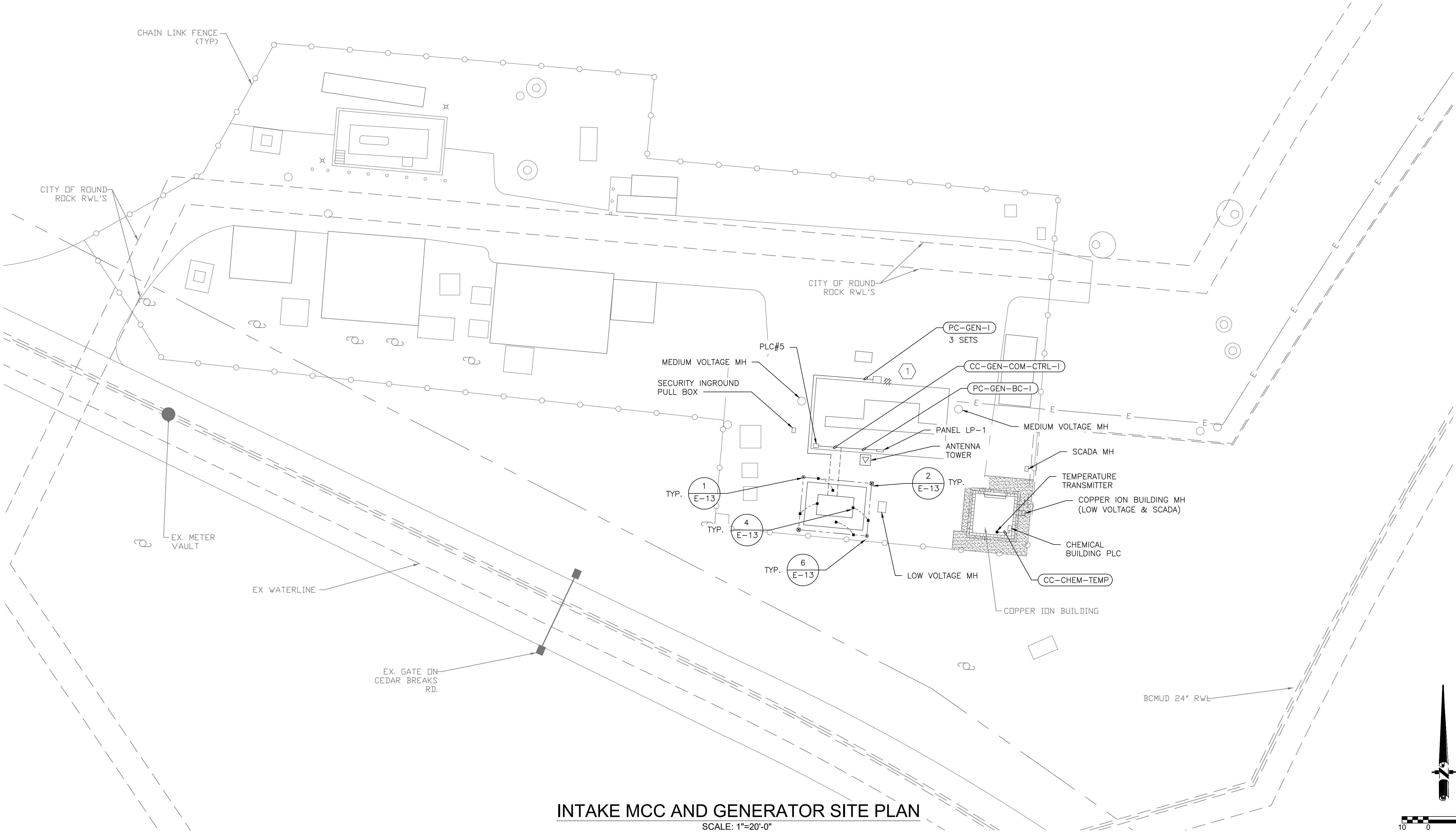
DESIGNED P. LANDGRAF

DRAWN T. FORNEY  
CHECKED A. RISTOW  
REVIEWED A. RISTOW  
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2023-0002-00

PRINTED: 10/26/2023 11:01 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 Drawings\8.3 sheets\Electrical\E-5 INTAKE MCC AND GENERATOR SITE PLAN.dwg, SAVED: 9/22/2023 9:04 AM USER: Ryan Banerjee



INTAKE MCC AND GENERATOR SITE PLAN  
SCALE: 1"=20'-0"

- NOTESBY SYMBOL
1. THE EXISTING SITE PLAN IS INCLUDED FOR INFORMATION PURPOSE ONLY. EXISTING PIPING ELEVATIONS WERE OBTAINED FROM RECORD DRAWINGS AND HAVE NOT BEEN FIELD VERIFIED. CONTRACTOR SHALL FIELD VERIFY PRIOR TO COMMENCEMENT OF INSTALLING NEW PIPING. SHOULD ANY POTENTIAL CONFLICT BE IDENTIFIED WITH PROPOSED PIPING INSTALLATION, CONTRACTOR SHALL NOTIFY THE DISTRICT AND ENGINEER. FIELD ADJUSTMENT SHALL BE MADE UPON APPROVAL BY THE ENGINEER AT NO ADDITIONAL COSTS TO THE OWNER. DEMOLISH PORTABLE GENERATOR TERMINATION CABINET. REFERENCE SHEET E-4.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

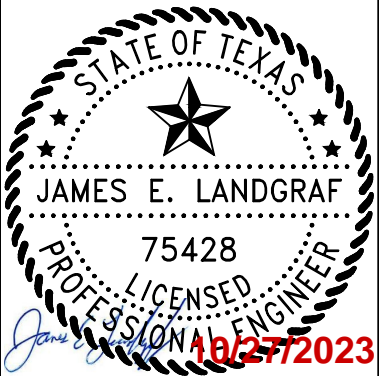
ELECTRICAL  
INTAKE MCC AND GENERATOR SITE PLAN

DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of
	XX XXX
Dwg. No.	E-5
2023-0002-00	



NOTES BY SYMBOL :

1. PROVIDE NEW BREAKERS IN EXISTING PANEL FOR NEW GENERATOR CIRCUITS.



INTAKE GENERATOR ADDITION				
CONDUIT TAG	CONDUIT SIZE (INCH)	CONDUCTORS IN EACH SET	FROM	TO
PC-GEN-I	4	3#500 KCMIL / #4/0 G	GENSET POWER BREAKER	STEP UP XFMR BREAK (1000 KVA)
PC-GEN-JW-BC-I	1.5	3#10AWG W/ #12AWG, 2#12AWG W/ #12AWG G	GENSET JACKET WATER HEATER/BATTERY CHGR	LV PANEL (LP-1)
CC-GEN-COM-CTRL-I	1	CAT 6 CABLE, 8 # 14AWG	GENSET CONTROL PANEL COMM	PLC #5
INTAKE TEMPERATURE TRANSMITTERS				
CC-CHEM-TEMP	0.75	1 PR #16AWG TWSP	COPPER ION PLC	CHEM BLDG TEMP XMTR
CC-COMP-TEMP	0.75	1 PR #16AWG TWSP	COMPRESSOR BLDG PLC	COMP BLDG TEMP XMTR

## CONDUIT & CABLE SCHEDULE

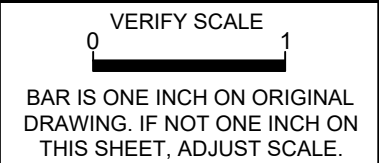
				PANELBOARD: LP-1 INTAKE							
MAIN BREAKER (AMPS):		60		ENCLOSURE UL RATING:		TYPE 1					
BUS RATING (AMPS):		125 *		MOUNTING:		WALL					
L-L VOLTAGE (VOLTS):		208		KAIC Rating:		10					
L-N VOLTAGE (VOLTS):		120		PHASE:		3					
NEUTRAL:		FULL		WIRE:		4					
CIRCUIT DESCRIPTION	LOAD KVA			BREAKER AMPS/ POLES	CIRCUIT NO	CIRCUIT NO	BREAKER AMPS/ POLES	LOAD KVA			CIRCUIT DESCRIPTION
	AΦ	BΦ	CΦ					AΦ	BΦ	CΦ	
RECEPTACLES	0.72			20/1	1	2	20/1				SPACE
SPARE				20/1	3	4	20/1				SPACE
SPARE				20/1	5	6	20/1				SPACE
PLC-5	1			20/1	7	8	20/1	0.6			SMOKE & HEAT DETECTORS
SPARE		0.1		20/1	9	10	20/1		0.1		SPARE
GATE 1 (ELEC BLDG)				20/3	13	14	20/3				GATE 2 (R.R. ENTRANCE)
JACKET WATER HEATER (NEW GENERATOR)			1.5	20/2	17	18	20/1				VALVE CONTOL PANELS (3)
	1.5				19	20	20/1	0.36			BATTERY CHARGER (NEW GENERATOR)
SPACE				20/1	21	22	20/1				SPACE
SPACE				20/1	23	24	20/1				SPACE
GATE 3 (ARM GATE)				20/1	25	26	20/1				SPACE
SPACE				20/1	27	28	20/1				SPACE
SPACE				20/1	29	30	20/1				SPACE
KVA SUMS:	3.22	0.1	1.5					0.96	0.1	0	
LOCATION:					INTAKE ELECTRICAL BUILDING						
SERVICE VOLTAGE:					120/208V						
TOTAL LOAD KVA:					5.88						
* INTEGRAL TVSS											

## PANELBOARD LP-1 MODIFIED SCHEDULE



## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

**ELECTRICAL**  
**INTAKE PANEL AND**  
**CONDUIT-CABLE SCHEDULES**

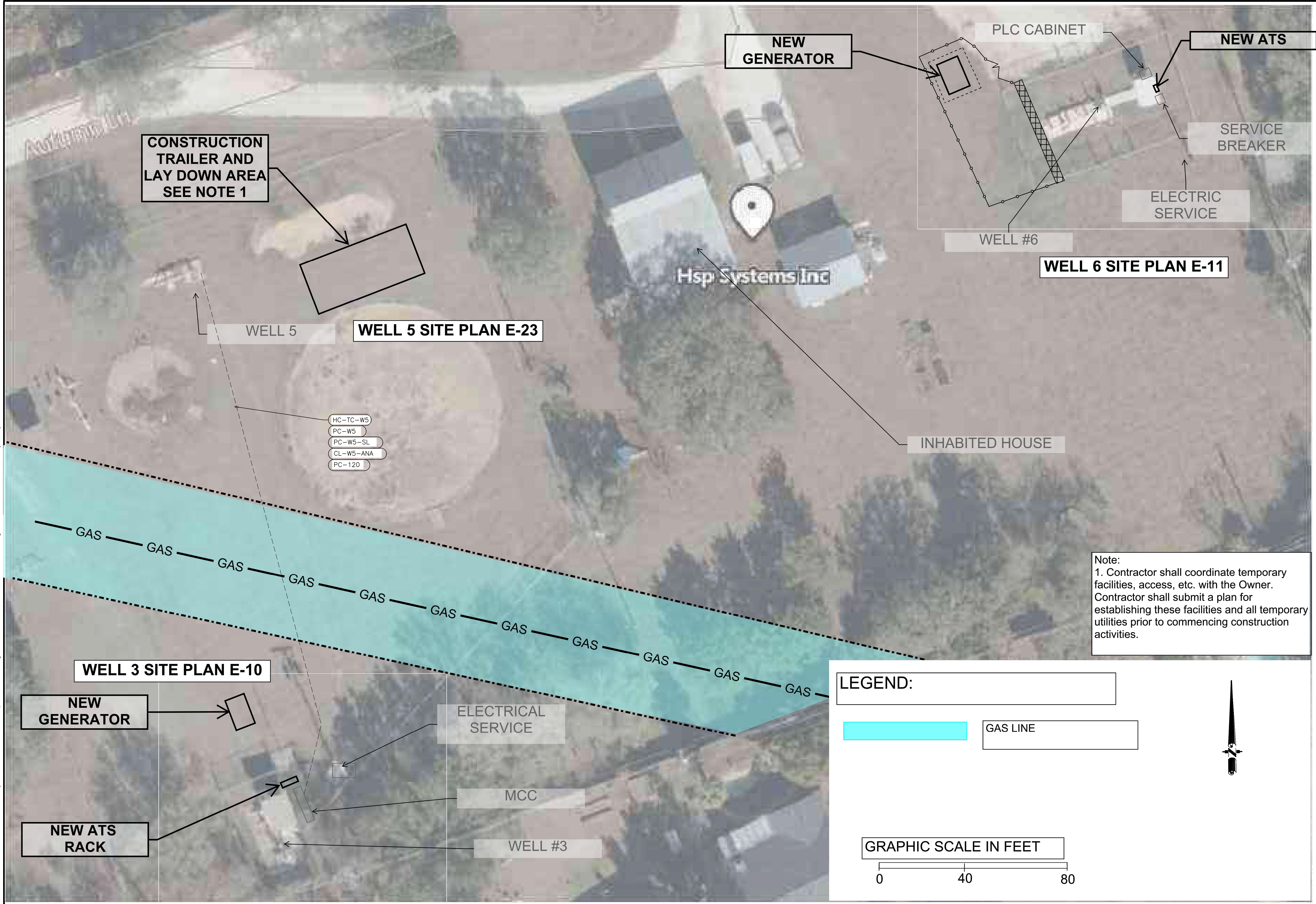


DESIGNED	<u>P. LANDGRAF</u>
DRAWN	<u>R. CHISHOLM</u>
CHECKED	<u>A. RISTOW</u>
REVIEWED	<u>A. RISTOW</u>
Seq.	of
	XX XXX
Dwg. No.	E-6

2023-0002-00



PRINTED: 10/26/2023 11:03 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 Drawings\8.3 sheets\Electrical\E-7 WELL SITES OVERVIEW.dwg    SAVED: 9/22/2023 9:04 AM    USER: Riva Banerjee



STATE OF TEXAS

JAMES E. LANDGRAF

75428

PROFESSIONAL ENGINEER

10/25/2023

										BY
										REVISION
										DATE
										NO.

3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053

Brushy Creek  
Municipal Utility District

BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

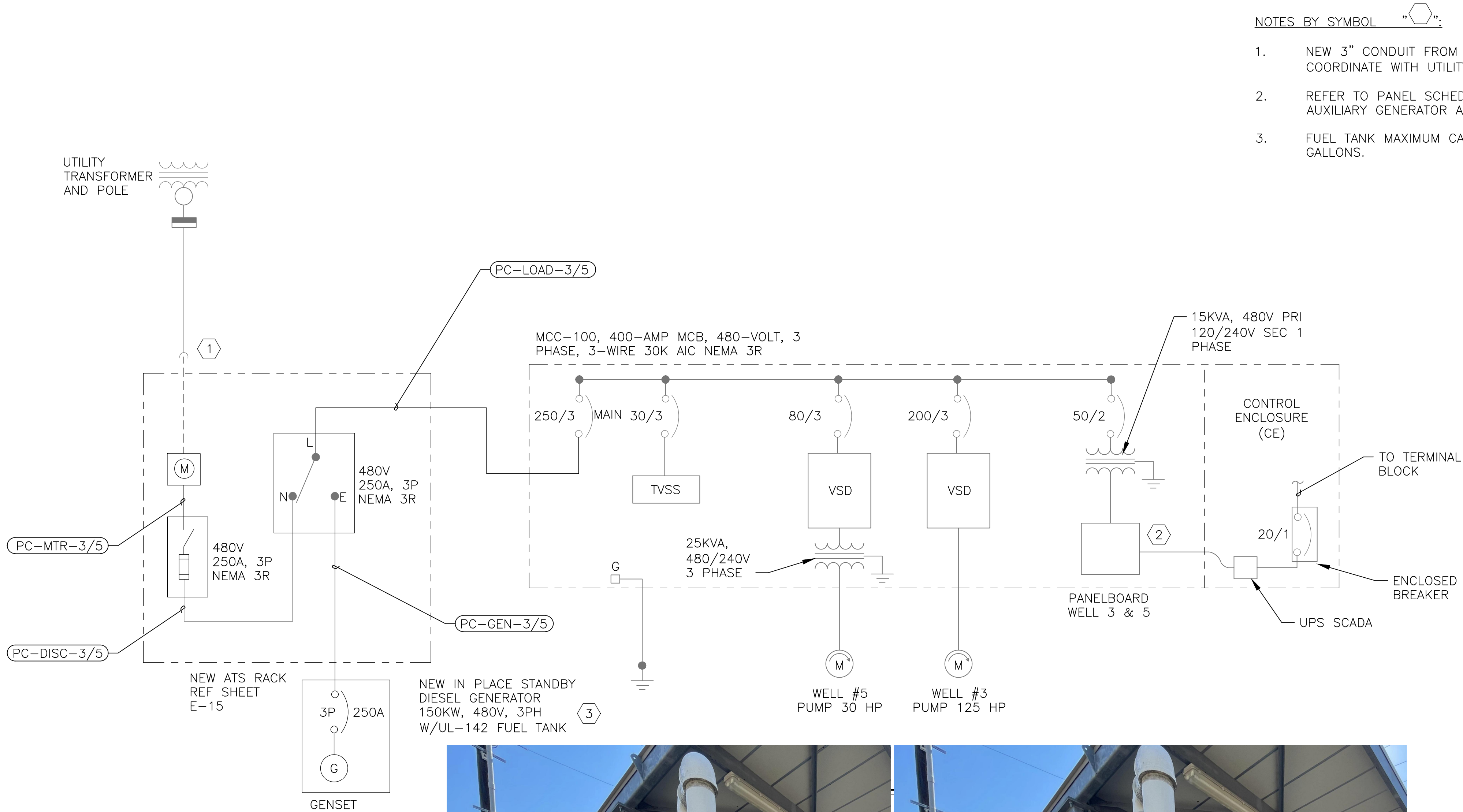
ELECTRICAL  
WELL SITES OVERVIEW

VERIFY SCALE  
0 1  
BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE

DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW  
Seq. of  
XX XXX  
Dwg. No. E-7  
2023-0002-00



PRINTED: 10/26/2023 2:17 PM | PROJECT:Brushy Creek winterization and electrical improvements8.0 drawings8.3 sheetsElectricalE-8 WELL 3 & 5 ONE LINE.dwg, SAVED: 10/26/2023 9:46 AM, USER: Riya Banerjee



NOTES BY SYMBOL "":

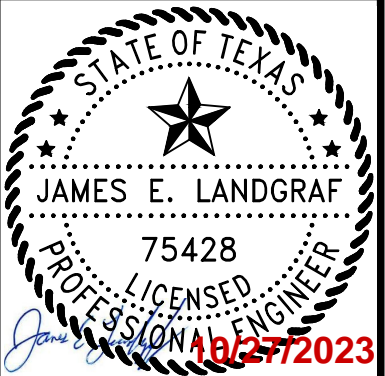
- NEW 3" CONDUIT FROM METER TO SERVICE POLE. COORDINATE WITH UTILITY (ONCOR).
- REFER TO PANEL SCHEDULE ON SHEET E-12 FOR AUXILIARY GENERATOR AND HEAT TRACE CIRCUITS.
- FUEL TANK MAXIMUM CAPACITY SHALL BE LESS THAN 500 GALLONS.



EXISTING METER



NEW ATS RACK



NO.	DATE	REVISION	BY



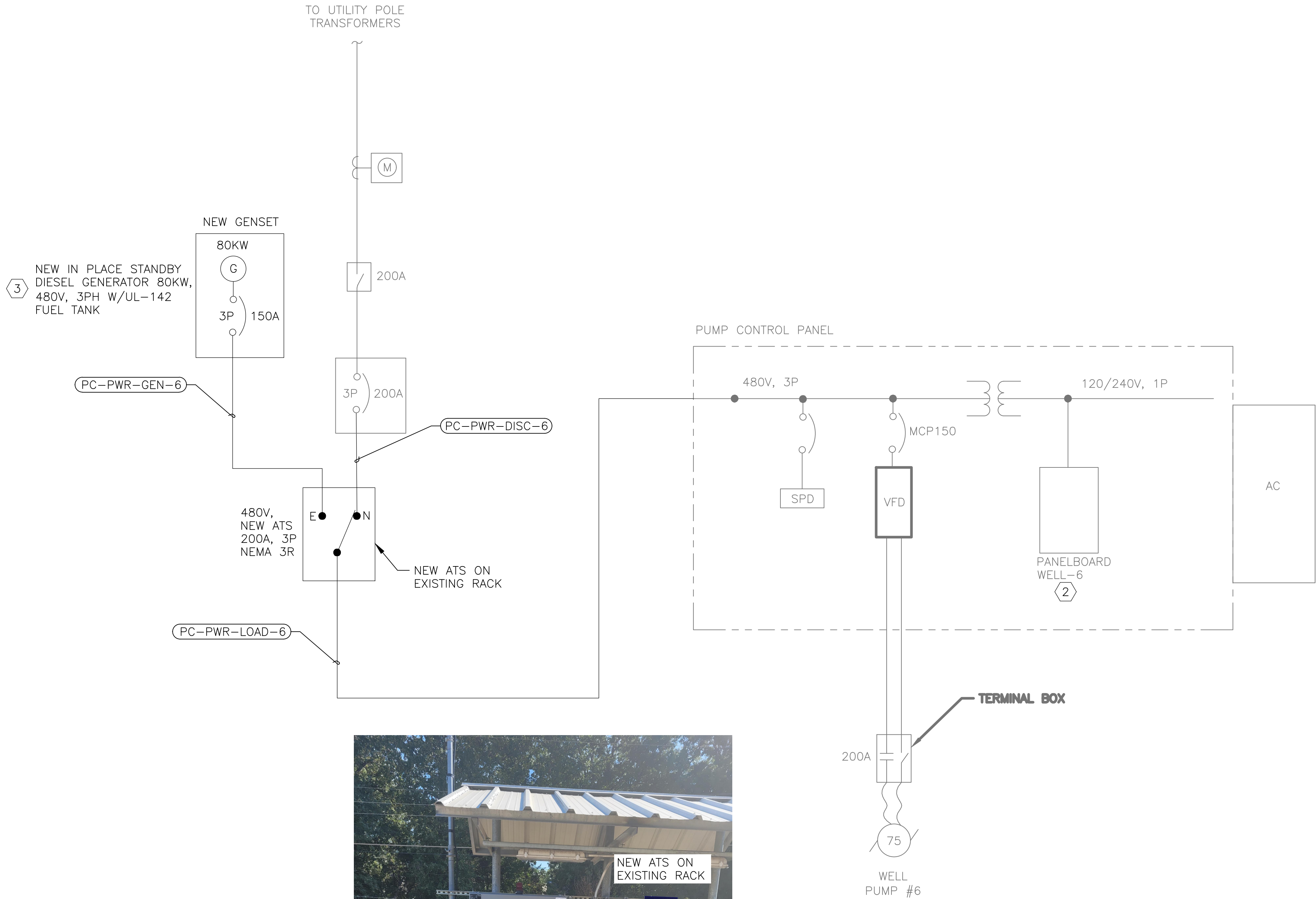
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WELL 3 & 5 ONE LINE

DESIGNED	P. LANDGRAF
DRAWN	T. FORNEY
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	XX XXX
Dwg. No.	E-8
2023-0002-00	



PRINTED: 10/26/2023 2:27 PM | PROJECT:Brushy Creek winterization and electrical improvements8.0 drawings8.3 sheetsElectricalE-9 WELL 6 ONE LINE.dwg. SAVED: 10/26/2023 9:56 AM USER: Riya Banerjee



WELL SITE NO. 6 ONE LINE DIAGRAM

- NOTES BY SYMBOL "":
- NEW 3" CONDUIT FROM METER TO SERVICE POLE. COORDINATE WITH UTILITY (ONCOR).
  - REFER TO PANEL SCHEDULE ON SHEET E-12 FOR AUXILIARY GENERATOR AND HEAT TRACE CIRCUITS.
  - FUEL TANK MAXIMUM CAPACITY SHALL BE LESS THAN 500GALLONS.



NO.	DATE	REVISION	BY

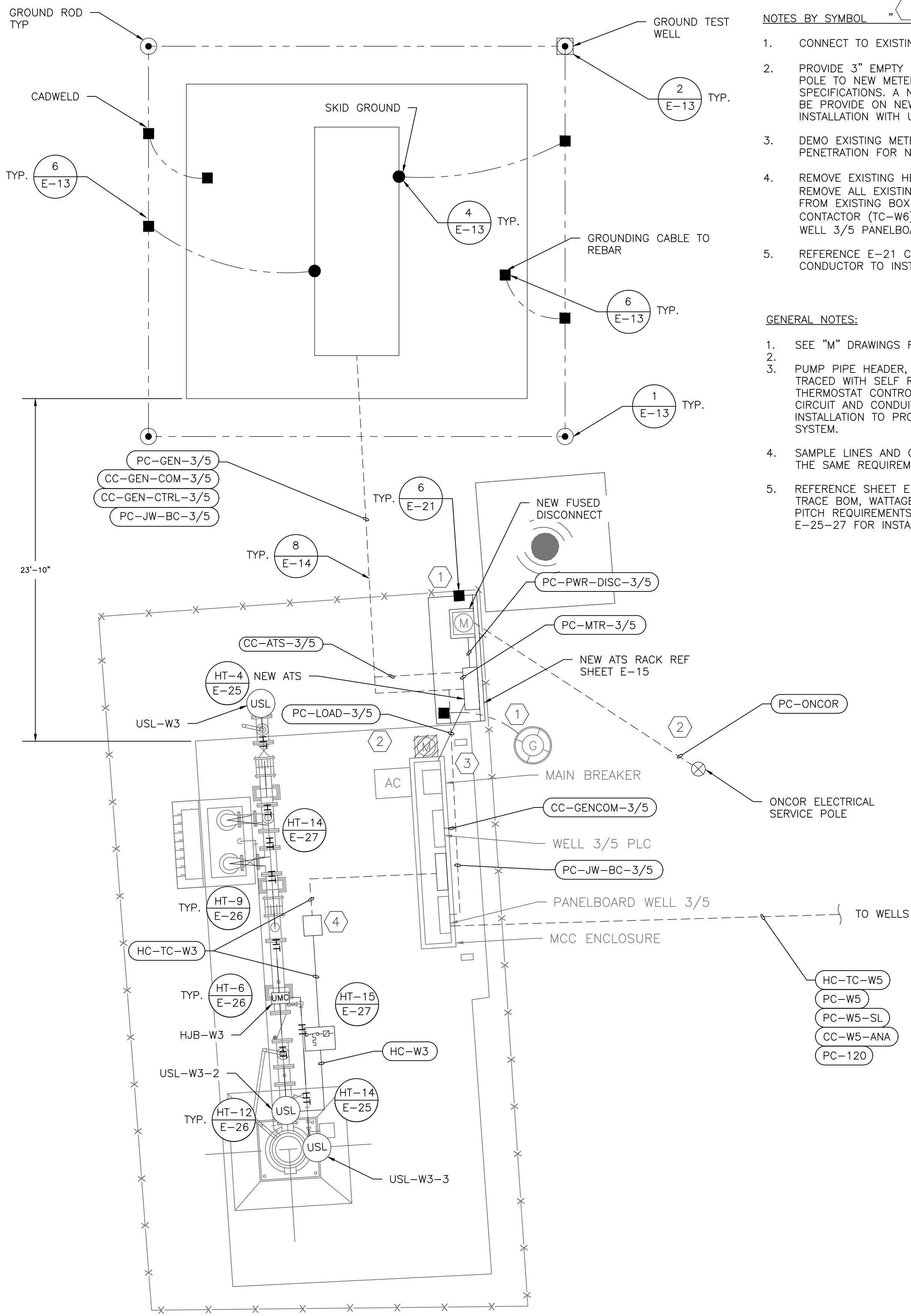


BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
ELECTRICAL  
WELL 6 ONE LINE

DESIGNED	P. LANDGRAF
DRAWN	T. FORNEY
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	XX XXX
Dwg. No.	E-9
2023-0002-00	



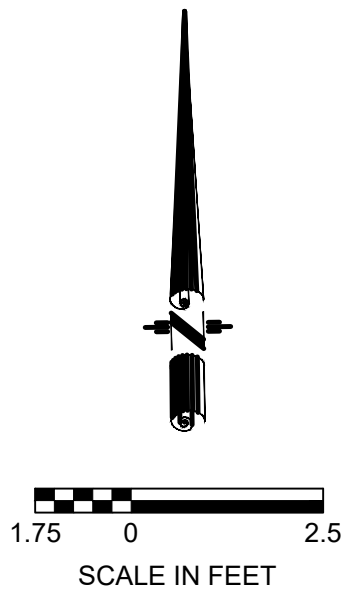
PRINTED: 10/26/2023 11:05 AM | PROJECT: brushy creek winterization and electrical improvements | 10 sheets | Electrical | E-10 WELL 3 SITE PLAN | User: Riya Banerjee



- NOTES BY SYMBOL "⬡":
- CONNECT TO EXISTING GROUND GRID.
  - PROVIDE 3" EMPTY CONDUIT FROM EXISTING METER POLE TO NEW METER CAN ON ATS RACK PER ONCOR SPECIFICATIONS. A NEW METER CAN WITH SOCKET TO BE PROVIDE ON NEW ATS RACK. COORDINATE INSTALLATION WITH UTILITY.
  - DEMO EXISTING METER CAN AND USE EXISTING PENETRATION FOR NEW MCC FEED FROM ATS.
  - REMOVE EXISTING HEATRACE CIRCUIT IN 1" CONDUIT. REMOVE ALL EXISTING HEAT TRACE. ADD 1" CONDUIT FROM EXISTING BOX TO THERMOSTAT CONTROLLED CONTACTOR (TC-W6). INSTALL 4#12 W/#12G FROM WELL 3/5 PANELBOARD TO TC-W3.
  - REFERENCE E-21 CONDUIT AND CABLE SCHEDULE FOR CONDUCTOR TO INSTALL.

- GENERAL NOTES:
- SEE "M" DRAWINGS FOR HEAT TRACE INSULATION DETAILS.
  - PUMP PIPE HEADER, VALVES AND INSTRUMENTS SHALL BE HEAT TRACED WITH SELF REGULATING HEATING CABLE INCLUDING A THERMOSTAT CONTROL CONTACTOR. CONTRACTOR SHALL PROVIDE CIRCUIT AND CONDUIT FROM BREAKER AS PART OF ELECTRICAL INSTALLATION TO PROVIDE POWER TO THE PROPOSED HEAT TRACE SYSTEM.
  - SAMPLE LINES AND CHEMICAL LINES SHALL BE HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
  - REFERENCE SHEET E-22 WTP HEAT TRACE SCHEDULE FOR HEAT TRACE BOM, WATTAGE, POWER CONNECTION AND HEAT TRACE PITCH REQUIREMENTS. REFERENCE HEAT TRACE DETAILS SHEETS E-25-27 FOR INSTALLATION DETAILS.

WELL 3 SITE PLAN  
SCALE: 1" = 2'-6"



NO.	DATE	REVISION	BY



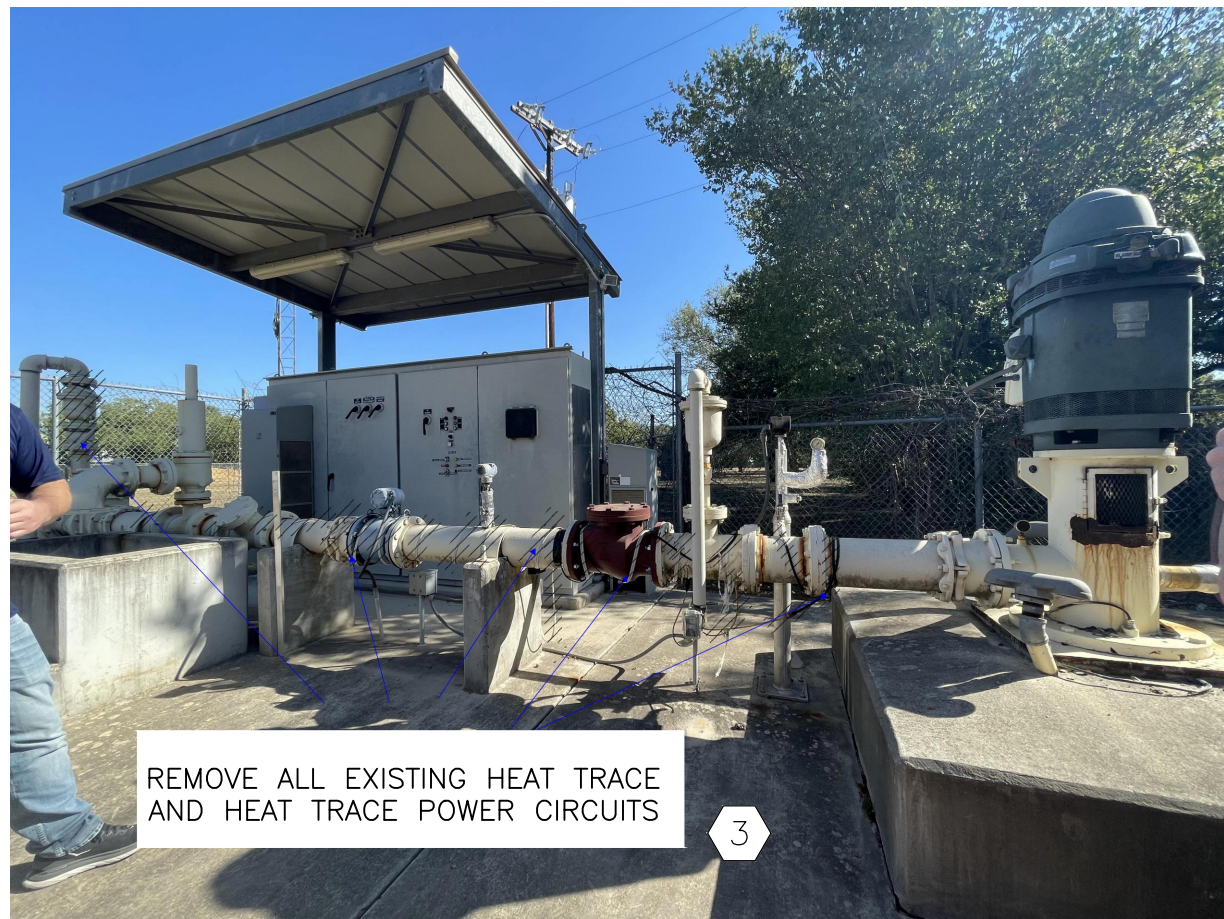
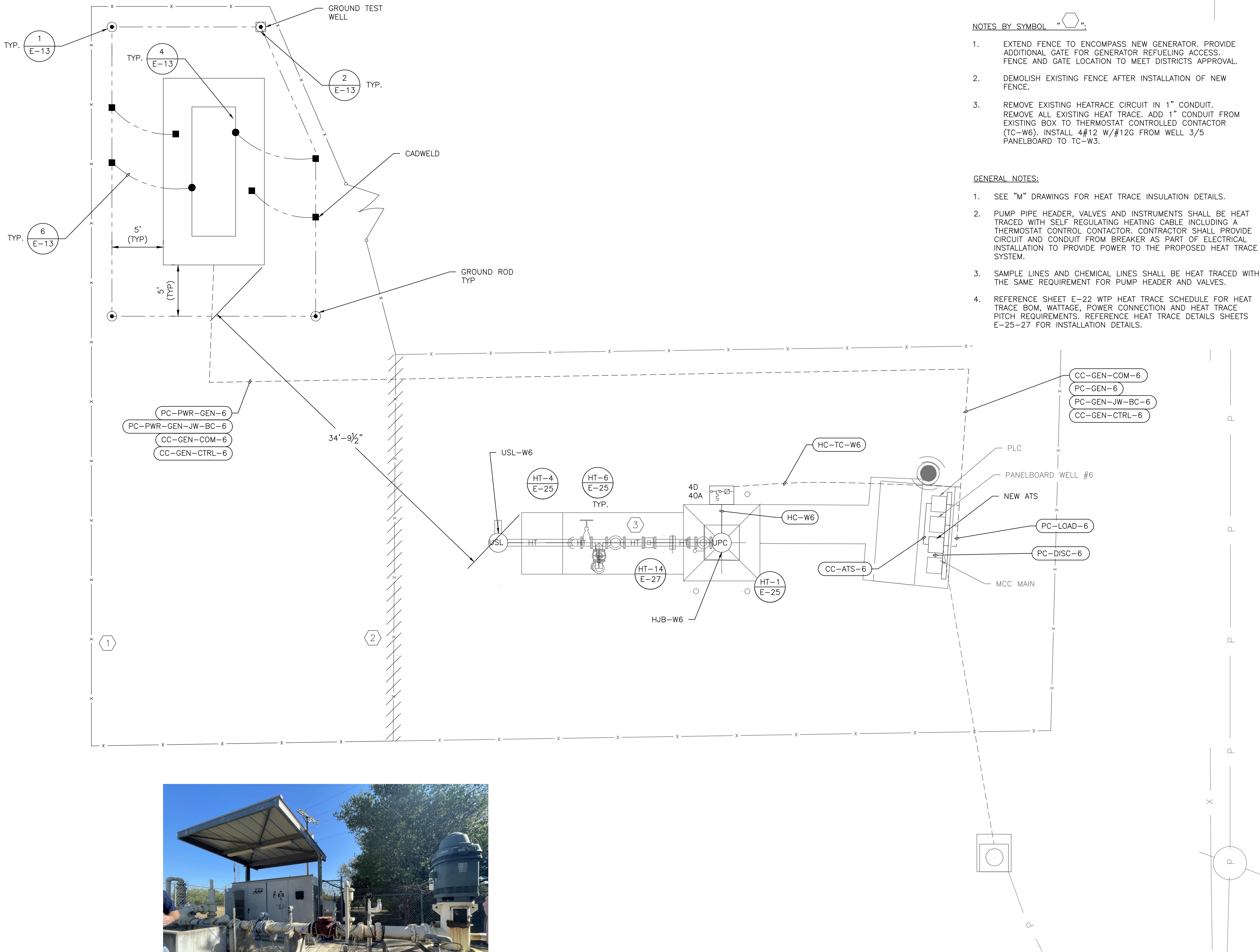
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WELL 3 SITE PLAN

DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	XX XXX
Dwg. No.	E-10
2023-0002-00	



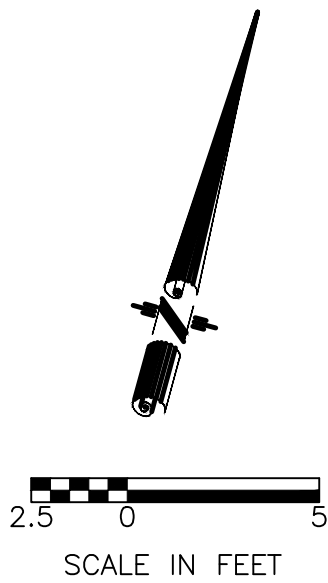
PRINTED: 10/26/2023 11:07 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-11 WELL 6 SITE PLAN.dwg    SAVED: 10/26/2023 10:03 AM    USER: Ryan Bonerjee



WELL 6 SITE PLAN  
SCALE: 1" = 5'-0"

- NOTES BY SYMBOL "⬡":
- EXTEND FENCE TO ENCOMPASS NEW GENERATOR. PROVIDE ADDITIONAL GATE FOR GENERATOR REFUELING ACCESS. FENCE AND GATE LOCATION TO MEET DISTRICTS APPROVAL.
  - DEMOLISH EXISTING FENCE AFTER INSTALLATION OF NEW FENCE.
  - REMOVE EXISTING HEATTRACE CIRCUIT IN 1" CONDUIT. REMOVE ALL EXISTING HEAT TRACE. ADD 1" CONDUIT FROM EXISTING BOX TO THERMOSTAT CONTROLLED CONTACTOR (TC-W6). INSTALL 4#12 W/#12G FROM WELL 3/5 PANELBOARD TO TC-W3.

- GENERAL NOTES:
- SEE "M" DRAWINGS FOR HEAT TRACE INSULATION DETAILS.
  - PUMP PIPE HEADER, VALVES AND INSTRUMENTS SHALL BE HEAT TRACED WITH SELF REGULATING HEATING CABLE INCLUDING A THERMOSTAT CONTROL CONTACTOR. CONTRACTOR SHALL PROVIDE CIRCUIT AND CONDUIT FROM BREAKER AS PART OF ELECTRICAL INSTALLATION TO PROVIDE POWER TO THE PROPOSED HEAT TRACE SYSTEM.
  - SAMPLE LINES AND CHEMICAL LINES SHALL BE HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
  - REFERENCE SHEET E-22 WTP HEAT TRACE SCHEDULE FOR HEAT TRACE BOM, WATTAGE, POWER CONNECTION AND HEAT TRACE PITCH REQUIREMENTS. REFERENCE HEAT TRACE DETAILS SHEETS E-25-27 FOR INSTALLATION DETAILS.



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BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WELL 6 SITE PLAN

DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of XX XXX
Dwg. No.	E-11
2023-0002-00	



WELL 6 GENERATOR ADDITION				
CONDUIT TAG	CONDUIT SIZE (INCH)	CONDUCTORS IN EACH SET	FROM	TO
PC-GEN-6	3	3#2/0AWG W/#2 AWG G	GENSET POWER BREAKER	ATS Emergency
PC-DISC-6	3	3#2/0AWG W/#2 AWG G	FUSED DISCONNECT	ATS NORMAL
PC-LOAD-6	3	3#2/0AWG W/#2 AWG G	ATS LOAD	MCC MAIN
PC-GEN-JW-BC-6	1.5	3#10AWG W/ #12AWG G, 2#12AWG W/ #12AWG G	GENSET JACKET WATER HEATER	PANELBOARD WELL 6
CC-GEN-COM-6	1	CAT 6 CABLE	GENSET CONTROL PANEL COMM	NETWORK SWITCH PLC CONTROL PANEL
CC-GEN-CTRL-6	1	8 # 14AWG	GENSET CONTROL PANEL I/O	ATS
CC-ATS-6	1	8 # 14AWG	ATS	WELL 3 PLC
WELL 6 HEAT TRACE				
HC-TC-W6	1	4#12AWG W/ #12AWG G	PNWELBOARD WELL 6	TC-W6
HC-W6	3	4#12AWG W/ #12AWG G	TC-W6	H/B-W6

## WELL 6 CONDUIT & CABLE SCHEDULE

PANELBOARD: WELL 6											
MAIN BREAKER (AMPS):		70 2-POLE		ENCLOSURE UL RATING:							
BUS RATING (AMPS):		100		MOUNTING:		INTEGRAL					
L-L VOLTAGE (VOLTS):		240		AMPERE INTERRUPT RATING:		10,000					
L-N VOLTAGE (VOLTS):		120		PHASE:		1					
NEUTRAL: "100%"				WIRE:		3					
LOAD SERVED	LOAD VA (VOLT AMPS)		LOAD TYPE	BREAKER AMPS/ POLES	CIRCUIT NO	CIRCUIT NO	BREAKER AMPS/ POLES	LOAD TYPE	LOAD VA (VOLT AMPS)		LOAD SERVED
	AΦ	BΦ							AΦ	BΦ	
PLC	250	BΦ	3	20/1	1	2	20/1	1	100	BΦ	LIGHTS
FLOW METER		100	3	20/1	3	4	20/1	3		100	RECEPTACLE
SPARE	1000		1	20/1	5	6			650		HJB-W5 HEAT TRACE 30MA GFIC
JACKET WATER HEATER (New Generator)		500	3	20/2	7	8	20/2	5		650	TC-W5 THERMOSTAT CONTROL
	500		3		9	10	20/1	3	50		
BATTERY CHARGER (New Generator)		250	3	20/1	11	12					SPARE

LOADS:	PHASE A:	2550	LOADS TYPES:	1=LIGHTING
	PHASE B:	1600		2=RECEPTACLES
				3=MISC .
				4=MOTOR
	TOTAL:	4150		5=HEATER

## PANELBOARD WELL 6 MODIFIED SCHEDULE

1. PROVIDE NEW BREAKERS IN EXISTING PANEL FOR NEW GENERATOR CIRCUITS.



# WELL SITES PANEL AND CONDUIT & CABLE SCHEDULES

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

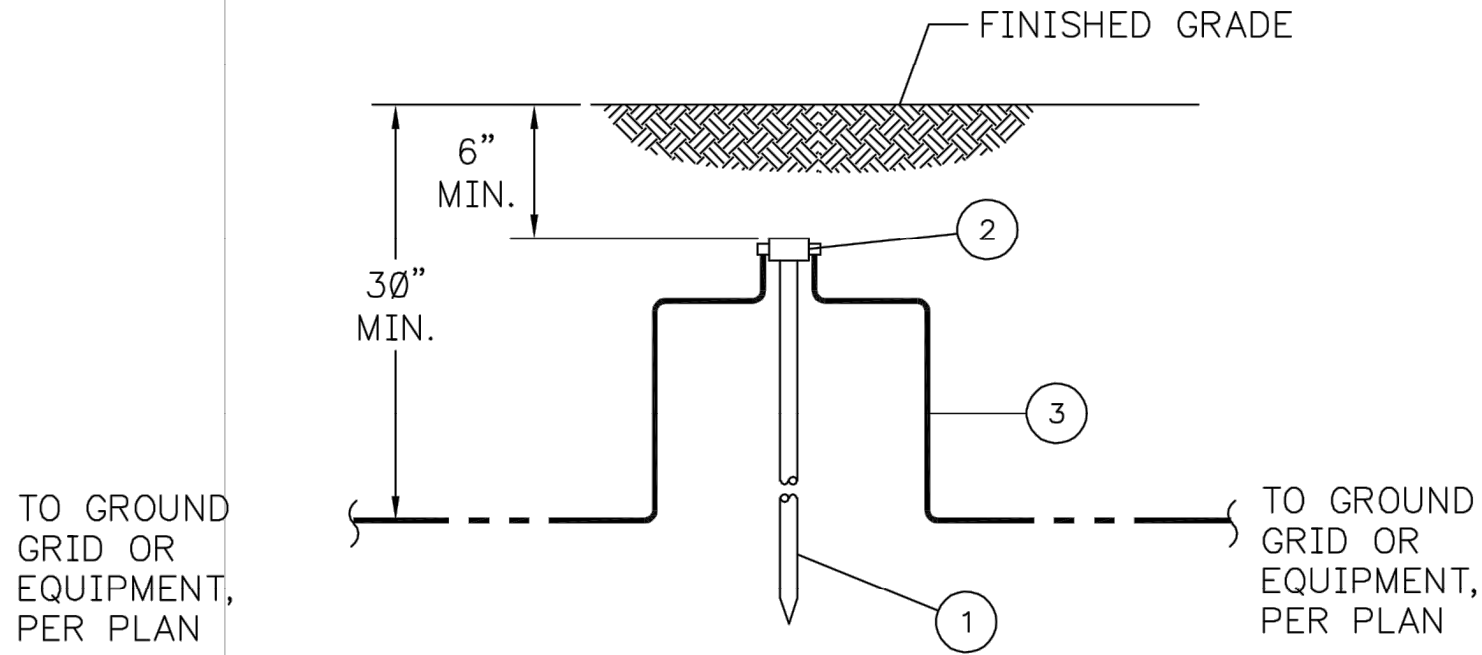
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Dwg.  
No. E-12

2023-0002-00



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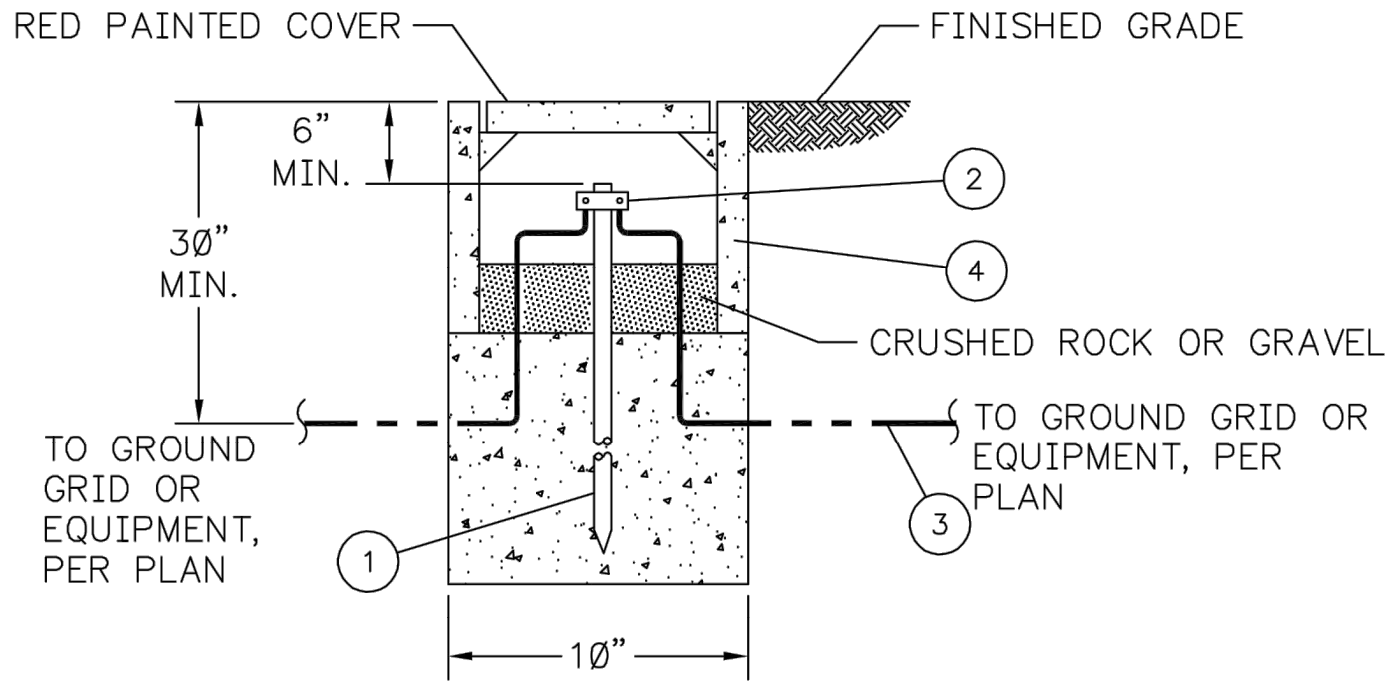


NOTE:  
CADWELD GROUND ROD SPLICE CONNECTIONS ARE TO BE USED IN THE EVENT WHERE ADDITIONAL GROUND RODS ARE REQUIRED TO EXTEND ROD LENGTH BEYOND 10'. ELECTRICAL CONTRACTOR SHALL USE CADWELD CAT. NO. HDGBD-18 MOLD WITH CAT. NO. 2-200 WELD METAL (OR EQUAL).

BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	1	GROUND ROD, 3/4" DIA. X 10' LONG COPPER CLAD STEEL, THOMPSON #TL3410 OR EQUAL
2	1	CONNECTOR, STR. CABLE TO GND. ROD, CADWELD GTC OR GYR
3	A/R	GROUND WIRE, MAIN GRID (SIZE PER GENERAL NOTES)

### 1 GROUND ROD

SCALE: NONE

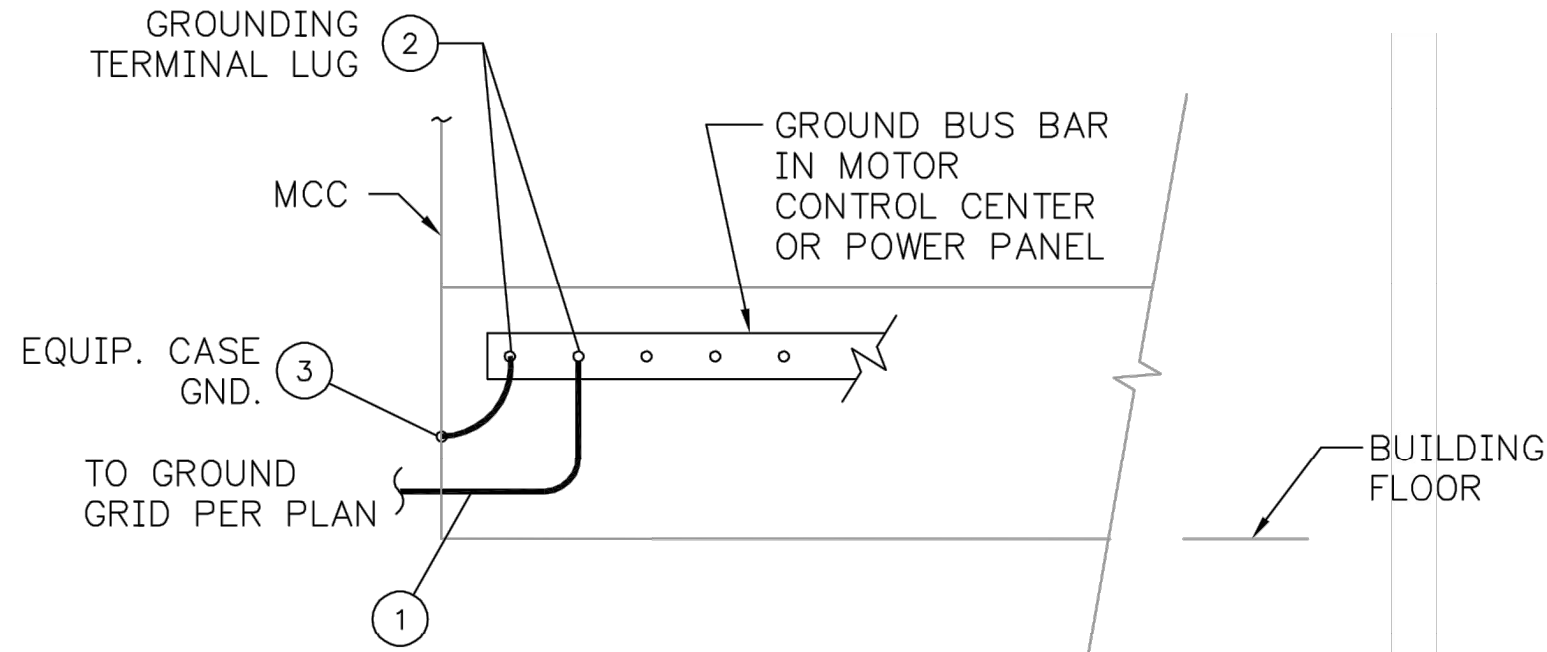


NOTE:  
CADWELD SPLICE CONNECTIONS ARE TO BE USED IN THE EVENT WHERE ADDITIONAL GROUND RODS ARE REQUIRED TO EXTEND ROD LENGTH BEYOND 10'. ELECTRICAL CONTRACTOR SHALL USE CADWELD CAT. NO. HDGBD-18 MOLD WITH CAT. NO. 2-200 WELD METAL (OR EQUAL)

BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	1	GROUND ROD, 3/4" DIA. X 10' LONG COPPER CLAD STEEL, THOMPSON #TL3410 OR EQUAL
2	1	GROUND CONNECTOR, BURNDY #GAR6429 OR EQUAL
3	A/R	GROUND WIRE, MAIN GRID (SIZE PER GENERAL NOTES)
4	1	GROUND ACCESS WELL, HARGER P/N 358TC OR EQUAL

### 2 GROUND TEST WELL

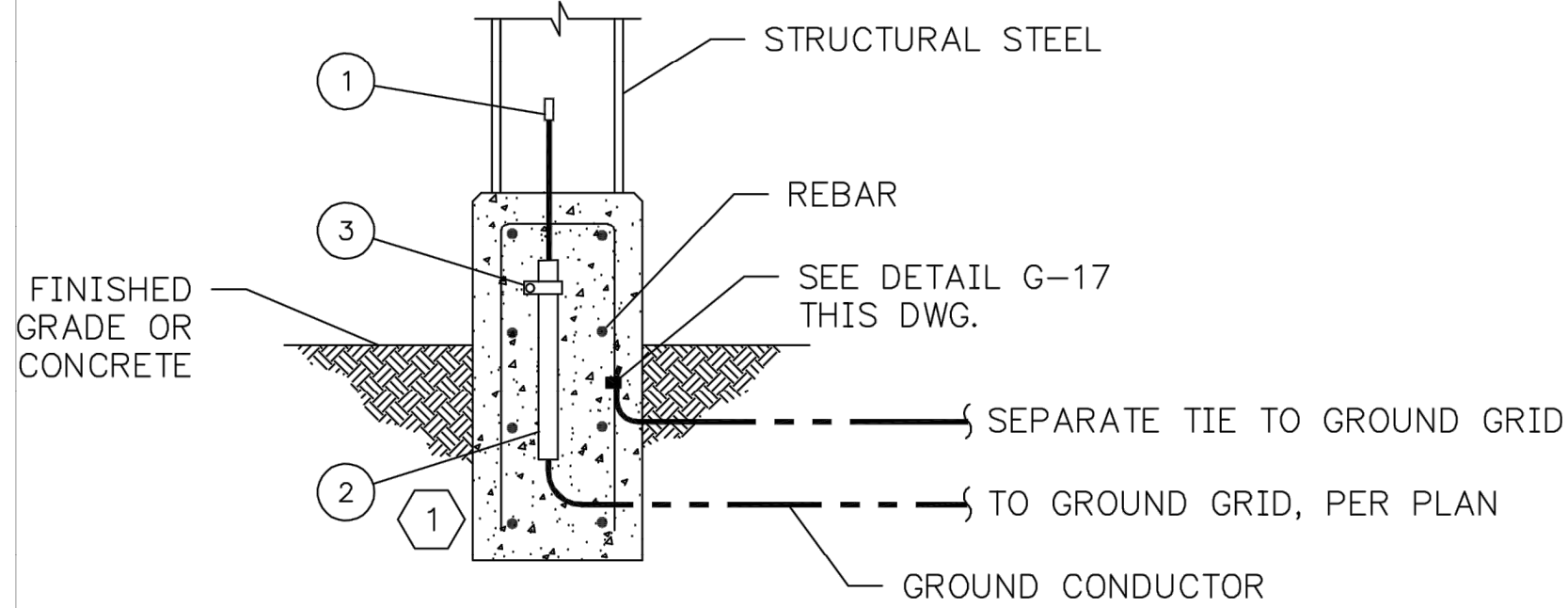
SCALE: NONE



BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	A/R	GROUND WIRE, TAP
2	1	GROUND LUG, BURNDY #KPA34UNPL
3	1	GROUND CONNECTION, BURNDY SERVIT POST #K2C26

### 3 MCC/POWER PANEL GROUND

SCALE: NONE

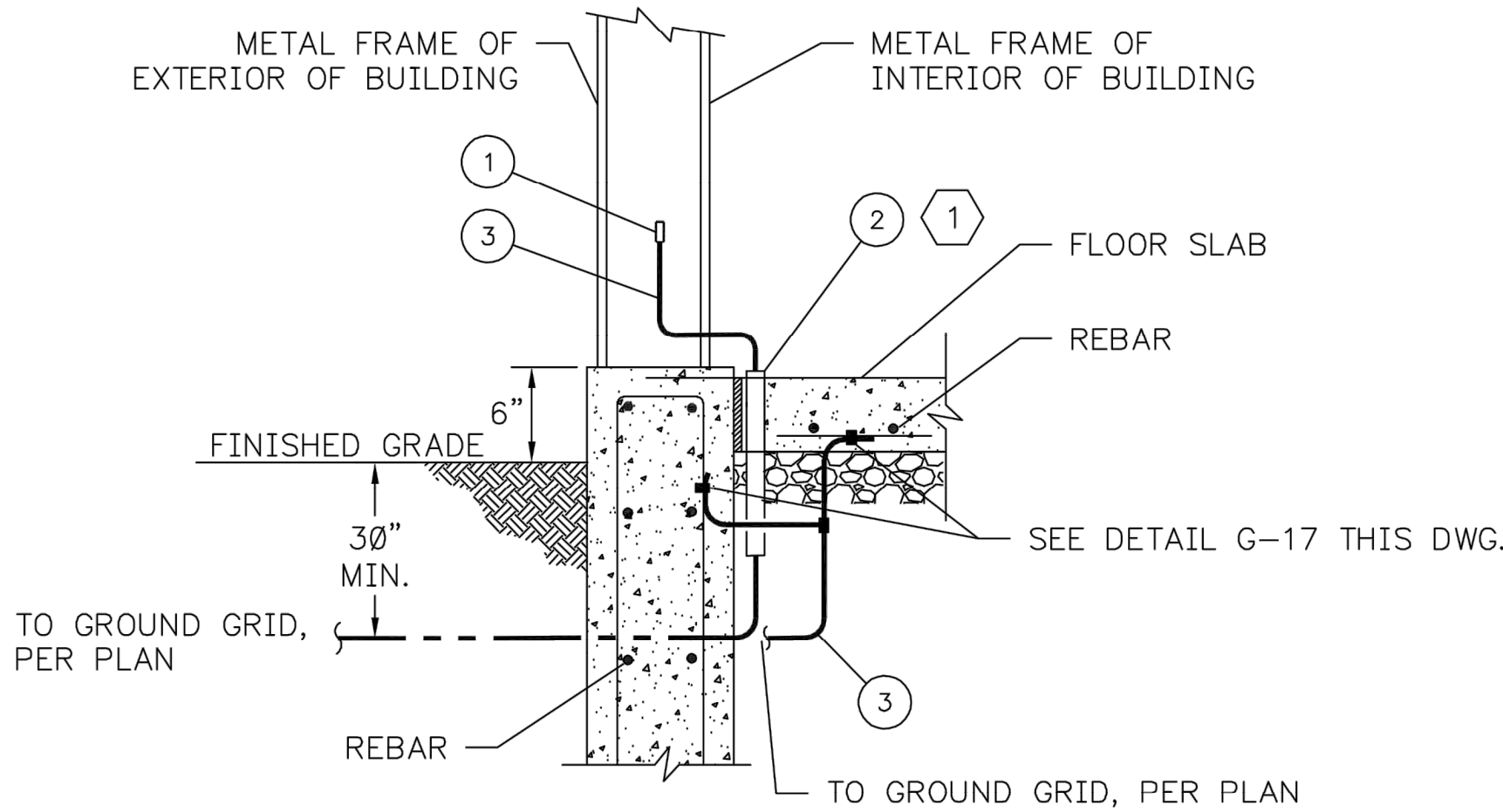


NOTE:  
THIS DETAIL APPLIES TO BUILDING STRUCTURAL STEEL AND PIPE RACK GROUNDING.

BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	1	VERTICAL STEEL SURFACE CONNECTION, CADWELD VS OR HS OR HA
2	1	PVC CONDUIT SLEEVE, 3/4" x 1'-6" LONG, SCHEDULE 80
3	1	CONDUIT CLAMP, THOMAS & BETTS #1278, CADMIUM PLATED ANCHOR BOLT OR EQUAL

### 4 SKID/STRUCTURAL STEEL GROUND

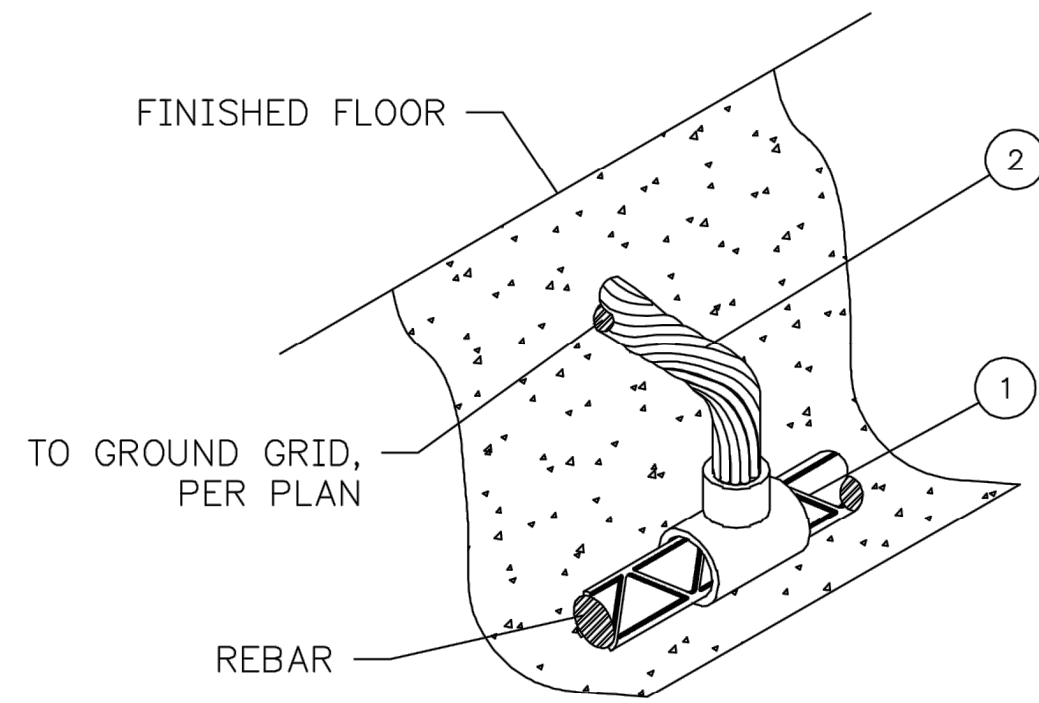
SCALE: NONE



BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	1	CADWELD CONNECTION, CADWELD # VS OR HA OR HS
2	1	PVC CONDUIT SLEEVE, 3/4" x 2'-0" LONG, SCHEDULE 80
3	A/R	GROUND WIRE TAP (SIZE PER GENERAL NOTES)

### 5 STEEL STRUCTURE & FOUNDATION

SCALE: NONE



NOTE:  
THE AVERAGE MOLD LIFE IS FIFTY CONNECTIONS.

BILL OF MATERIAL		
ITEM	QTY.	DESCRIPTION
1	1	GROUND WIRE TO #5 REBAR MOLD, CADWELD # RG OR RH OR RK
2	A/R	GROUND WIRE TAP (SIZE PER GENERAL NOTES)

### 6 GROUNDING CABLE TO REBAR

SCALE: NONE



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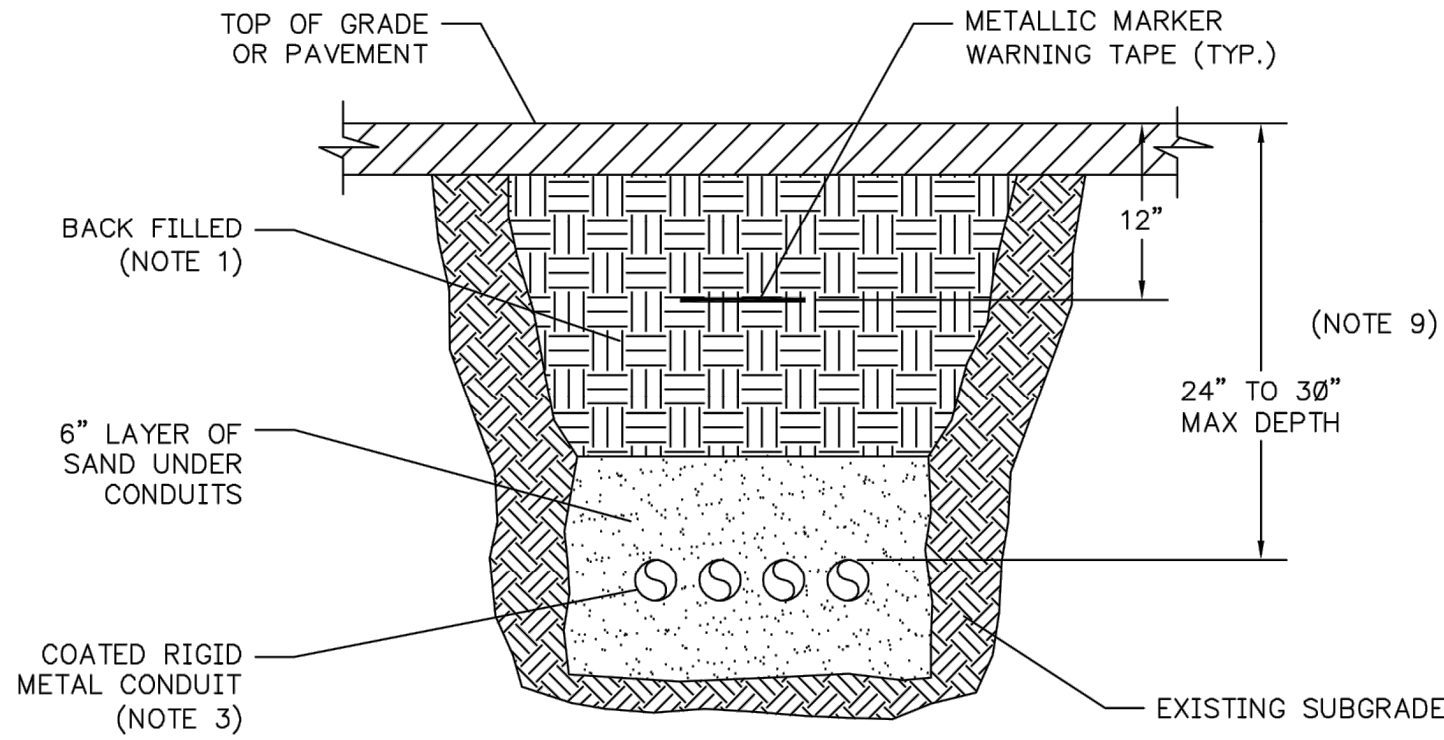
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
DETAILS 1 OF 2

VERIFY SCALE	
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BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE.	
DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of
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2023-0002-00	



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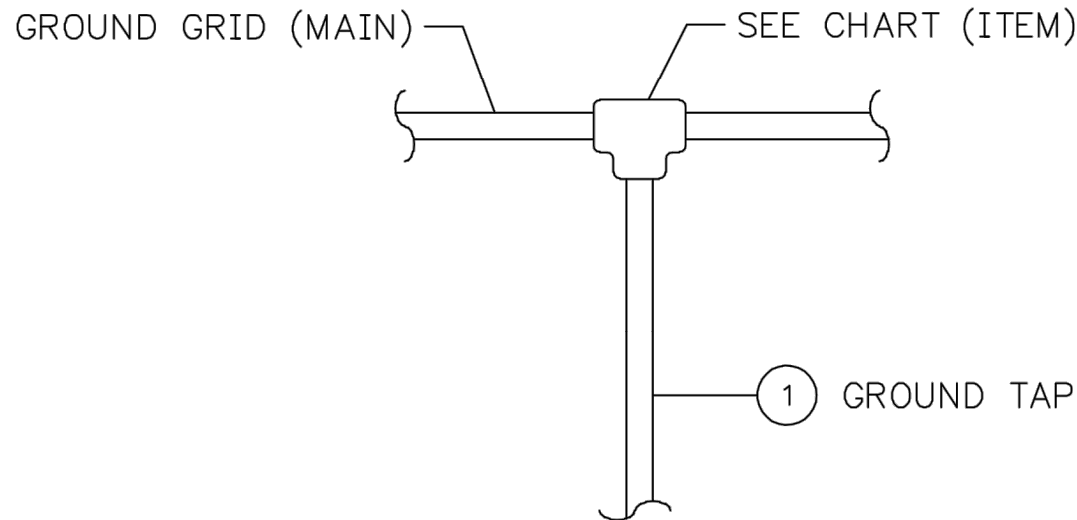


NOTES:

- TRENCH IS TO BE CLEARED OF ROCKS AND DIRT LUMPS BEFORE PLACING SAND INTO IT.
- CABLES OR CONDUITS MUST NOT CROSS EACH OTHER WHEN ENTERING OR LEAVING THE TRENCH.
- UNDERGROUND CONDUIT TO BE RIGID METAL CONDUIT WITH PLASTIBOND, TRANSITION TO SURFACE USING RIGID METAL CONDUIT (PLASTIBOND OR EQUAL) WITH LONG SWEEP BEND (PLASTIBOND OR EQUAL) OF MINIMUM 24" INCH RADIUS.
- SLOPE TRENCH AND CONDUITS DOWNWARD AND AWAY FROM BUILDINGS, A MINIMUM OF 6" PER 100' SLOPE.
- CONTROL CONDUITS AND ELECTRICAL CONDUITS ARE TO BE GROUPED SEPARATELY WITHIN THE TRENCH.
- CONTRACTOR WILL DETERMINE SIZE OF TRENCH NECESSARY TO ACCOMMODATE ALL POWER, LIGHTING AND CONTROL CONDUITS, MAINTAINING 6" OF SAND COVER SURROUNDING ALL CONDUITS IN TRENCH.
- DIRECT BURIED CONDUITS WILL BE USED FOR CONDUIT TO ELECTRICAL EQUIPMENT FOR ALL OTHER APPLICATIONS OTHER THAN DETAIL E-100 & E-103 (THIS SHEET).
- USE SEPARATORS (CARLON SNAP-N-STAC) INSTALLED IN INTERVALS OF 5'. ANCHOR SPACERS WITH #5 REBAR DRIVEN INTO SOLID EARTH.
- DISTANCE SHALL BE INCREASED TO KEEP CABLES BELOW THE FROST LINE DEPENDING ON SITE SPECIFIC CONDITIONS.

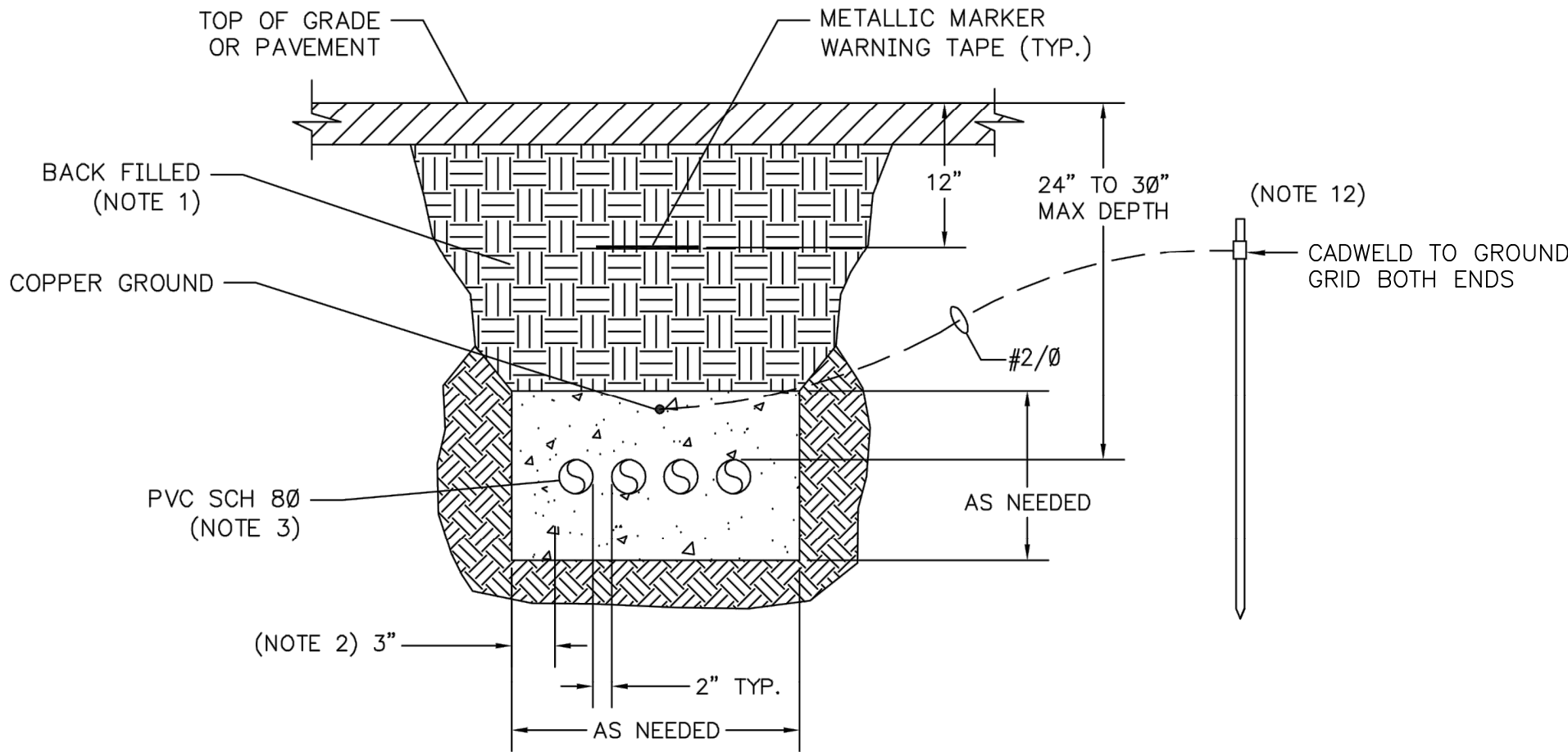
7 DIRECT BURIED  
SCALE: NONE

MAIN	TAP	ITEM
#4/Ø	1	2 7
#2/Ø	1	3 6
#4	1	4 5



BILL OF MATERIAL			
ITEM	SIZE	DESCRIPTION	MATERIAL
1	#2 AWG	CABLE, GREEN, THWN INSULATION (TAP)	COPPER
2	—	CADWELD MOLD, #4/Ø MAIN	GRAPHITE
3	—	CADWELD MOLD, #2/Ø MAIN	GRAPHITE
4	—	CADWELD MOLD, #4 MAIN	GRAPHITE
5	—	WELD METAL, CADWELD #32	STANDARD
6	—	WELD METAL, CADWELD #45	STANDARD
7	—	WELD METAL, CADWELD #9Ø	STANDARD

9 TYPICAL GROUNDING TAP-CADWELD  
SCALE: NONE

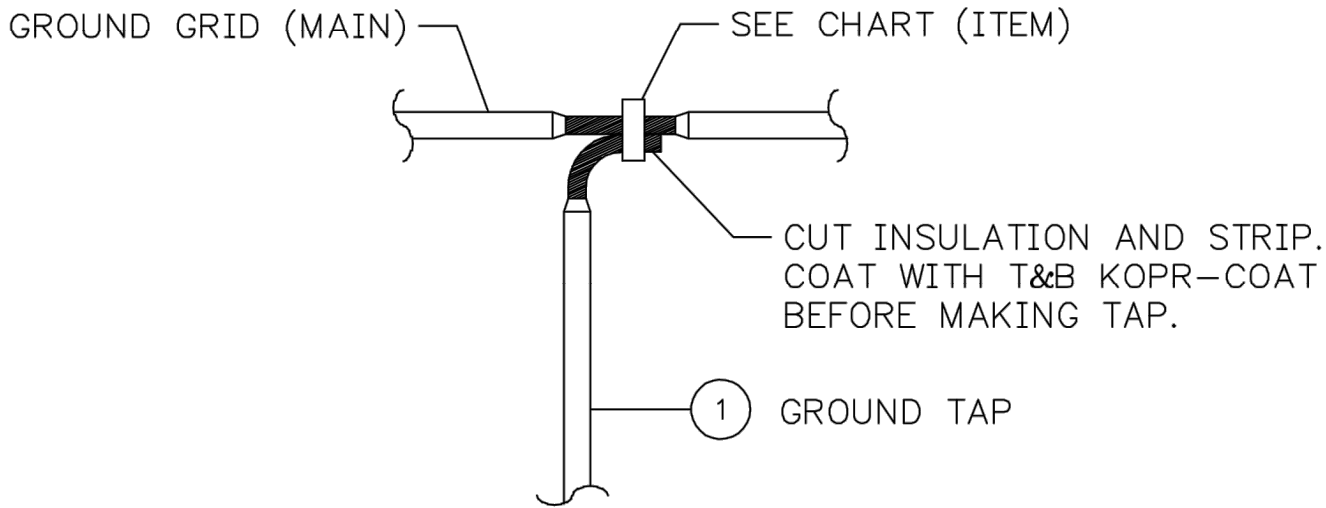


NOTES:

- REMOVE ROCKS, CONCRETE, OR OTHER DEBRIS ENCOUNTERED DURING EXCAVATION.
- DUCT BANK SHALL HAVE A MINIMUM OF 3" OF CONCRETE COVER ON ALL SIDES.
- UNDERGROUND DUCT BANKS TO BE PVC CONDUIT, TRANSITION TO SURFACE USING RIGID METAL COATED CONDUIT (PLASTIBOND OR EQUAL) WITH LONG SWEEP BEND (PLASTIBOND OR EQUAL) OF MINIMUM 24" INCH RADIUS.
- CONCRETE TO BE 3,000 PSI AT 28 DAYS, RED FERROUS OXIDE COLORING ADDED TO CONCRETE AT 1 POUND PER 60 POUNDS OF CEMENT.
- SLOPE DUCT BANK DOWNWARD, TOWARD MANHOLE, AND AWAY FROM BUILDINGS, A MINIMUM OF 6" PER 100' SLOPE.
- PROVIDE BELL END FITTING ON DUCTS WHERE THE DUCTS ENTER MANHOLES, EQUIPMENT PAD OR BUILDINGS.
- CONTRACTOR SHALL CLEAN OUT THE DUCT, USING A FLEXIBLE MANDREL AND A STIFF BRISTLED BRUSH, PRIOR TO CABLE PULLING.
- CONTROL CONDUITS AND ELECTRICAL CONDUITS ARE TO BE GROUPED SEPARATELY WITHIN THE DUCT BANK.
- CONTRACTOR WILL DETERMINE SIZE OF DUCT BANK NECESSARY TO ACCOMMODATE ALL POWER, LIGHTING AND CONTROL CONDUITS, MAINTAINING 3" OF CONCRETE COVER TOP AND BOTTOM, AND 2" LEFT AND RIGHT SIDE OF CONDUITS IN DUCT BANK.
- CONCRETE DUCT BANK TO BE USED FOR CONDUIT UNDER ROADS OR WHERE HEAVY MACHINERY WILL BE TRANSPORTED.
- USE SEPARATORS (CARLON SNAP-N-STAC) INSTALLED IN INTERVALS OF 5'. ANCHOR SPACERS WITH #5 REBAR DRIVEN INTO SOLID EARTH.
- DISTANCE SHALL BE INCREASED TO KEEP CABLES BELOW THE FROST LINE DEPENDING ON SITE SPECIFIC CONDITIONS.

8 CONCRETE ENCASED DUCT BANK  
SCALE: NONE

MAIN	TAP	ITEM
#4/Ø	1	2
#2/Ø	1	3
#4	1	4



BILL OF MATERIAL			
ITEM	SIZE	DESCRIPTION	MATERIAL
1	#2 AWG	CABLE, GREEN, THWN INSULATION (TAP)	COPPER
2	—	"C-TAP" COMPRESSION CONNECTOR, BURNDY #YGHC-29C26 (4/Ø - 4)	COPPER
3	—	"C-TAP" COMPRESSION CONNECTOR, BURNDY #YGHC-26C2 (2/Ø - 4)	COPPER
4	—	"C-TAP" COMPRESSION CONNECTOR, BURNDY #YGHC-2C2 (4 - 4)	COPPER

10 TYPICAL COMPRESSION CONNECTION TYPES  
SCALE: NONE



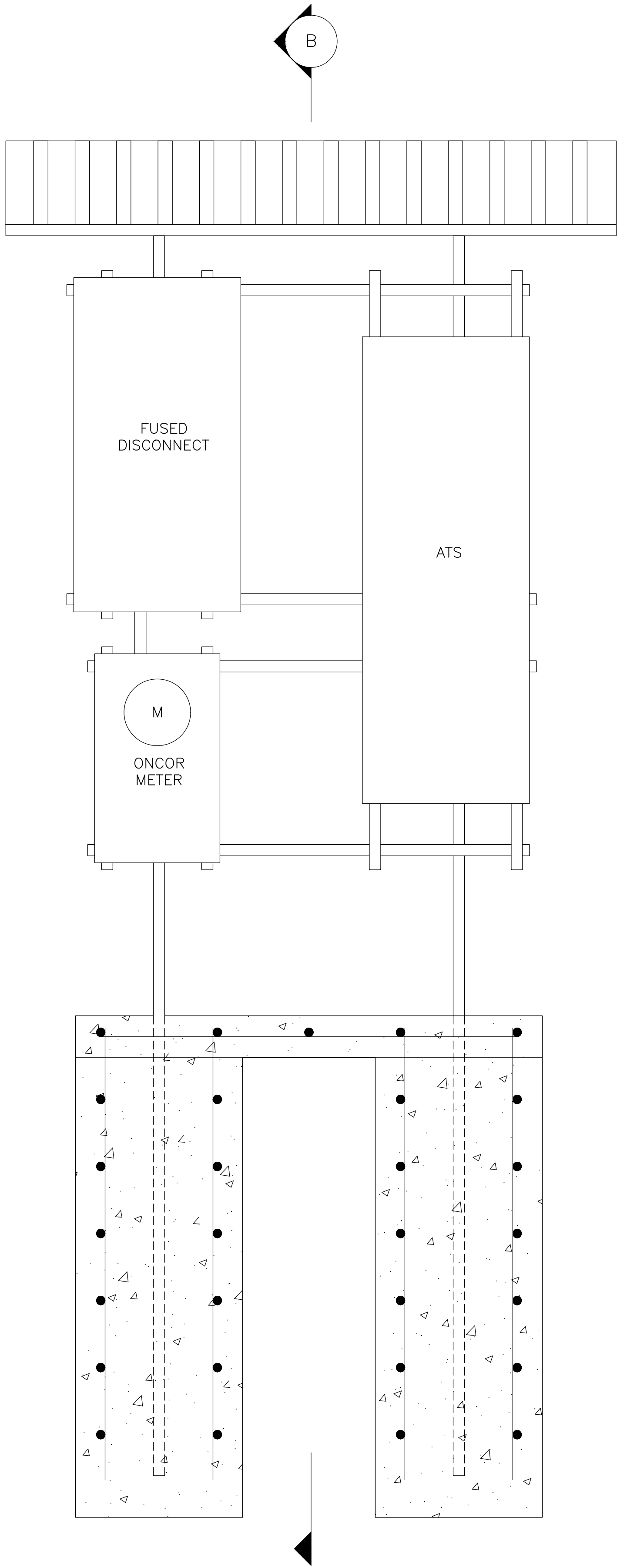
BY	REVISION	DATE	NO.



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
ELECTRICAL  
DETAILS 2 OF 2

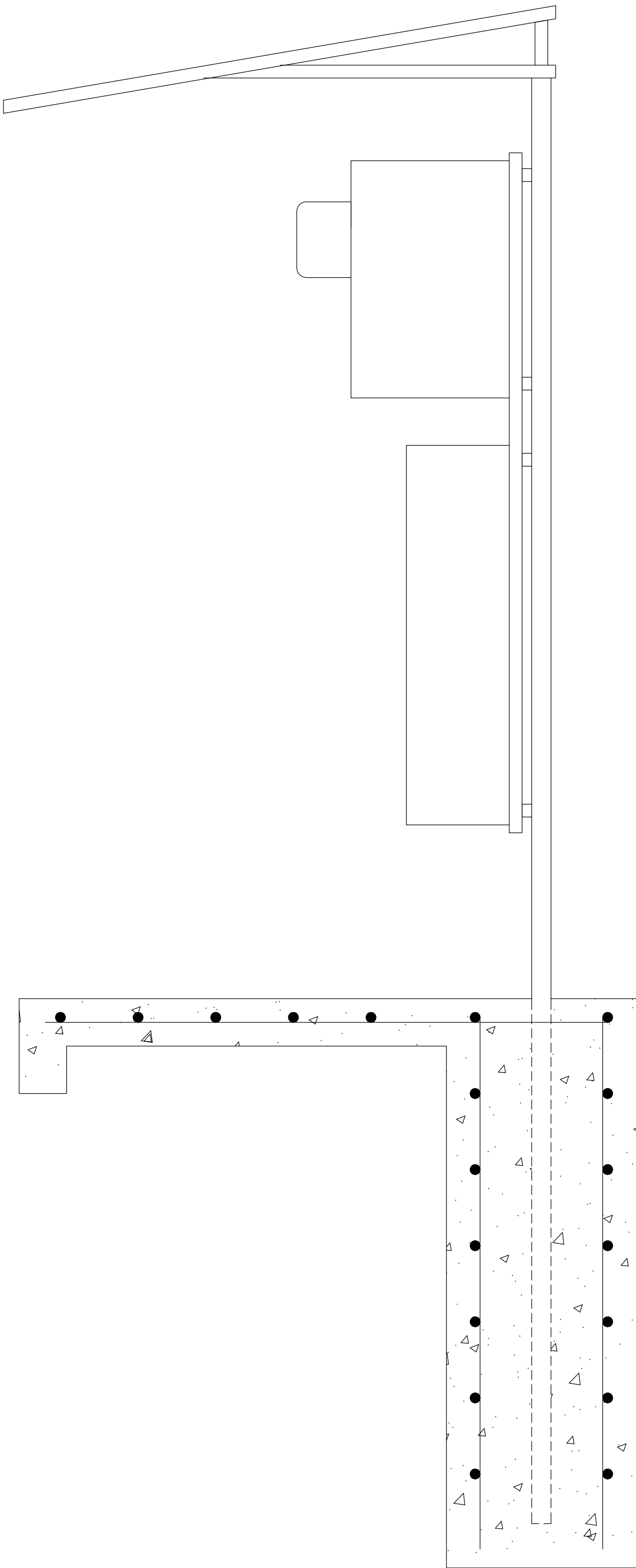
VERIFY SCALE 0 1	
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE.	
DESIGNED	P. LANDGRAF
DRAWN	R. CHISHOLM
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of XX XXX
Dwg. No.	E-14
2023-0002-00	

PRINTED: 10/26/2023 11:10 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-15 WELL 3 & 5 ATS RACK LAYOUT.dwg SAVED: 9/1/2023 4:40 PM USER: Riya Banerjee



FRONT VIEW

WELL 3/5 ATS RACK




SIDE VIEW B-B

GENERAL NOTES:


1. REFERENCE SHEET S-04 FOR STRUCTURAL DETAILS.



NO.	DATE	REVISION	BY



**ARDURRA**  
3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



Brushy Creek  
Municipal Utility District

BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

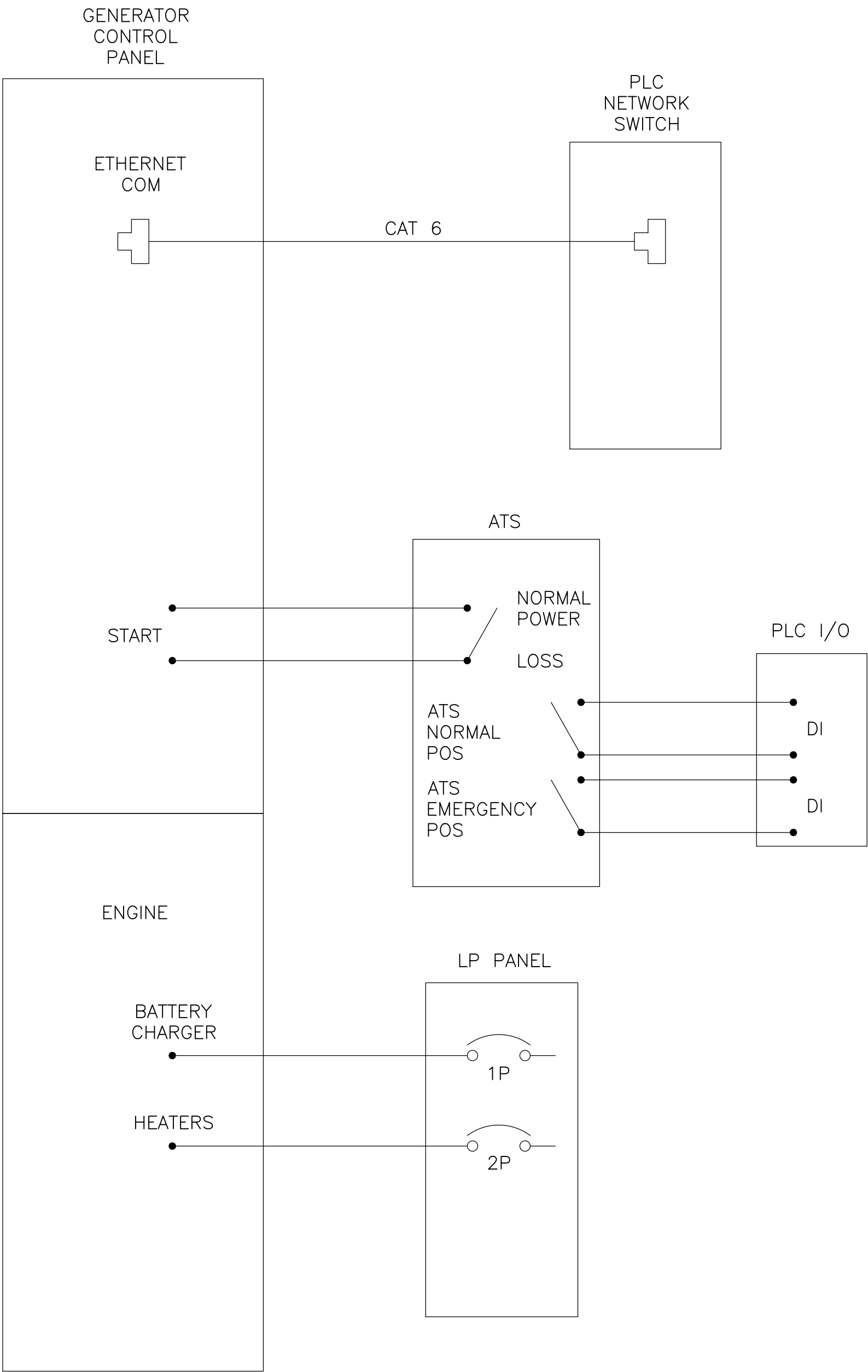
ELECTRICAL  
WELL 3 & 5 ATS RACK LAYOUT

0 1  
VERIFY SCALE  
BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

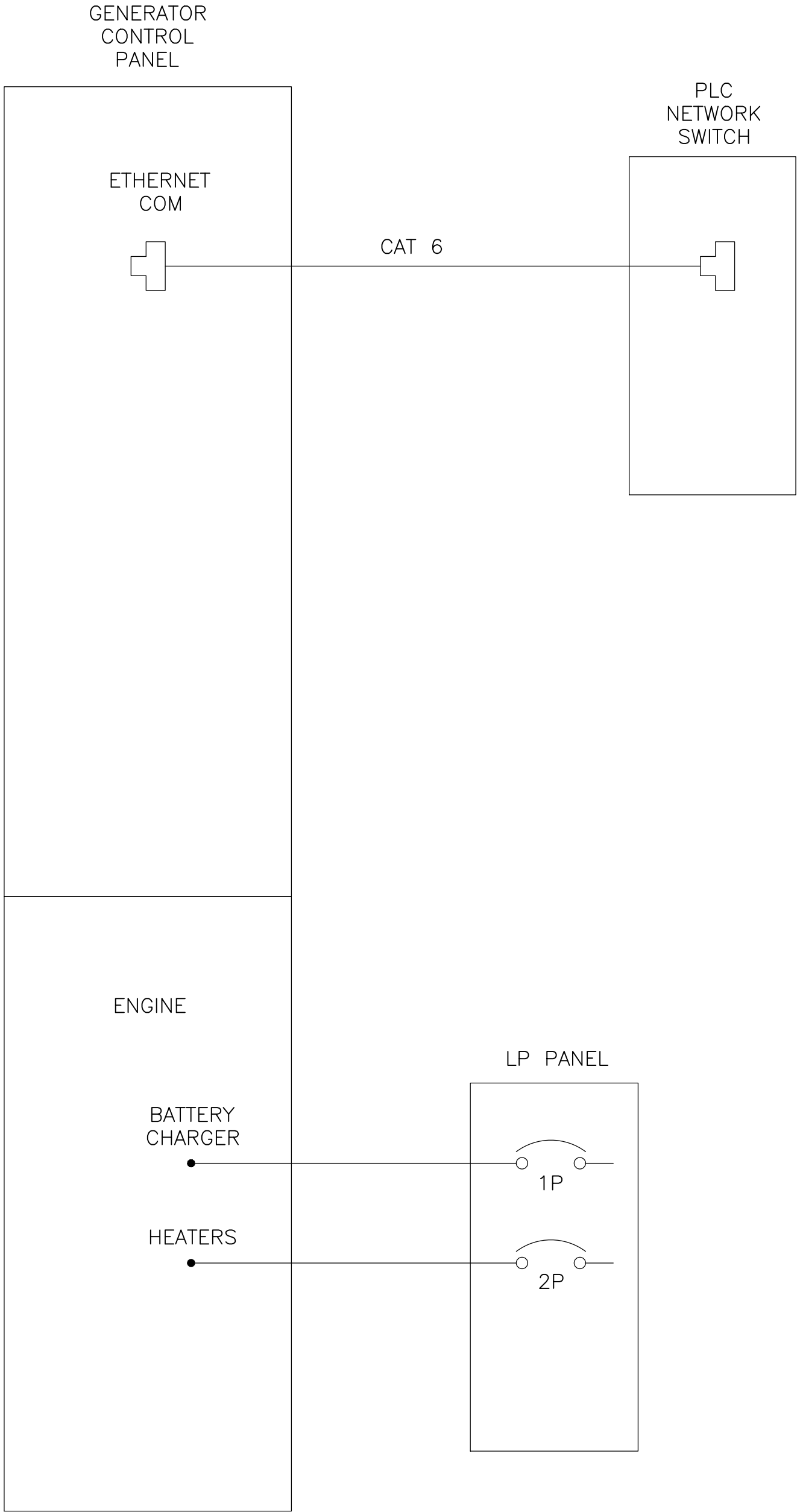
DESIGNED P. LANDGRAF  
DRAWN T. FORNEY  
CHECKED A. RISTOW  
REVIEWED A. RISTOW  
Seq. of  
XX XXX  
Dwg. No. E-15  
2023-0002-00



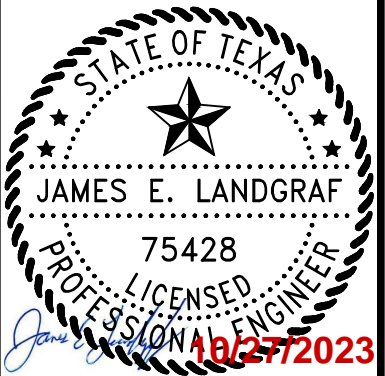
PRINTED: 10/26/2023 11:10 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 Drawings\8.3 sheets\Electrical\E-16 GENERATOR SCHEMATICS.dwg    SAVED: 9/12/2023 9:47 AM    USER: Riva Banerjee



WELL GENERATOR/ATS SCHEMATIC



RAW WATER INTAKE GENERATOR SCHEMATIC



NO.	DATE	REVISION	BY



**ARDURRA**  
3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
GENERATOR SCHEMATICS

01"=1'-0"

VERIFY SCALE

01"=1'-0"

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED P. LANDGRAF

DRAWN R. CHISHOLM

CHECKED A. RISTOW

REVIEWED A. RISTOW

Seq. of

XX XXX

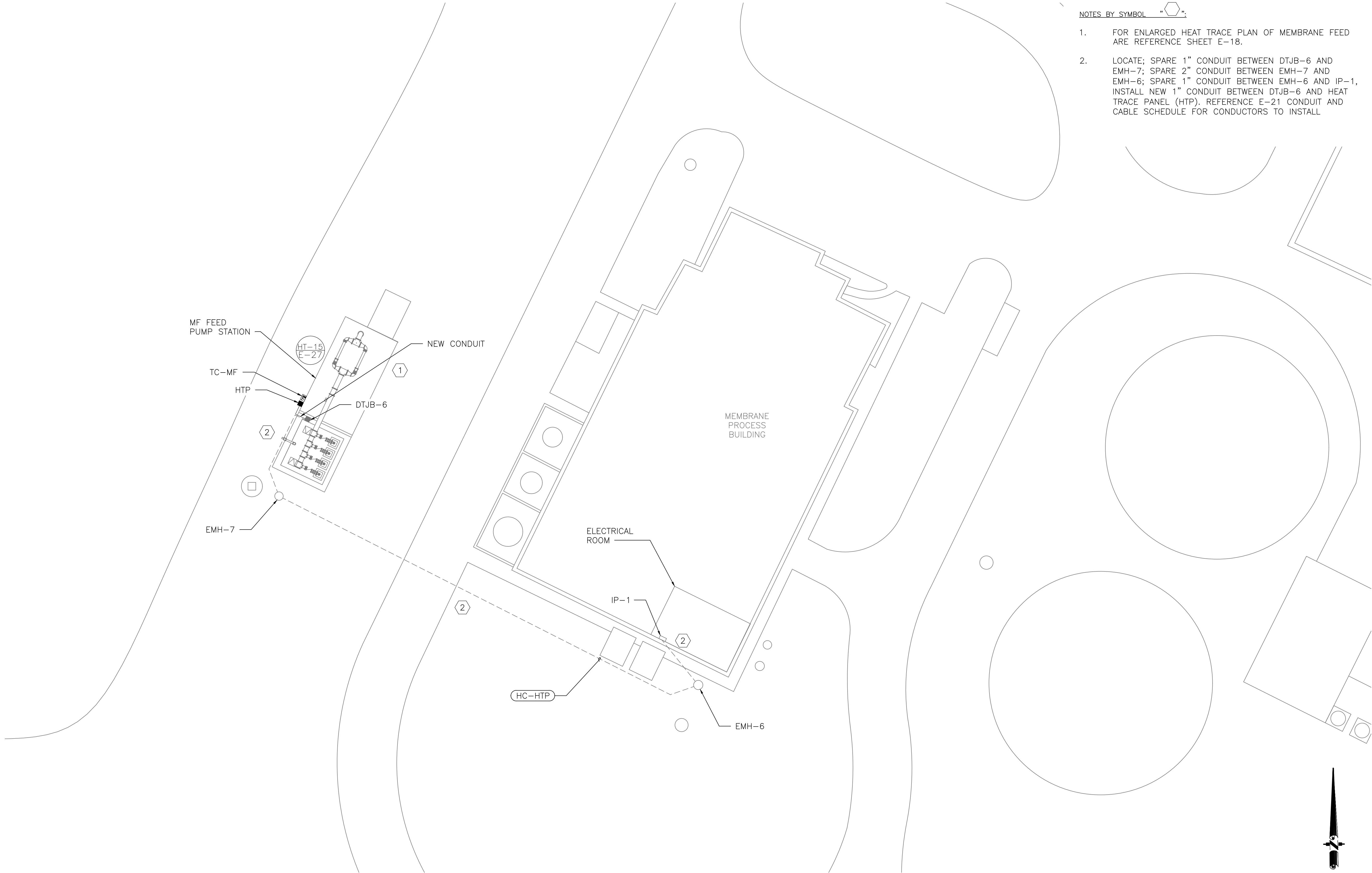
Dwg. No.

E-16

2023-0002-00

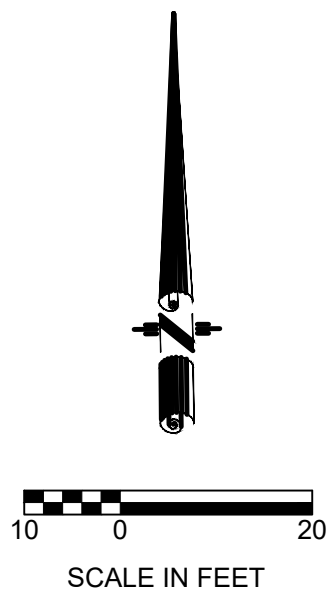


PRINTED: 10/26/2023 11:10 AM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-17 WTP MEMBRANE FEED SITE OVERVIEW.dwg, SAVED: 9/22/2023 9:04 AM USER: Riya Banerjee



- NOTES BY SYMBOL "⬡":
- FOR ENLARGED HEAT TRACE PLAN OF MEMBRANE FEED ARE REFERENCE SHEET E-18.
  - LOCATE; SPARE 1" CONDUIT BETWEEN DTJB-6 AND EMH-7; SPARE 2" CONDUIT BETWEEN EMH-7 AND EMH-6; SPARE 1" CONDUIT BETWEEN EMH-6 AND IP-1, INSTALL NEW 1" CONDUIT BETWEEN DTJB-6 AND HEAT TRACE PANEL (HTP). REFERENCE E-21 CONDUIT AND CABLE SCHEDULE FOR CONDUCTORS TO INSTALL

WTP MEMBRANE FEED SITE OVERVIEW  
SCALE: 1" = 20'-0"



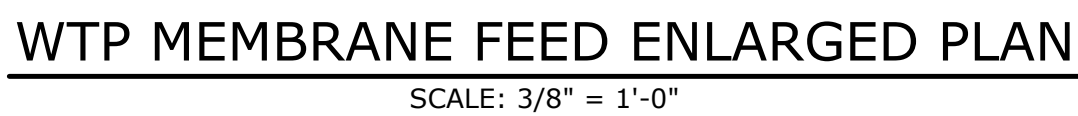
NO.				DATE	REVISION	BY



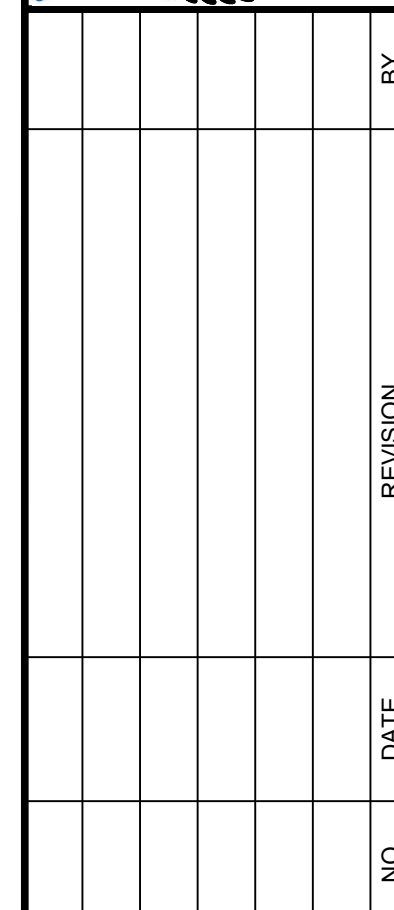
BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WTP MEMBRANE FEED SITE OVERVIEW

DESIGNED <u>P. LANDGRAF</u>	
DRAWN <u>R. CHISHOLM</u>	
CHECKED <u>A. RISTOW</u>	
REVIEWED <u>A. RISTOW</u>	
Seq. of XX XXX	
Dwg. No. <b>E-17</b>	
2023-0002-00	

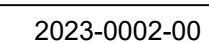


1. SEE "M" DRAWINGS FOR HEAT TRACE INSULATION DETAILS.
- 2.
3. PUMP PIPE HEADER, VALVES AND INSTRUMENTS SHALL BE HEAT TRACED WITH SELF REGULATING HEATING CABLE INCLUDING A THERMOSTAT CONTROL CONTACTOR. CONTRACTOR SHALL PROVIDE CIRCUIT AND CONDUIT FROM BREAKER AS PART OF ELECTRICAL INSTALLATION TO PROVIDE POWER TO THE PROPOSED HEAT TRACE SYSTEM.
4. SAMPLE LINES AND CHEMICAL LINES SHALL BE HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
5. REFERENCE SHEET E-22 WTP HEAT TRACE SCHEDULE FOR HEAT TRACE BOM, WATTAGE, POWER CONNECTION AND HEAT TRACE PITCH REQUIREMENTS. REFERENCE HEAT TRACE DETAILS SHEETS E-25-27 FOR INSTALLATION DETAILS.



ELECTRICAL

WTP MEMBRANE FEED ENLARGED PLAN

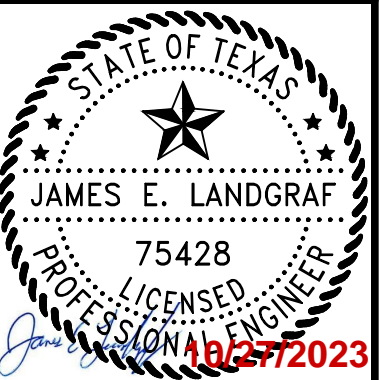


# WTP RECYCLE SITE OVERVIEW

SCALE: 1" = 10'-0"

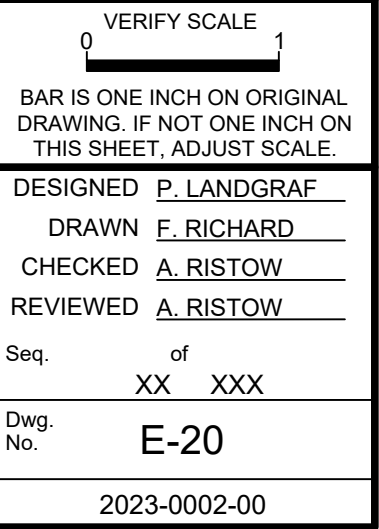
NOTES BY SYMBOL :

1. FOR ENLARGED HEAT TRACE PLAN OF RECYCLE PUMPS  
REFERENCE SHEET E-19.
2. LOCATE; SPARE 2" CONDUIT BETWEEN AND EMH-3;  
SPARE 3" CONDUIT BETWEEN EMH-7 AND EMH-3; SPARE  
1" CONDUIT BETWEEN EMH-6 AND IP-1, INSTALL NEW  
1" CONDUIT BETWEEN RECYCLE PUMP PAD AND TC-RCYC  
AND BETWEEN ATS AND LP-1. REFERENCE SHEET E-21,  
CONDUIT AND CABLE SCHEDULE FOR CONDUCTORS TO  
INSTALL.

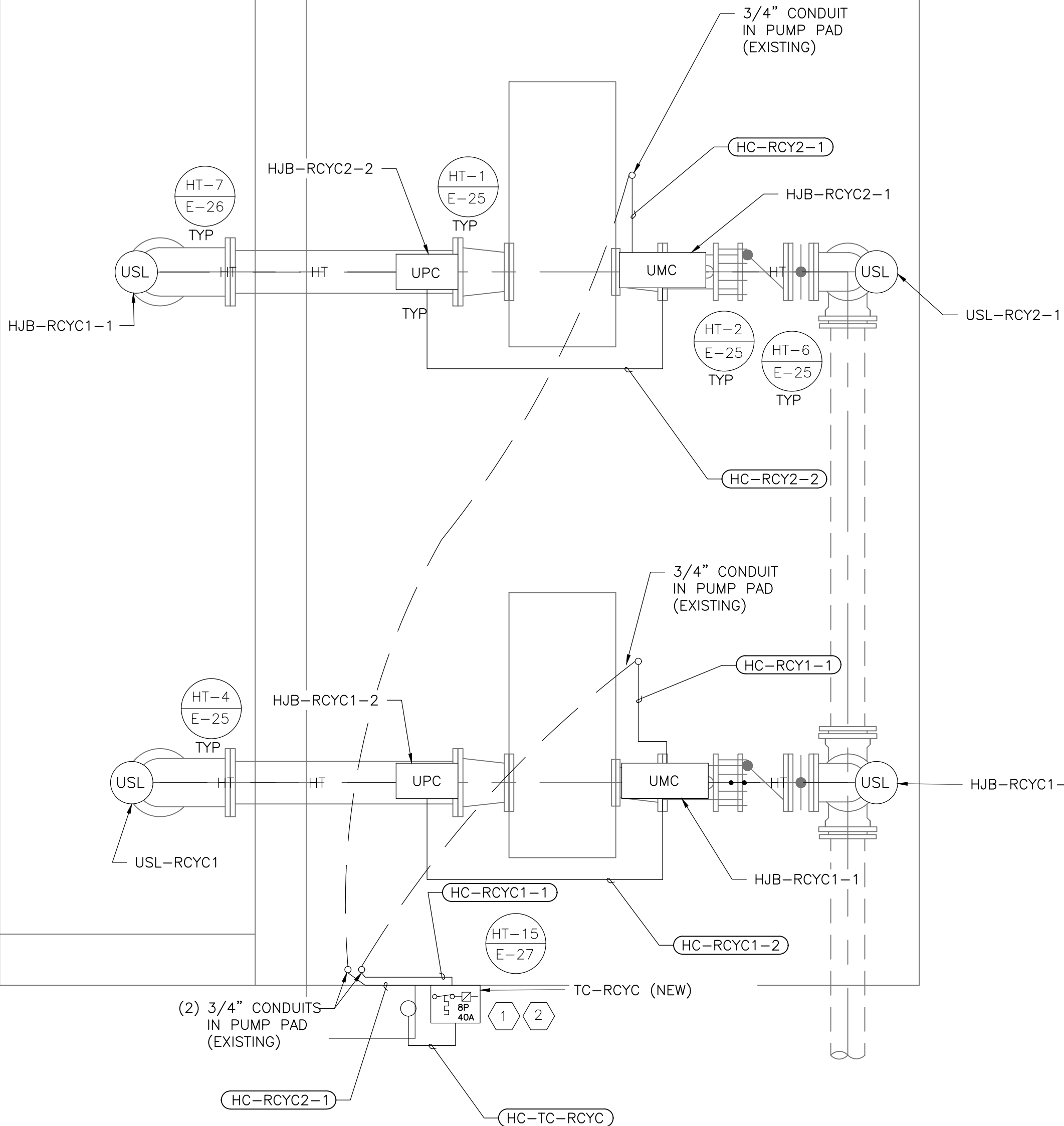
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## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

ELECTRICAL  
WTP RECYCLE ENLARGED PLAN







WTP RECYCLE ENLARGED PLAN

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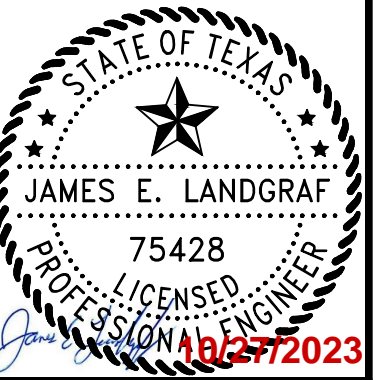
SCALE: 3/16" = 1'-0"

GENERAL NOTES:

1. SEE "M" DRAWINGS FOR HEAT TRACE INSULATION DETAILS.
- 2.
3. PUMP PIPE HEADER, VALVES AND INSTRUMENTS SHALL BE HEAT TRACED WITH SELF REGULATING HEATING CABLE INCLUDING A THERMOSTAT CONTROL CONTACTOR. CONTRACTOR SHALL PROVIDE CIRCUIT AND CONDUIT FROM BREAKER AS PART OF ELECTRICAL INSTALLATION TO PROVIDE POWER TO THE PROPOSED HEAT TRACE SYSTEM.
4. SAMPLE LINES AND CHEMICAL LINES SHALL BE HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
5. REFERENCE SHEET E-22 WTP HEAT TRACE SCHEDULE FOR HEAT TRACE BOM, WATTAGE, POWER CONNECTION AND HEAT TRACE PITCH REQUIREMENTS. REFERENCE HEAT TRACE DETAILS SHEETS E-25-27 FOR INSTALLATION DETAILS.

NOTES BY SYMBOL :

1. REFERENCE ELECTRICAL SHEET E-19 WTP RECYCLE PUMP SITE OVERVIEW.
2. EXTEND UNISTRUT OFF OF EXISTING INSTRUMENT RACK AND INSTALL NEW TC-RCYC.



	NO.	DATE	REVISION	BY



3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



# BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

## ELECTRICAL

### WTP RECYCLE SITE OVERVIEW



BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED P. LANDGRAFDRAWN R. CHISHOLM

CHECKED A. RISTOW

REVIEWED A. RISTOW

Seq. of

	XX	XXX
Dwa		

E-19

2023-0002-00



WTP MEMBRANE FEED CONDUIT HEAT TRACE CABLE SCHEDULE					
CONDUIT TAG	CONDUIT SIZE (IN)	CONDUCTORS IN EACH SET	FROM	TO	COMMENTS
HC-HTP	1.2	(3) #8 AWG W/#10G	IP-1 MEMBRANE BUILDING ELECTRICAL ROOM	PANEL HTP - MEMBRANE FEED PUMP AREA	USE EXISTING SPARE CONDUITS BETWEEN IP-1 AND DTJB-6 ; NEW 1" BETWEEN DTJB-6 TO TC-MF
HC-TC-MF	1	(12) #12 AWG W/(1)#12G	PANEL HTP - MEMBRANE FEED PUMP AREA	HC-TC-MF (THERMOSTAT CONTROLLER CONTACTOR	
HC-MF	1.5	(10) #12 AWG W/(5)#12G	HC-TC-MF (THERMOSTAT CONTROLLER CONTACTOR	HC-MF1, HC-MF2, HC-MF3 , HC-MF4 & HC-MF5 ( CONDUIT TEES)	
HC-MF1	0.75	(2) #12 AWG W/(1)#12G	HC-MF	HJB-MF1-1	
HC-MF1	0.75	(2) #12 AWG W/(1)#12G	HJB-MF1-1	HJB-MF1-2	
HC-MF2	0.75	(2) #12 AWG W/(1)#12G	HC-MF	HJB-MF2	
HC-MF3	0.75	(2) #12 AWG W/(1)#12G	HC-MF	HJB-MF3	
HC-MF4	0.75	(2) #12 AWG W/(1)#12G	HC-MF	HJB-MF4	
HC-MF5	0.75	(2) #12 AWG W/(1)#12G	HC-MF	HJB-MF5	

## WTP MEMBRANE CONDUIT & CABLE SCHEDULE

WTP RECYCLE HEAT TRACE CONDUIT CABLE SCHEDULE					
CONDUIT TAG	CONDUIT SIZE (IN)	CONDUCTORS IN EACH SET	FROM	TO	
HC-TC-RCYC	1, 2 & 3	(6) #12 AWG W/(1)#12G	LP- 1	TC-RCYC (THERMOSTAT CONTROLLED CONTACTOR)	
HC-RCYC1-1	0.75	(2) #12 AWG W/(1)#12G	TC-RCYC	HJB-RCYC1-1	
HC-RCYC2-1	0.75	(2) #12 AWG W/(1)#12G	TC-RCYC	HJB-RCYC2-1	
HC-RCYC1-2	0.75	(2) #12 AWG W/(1)#12G	HJB-RCYC1-1	HJB-RCYC1-2	
HC-RCYC2-2	0.75	(2) #12 AWG W/(1)#12G	HJB-RCYC2-1	HJB-RCYC2-2	

## WTP RECYCLE CONDUIT & CABLE SCHEDULE

PANELBOARD HTP OUTSIDE BUILDING											
MAIN BREAKER (AMPS):		50 2-POLE		ENCLOSURE UL RATING: NEMA 3R SS304							
BUS RATING (AMPS):		125		MOUNTING: INTEGRAL							
L-L VOLTAGE (VOLTS):		208		AMPERE INTERRUPT RATING:				10,000			
L-N VOLTAGE (VOLTS):		120		PHASE:				1			
NEUTRAL: "100%"				WIRE:				3			
LOAD SERVED	LOAD VA (VOLT AMPS)		LOAD TYPE	BREAKER AMPS/ POLES	CIRCUIT NO	CIRCUIT NO	BREAKER AMPS/ POLES	LOAD TYPE	LOAD VA (VOLT AMPS)		LOAD SERVED
	AΦ	BΦ							AΦ	BΦ	
TC-MF THERMOSTAT CONTROL	60		3	20/1	1	2	20/2	5	300		HJB-MF1 HEAT TRACE 30MA GFIC
HJB-MF2 HEAT TRACE 30MA GFIC		100	5	20/2	3	4		5		300	
	100		5			5	6	20/2	5	200	
HJB-MF4 HEAT TRACE 30MA GFIC		100	5	20/2	7	8	5			200	
	100		5			9	10	20/2	5	250	
SPARE		0		20/1	11	12	5			250	

LOADS:	PHASE A:	1010	LOADS TYPES:	1=LIGHTING
	PHASE B:	950		2=RECEPTACLES
				3=MISC .
				4=MOTOR
	TOTAL:	1960		5=HEATER

## NEW PANELBOARD HTP SCHEDULE

PANELBOARD: LP-1 INTAKE												
MAIN BREAKER (AMPS): 60				ENCLOSURE UL RATING: TYPE 1								
BUS RATING (AMPS): 125 *				MOUNTING: WALL								
L-L VOLTAGE (VOLTS): 208				KAIC Rating: 10								
L-N VOLTAGE (VOLTS): 120				PHASE: 3								
NEUTRAL: FULL				WIRE: 4								
CIRCUIT DESCRIPTION		LOAD KVA			BREAKER AMPS/ POLES	CIRCUIT NO	CIRCUIT NO	BREAKER AMPS/ POLES	LOAD KVA			CIRCUIT DESCRIPTION
		AΦ	BΦ	CΦ					AΦ	BΦ	CΦ	
RECEPTACLES		0.72			20/1	1	2	20/1				SPACE
SPARE					20/1	3	4	20/1				SPACE
SPARE					20/1	5	6	20/1				SPACE
PLC-5		1			20/1	7	8	20/1	0.6			SMOKE & HEAT DETECTORS
SPARE			0.1		20/1	9	10	20/1		0.1		SPARE
GATE 1 (ELEC BLDG)					20/3	13	14	20/3				GATE 2 (R.R. ENTRANCE)
1 JACKET WATER HEATER (NEW GENERATOR)			1.5	20/2	17	18	20/1	0.36			VALVE CONTOL PANELS (3)	
	1.5				19	20	20/1		BATTERY CHARGER (NEW GENERATOR) 1			
SPACE					20/1	21	22	20/1				
SPACE					20/1	23	24	20/1				SPACE
GATE 3 (ARM GATE)					20/1	25	26	20/1				SPACE
SPACE					20/1	27	28	20/1				SPACE
SPACE					20/1	29	30	20/1				SPACE
KVA SUMS:		3.22	0.1	1.5					0.96	0.1	0	

LOCATION:	INTAKE ELECTRICAL BUILDING
SERVICE VOLTAGE:	120/208V
<b>TOTAL LAOD KVA:</b>	<b>5.88</b>
* INTEGRAL TVSS	

## PANELBOARD WTP IP-1 MODIFIED SCHEDULE

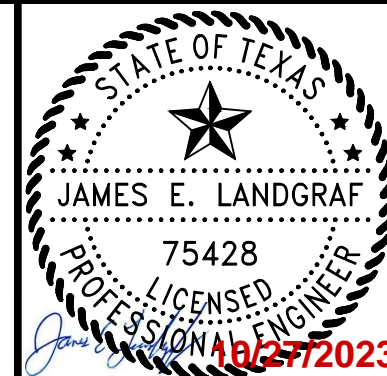
PANELBOARD: LP-1 WTP												
MAIN BREAKER (AMPS):		100		ENCLOSURE UL RATING:				TYPE 1 WALL				
BUS RATING (AMPS):		125 *		MOUNTING:				WALL				
L-L VOLTAGE (VOLTS):		208		KAIC RATING:				10				
L-N VOLTAGE (VOLTS):		120		PHASE:				3				
NEUTRAL:		FULL		WIRE:				4				
CIRCUIT DESCRIPTION	LOAD KVA			BREAKER AMPS/ POLES	CIRCUIT NO	CIRCUIT NO	BREAKER AMPS/ POLES	LOAD KVA			CIRCUIT DESCRIPTION	
	AΦ	BΦ	CΦ					AΦ	BΦ	CΦ		
GUH-1	0.9			20/1	1	2	20/1	0.2			RECEPTACLES @ ELEC ROOM	
FCU-5		1.2		20/1	3	4	20/1		0.9		GUH-2	
LOUVER, L-12, L-13			0.5	20/2	5	6	20/1			0.2	SUMP PUMP IN PUMP ROOM	
	0.5				7	8	30/2	1.0			GENSET JACKET WATER HEATER	
GENSET AUX POWER CKT		0.1		9	10				1.00			
			0.1	20/2	11	12				2.5		
GENSET BATTERY CHARGER	0.2			20/2	13	14	40/3	2.5			UPS FOR IP PANEL	
		0.2			15	16			2.5			
SPARE				20/1	17	18	20/1			0.3	ATS-SWGR CP BATTERY CHARGER	
SPARE				20/1	19	20	20/1	0.2			RECEPTACLES @ GENSET ROOM	
GENSET JACKET WATER HEATER		1.0		30/2	21	22	20/1		0.9		GUH-3	
			1.0		23	24	20/1				SPARE	
SPARE				20/1	25	26	20/1	0.2			RECEPTACLES @ DEISEL TANK PUMP	
SPARE				20/1	27	28	20/2		0.5		HUB-RCYC1-1 HEAT TRACE 30MA GFIC	
SPARE				20/1	29	30				0.5		
SPACE					31	32	20/2	0.5			HUB-RCYC2-1 HEAT TRACE 30MA GFIC	
SPACE					33	34				0.5		
SPACE					35	36	20/1			0.1	TC-RCYC THERMOSTAT CONTROL	
SPACE					37	38					SPACE	
SPACE					39	40					SPACE	
SPACE					41	42					SPACE	
KVA SUMS:		1.6	2.5	1.6				4.6	6.3	3.6		

LOCATION:	WTP HI SERVICE PUMP ELEC ROOM
SERVICE VOLTAGE:	120/208V
TOTAL LAOD KVA:	20.2
* INTEGRAL TVSS	

## PANELBOARD WTP LP-1 MODIFIED SCHEDULE

NOTES BY SYMBOLE "  ":

1. PROVIDE NEW BREAKERS IN EXISTING PANEL FOR NEW GENERATOR CIRCUITS.

[illegible]

# BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

ELECTRICAL

WTP PANEL AND CONDUIT/CABLE SCHEDULES

0 VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

Seq.	of
	XX XXX
Dwg. No.	E-21

2023-0002-00



PRINTED: 10/26/2023 2:52 PM | PROJECT:Brushy creek winterization and electrical improvements8.0 drawings8.3 sheetsElectricalE-22 WTP HEAT TRACE SCHEDULE.dwg SAVED: 9/18/2023 2:29 PM USER: Rya Bangjee

NOTES BY SYMBOL .

1. PROVIDE NEW BREAKERS IN EXISTING PANEL FOR NEW GENERATOR CIRCUITS.

WTP HEAT TRACE SCHEDULE										
CIRCUIT ID	CHROMALOX P/N		SUBCIRCUIT ID	CHROMALOX P/N				DESCRIPTION	COMMENT *	
	UMC	UPC		USL	SRL 3-2CT	SRL 5-2CT	SRL 8-2CT			SRL 10-2CT
HJB-MF1	1	1	HJB-MF1-1	1		47			12 " STATIC MIXER	12" PIPE USE 18" PITCH
			HJB-MF1-2	1		19			1/2" SAMPLE LINE	STRAIGHT RUN
			HJB-MF1-3	1		36			1" AIR	STRAIGHT RUN
HJB-MF2		1		1		19			1/2" SAMPLE LINE	STRAIGHT RUN
HJB-MF3		1	HJB-MF3-1	1		19			1/2" FERRIC LINE	STRAIGHT RUN
HJB-MF4		1		1		32			8" RETURN WATER LINE	8" PIPE USE 16" PITCH
HJB-MF5		1		1		47			12 " STATIC MIXER	12" PIPE USE 18" PITCH
HJB-RCYC1	1	1	HJB-RCYC1-1	2		45			10" SUCTION PUMP 1 , 8" DISCHARGE PUMP 1	8" PIPE USE 16" PITCH, 10" PIPE USE 20" PITCH
HJB-RCYC2	1	1	HJB-RCYC2-1	2		45			10" SUCTION PUMP 2 , 8" DISCHARGE PUMP 2	8" PIPE USE 16" PITCH, 10" PIPE USE 20" PITCH
TOTALS	3 EA	7 EA		11 EA	0 FT	309 FT	0 FT	0 FT		

\* Reference Heat Trace Details HT-13 One Cable Spiraling Method for pitch

WTP HEAT TRACE SCHEDULE



									BY
									REVISION
									DATE
									NO.



3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WTP HEAT TRACE SCHEDULE

0 1  
VERIFY SCALE

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THIS SHEET, ADJUST SCALE

DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

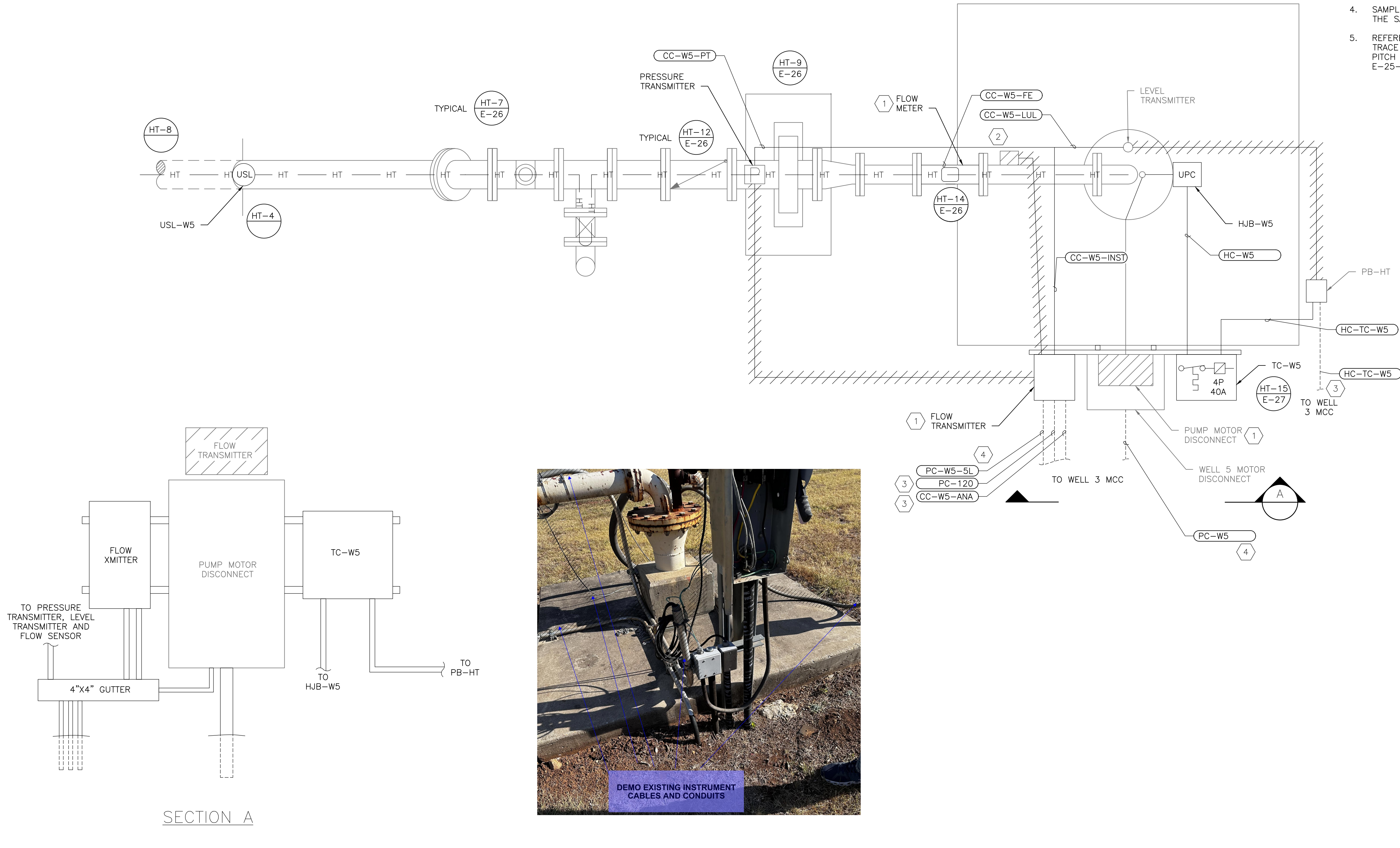
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XX XXX

Dwg. No. **E-22**

2023-0002-00



PRINTED: 10/26/2023 2:54 PM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-23 WELL 5 SITE PLAN.dwg SAVED: 9/22/2023 9:03 AM USER: Ryo Banerjee



NOTES:

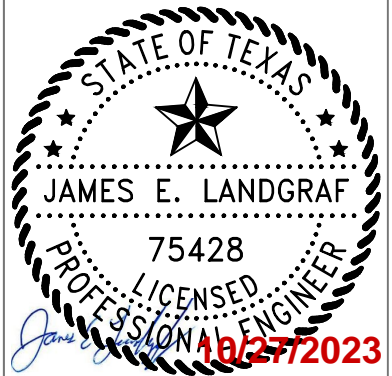
1. CONNECT TO EXISTING GROUND GRID.

NOTES BY SYMBOL "⬡":

1. DEMO OLD MAGMETER AND TRANSMITTER AND REPLACE WITH NEW.
2. DEMO EXISTING CLAMP-ON ULTRASONIC FLOW METER AND RETURN TO OWNER.
3. REUSE EXISTING UNDERGROUND CONDUITS DEMO EXISTING CONDUCTOR. INSTALL CONDUCTOR CONDUIT AND CABLE SCHEDULE.
4. REUSE UNDERGROUND CONDUITS AND CONDUCTORS. INSTALL EXPOSED CONDUITS AS NECESSARY TO COMPLETE RACEWAY.

GENERAL NOTES:

1. SEE "M" DRAWINGS FOR HEAT TRACE INSULATION DETAILS.
2. PUMP PIPE HEADER, VALVES AND INSTRUMENTS SHALL BE HEAT TRACED WITH SELF REGULATING HEATING CABLE INCLUDING A THERMOSTAT CONTROL CONTACTOR. CONTRACTOR SHALL PROVIDE CIRCUIT AND CONDUIT FROM BREAKER AS PART OF ELECTRICAL INSTALLATION TO PROVIDE POWER TO THE PROPOSED HEAT TRACE SYSTEM.
3. SAMPLE LINES AND CHEMICAL LINES SHALL BE HEAT TRACED WITH THE SAME REQUIREMENT FOR PUMP HEADER AND VALVES.
4. REFERENCE SHEET E-22 WTP HEAT TRACE SCHEDULE FOR HEAT TRACE BOM, WATTAGE, POWER CONNECTION AND HEAT TRACE PITCH REQUIREMENTS. REFERENCE HEAT TRACE DETAILS SHEETS E-25-27 FOR INSTALLATION DETAILS.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WELL 5 SITE PLAN

DESIGNED	P. LANDGRAF
DRAWN	T. FORNEY
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	XX XXX
Dwg. No.	E-23
2023-0002-00	



PRINTED: 10/26/2023 2:54 PM | PROJECT:Brushy creek winterization and electrical improvements|8.0 drawings|8.3 sheets|Electrical|E-24 WELL HEAT TRACE SCHEDULE.dwg SAVED: 9/15/2023 5:23 PM USER: Riya Banerjee

NOTES BY SYMBOL .

1. PROVIDE NEW BREAKERS IN EXISTING PANEL FOR NEW GENERATOR CIRCUITS.

WELL 3, 5 & 6 HEAT TRACE SCHEDULE										
CIRCUIT ID	CHROMALOX P/N		SUBCIRCUIT ID	CHROMALOX P/N					DESCRIPTION	COMMENT *
	UMC	UPC		USL	SRL 3-2CT	SRL 5-2CT	SRL 8-2CT	SRL 10-2CT		
HJB-W3	1			2		135			8" & 6" DISCHARGE LINE, 1" PRE-LUBE	8" PIPE USE 16" PITCH, 6" PIPE USE 18" PITCH, 1" STRAIGHT RUN
HJB-W5		1		1		80			6" DISCHARGE LINE	6" PIPE USE 18" PITCH
HJB-W6		1		1		115			8" DISCHARGE LINE	8" PIPE USE 16" PITCH
TOTALS	1 EA	2 EA		4 EA	0 FT	330 FT	0 FT	0 FT		

\* Reference Heat Trace Details HT-13 One Cable Spiraling Method for pitch

WELL 3, 5, & 6 HEAT TRACE SCHEDULE



									BY
									REVISION
									DATE
									NO.



3115 Allen Parkway, Suite 300  
Houston, TX 77019  
TBPE Firm Registration No. F-10053



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
WELL HEAT TRACE SCHEDULE

01"1"VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE

DESIGNED P. LANDGRAF

DRAWN R. CHISHOLM

CHECKED A. RISTOW

REVIEWED A. RISTOW

Seq. of

XX XXX

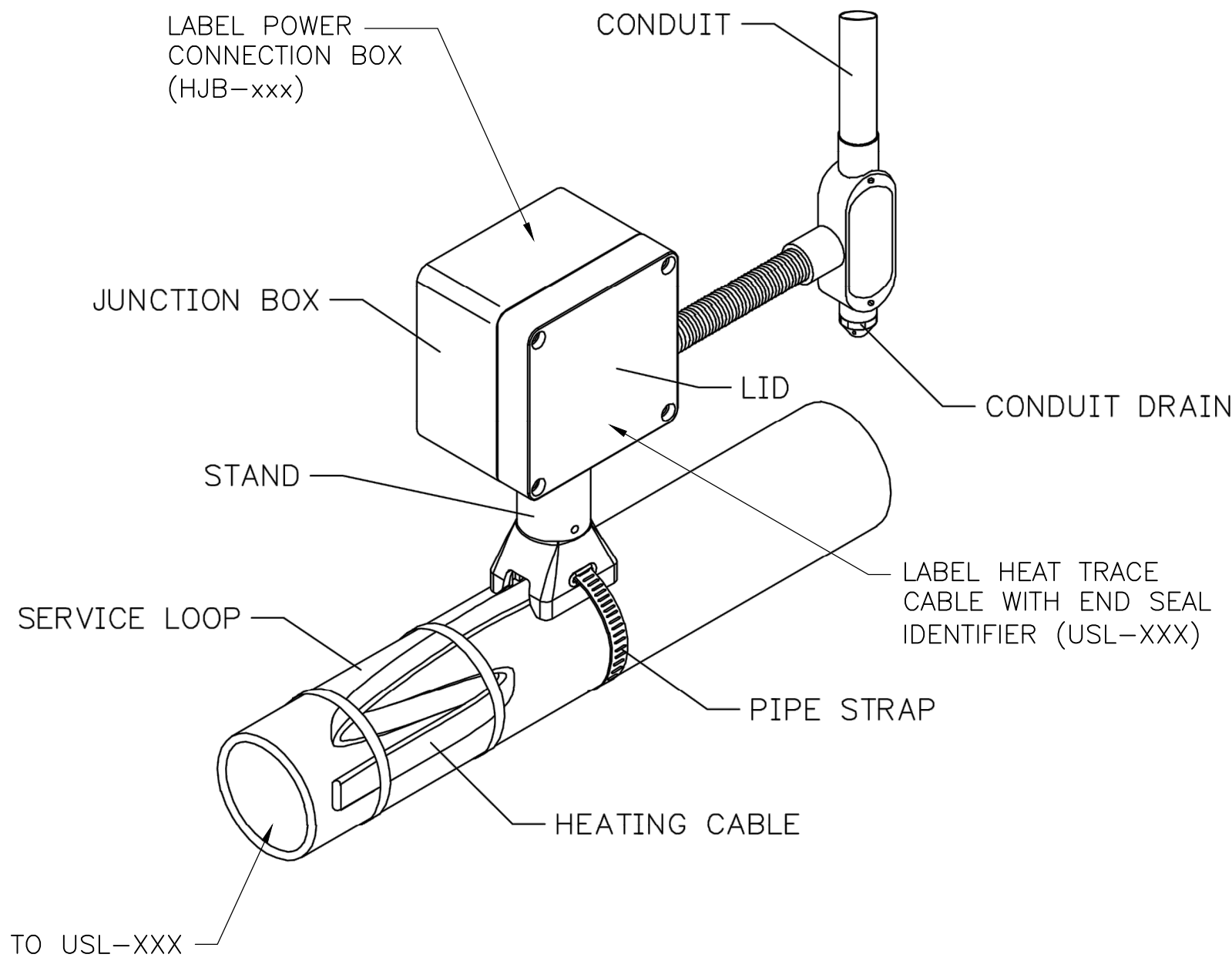
Dwg. No.

E-24

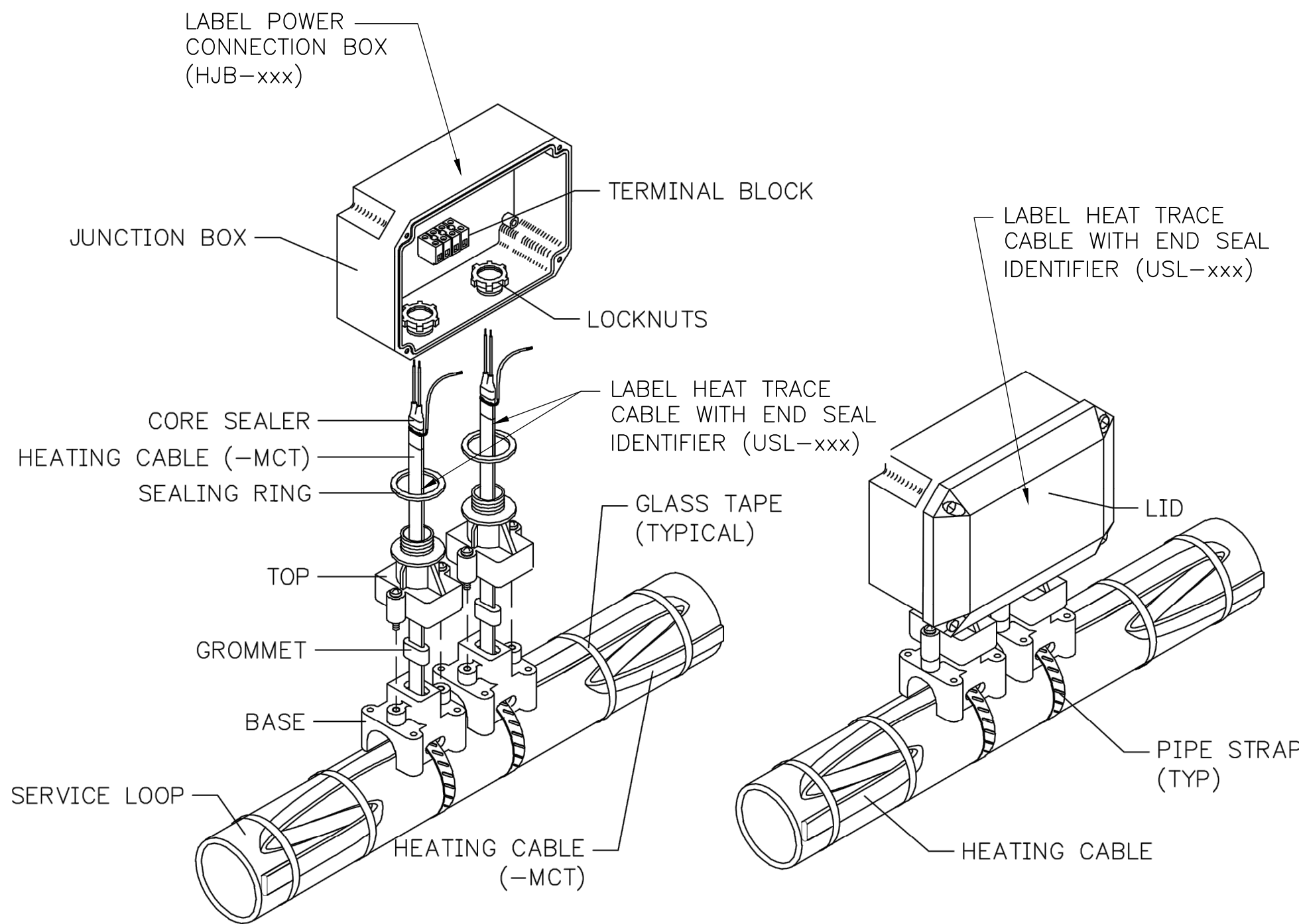
2023-0002-00



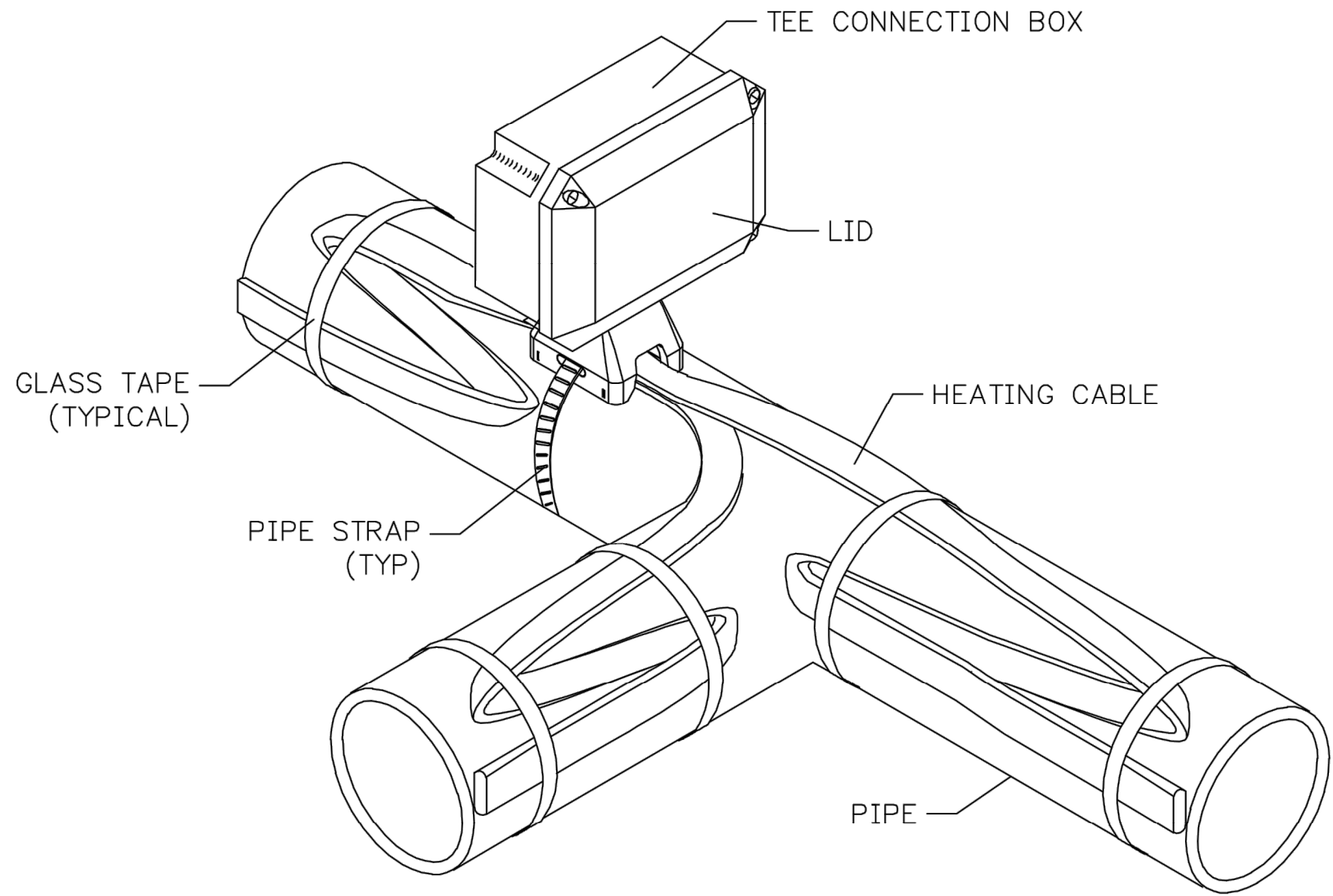
PRINTED: 10/26/2023 2:55 PM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-25 HEAT TRACE DETAILS 1 OF 3.dwg    SAVED: 9/11/2023 3:26 PM    USER: Riya Banerjee



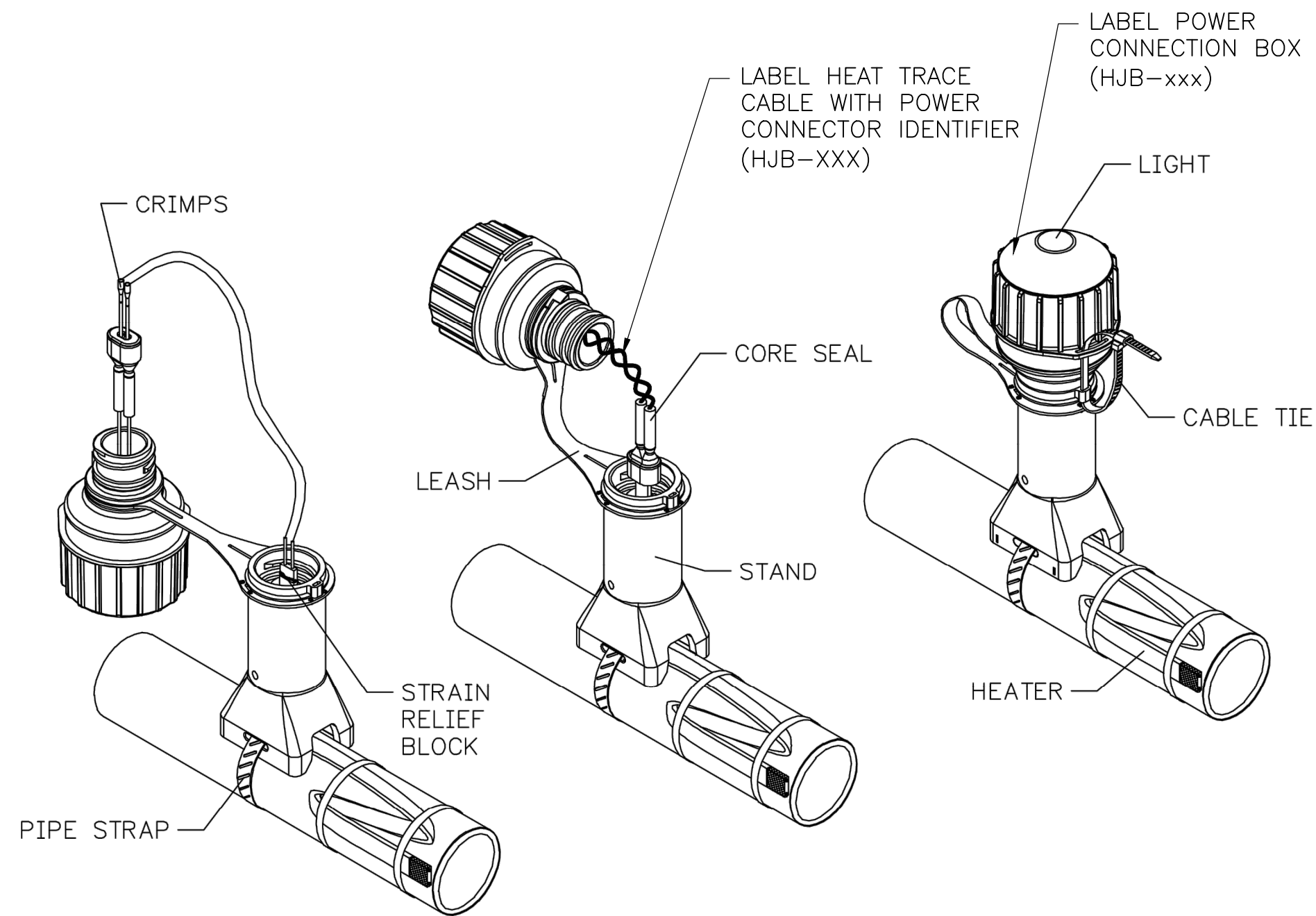
HT-1 SINGLE HEATING CABLE POWER CONNECTION KIT ABOVE INSULATION  
SCALE: NTS



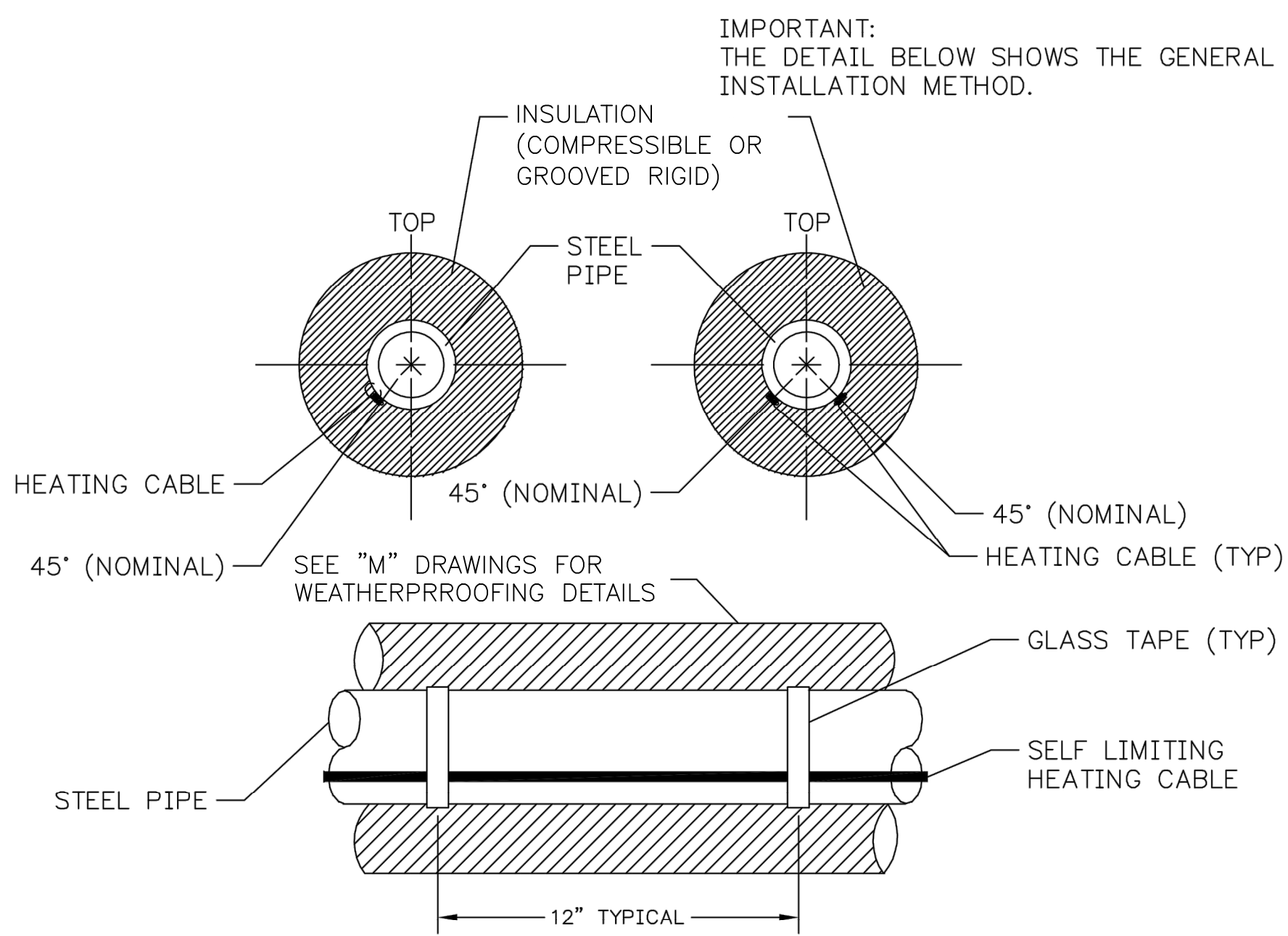
HT-2 MULTIPLE HEATING CABLES POWER CONNECTION KIT ABOVE INSULATION  
SCALE: NTS



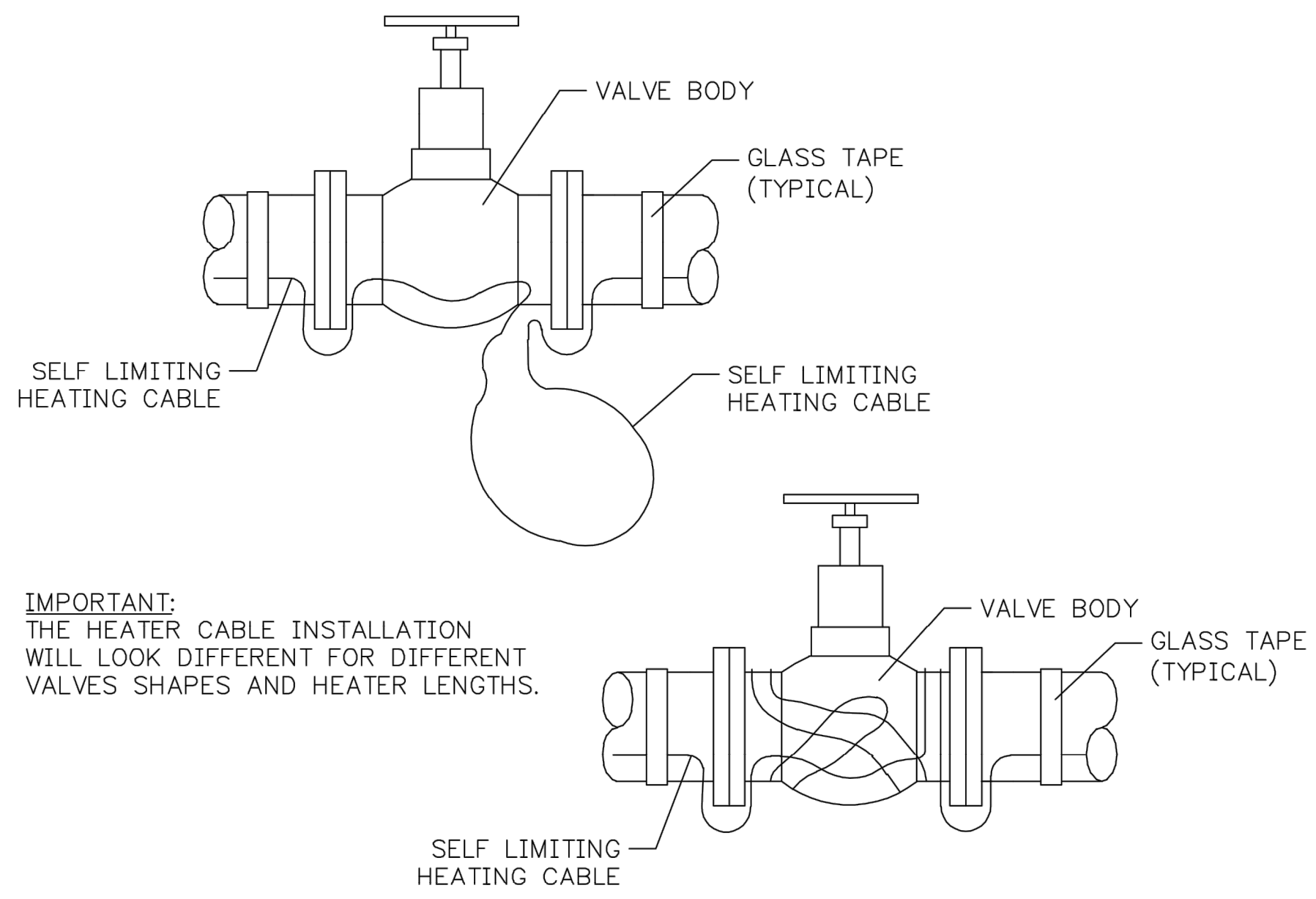
HT-3 TEE CONNECTION KIT ABOVE INSULATION  
SCALE: NTS



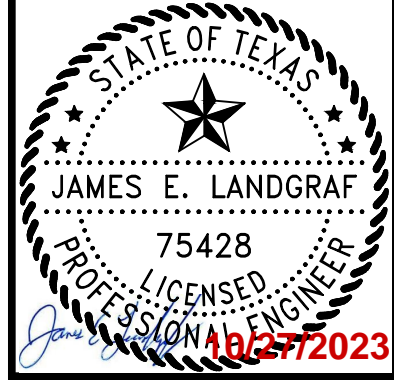
HT-4 LIGHTED END SEAL  
SCALE: NTS



HT-5 TYPICAL PLACEMENT OF HEATING CABLE WITH COMPRESSIBLE OR GROOVED RIGID INSULATION  
SCALE: NTS



HT-6 HEATING CABLE INSULATION FOR VALVES  
SCALE: NTS



NO.	DATE	REVISION	BY

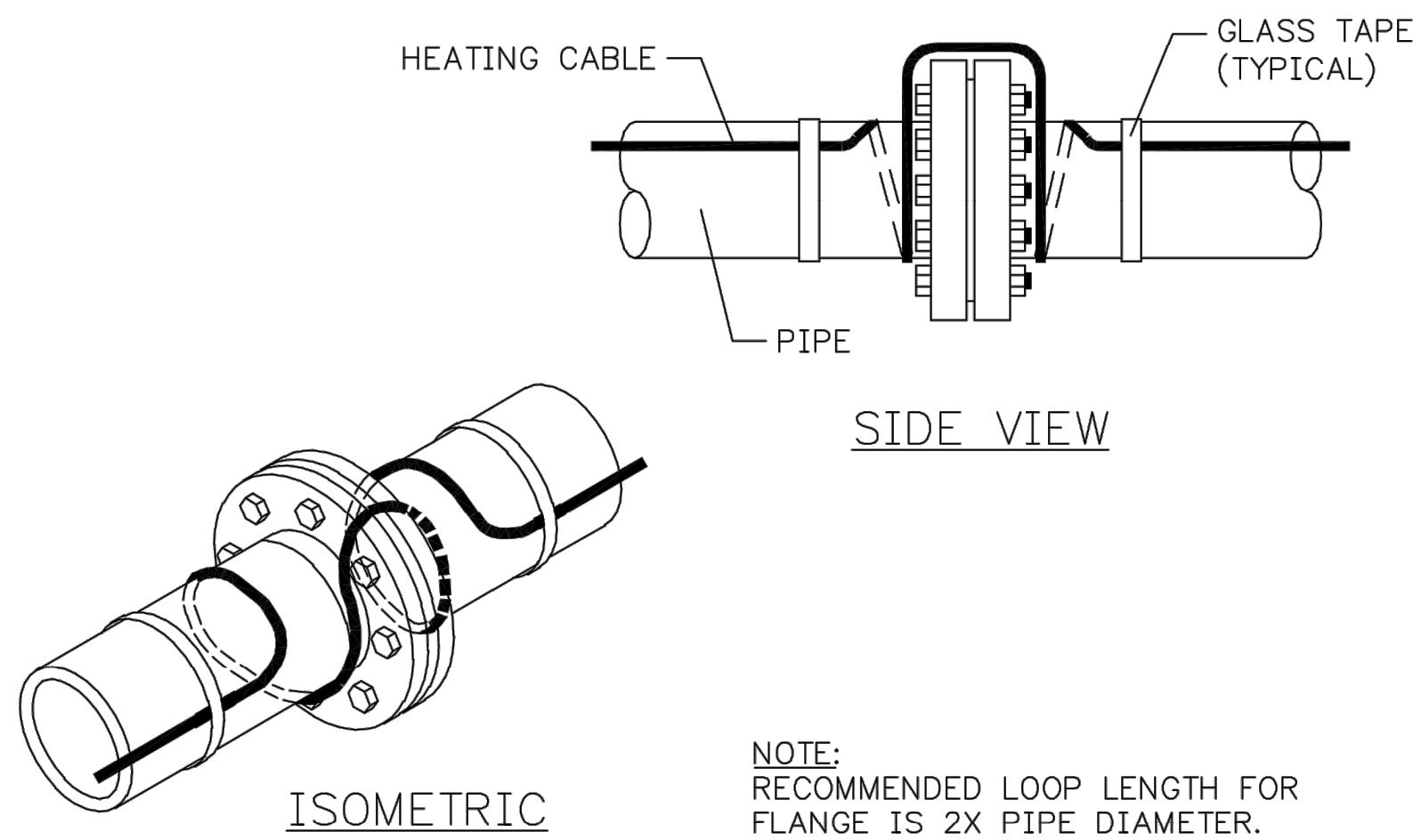


BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
ELECTRICAL  
HEAT TRACE DETAILS 1 OF 3

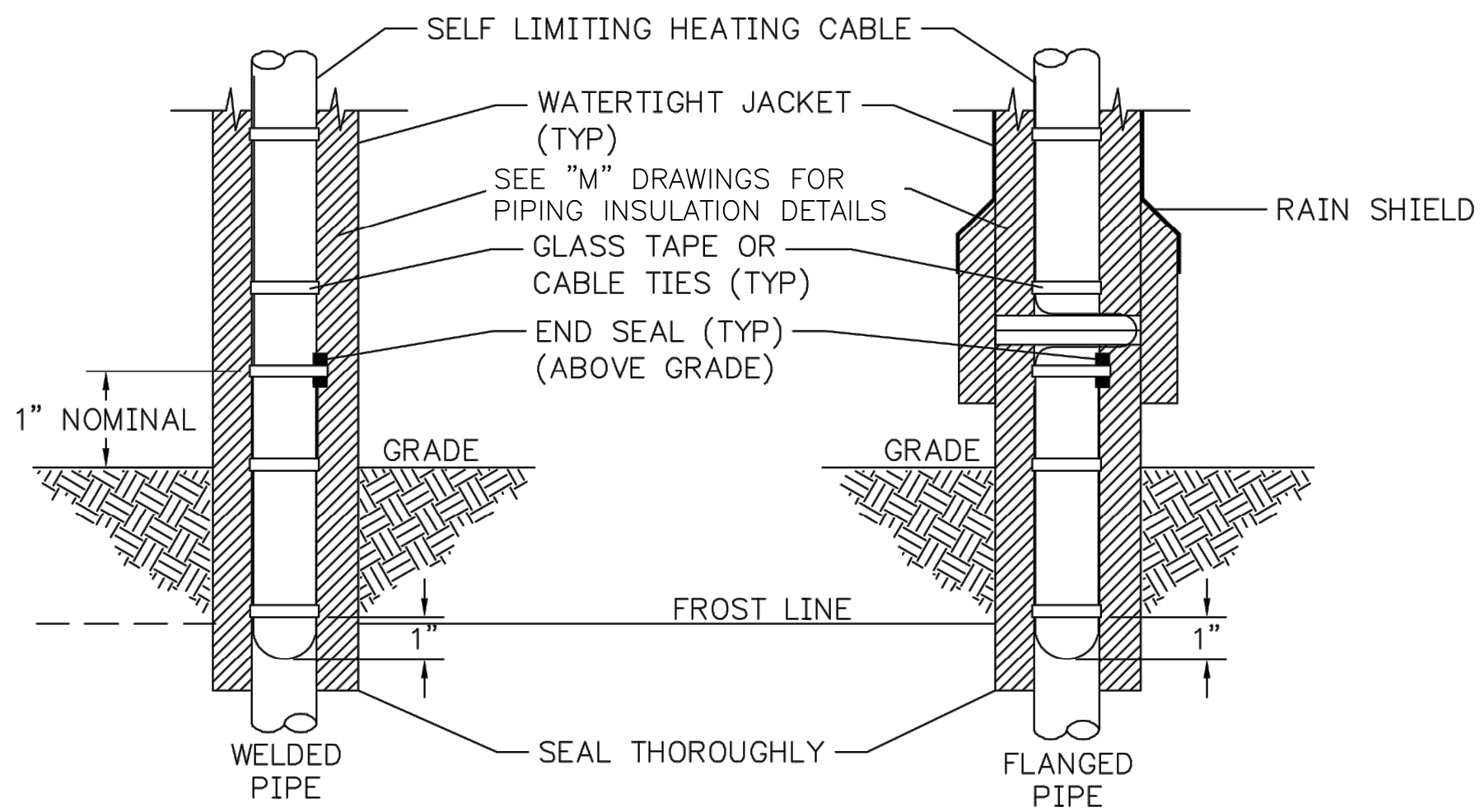
VERIFY SCALE  
0 1  
BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.  
DESIGNED P. LANDGRAF  
DRAWN T. FORNEY  
CHECKED A. RISTOW  
REVIEWED A. RISTOW  
Seq. of XX XXX  
Dwg. No. E-25  
2023-0002-00



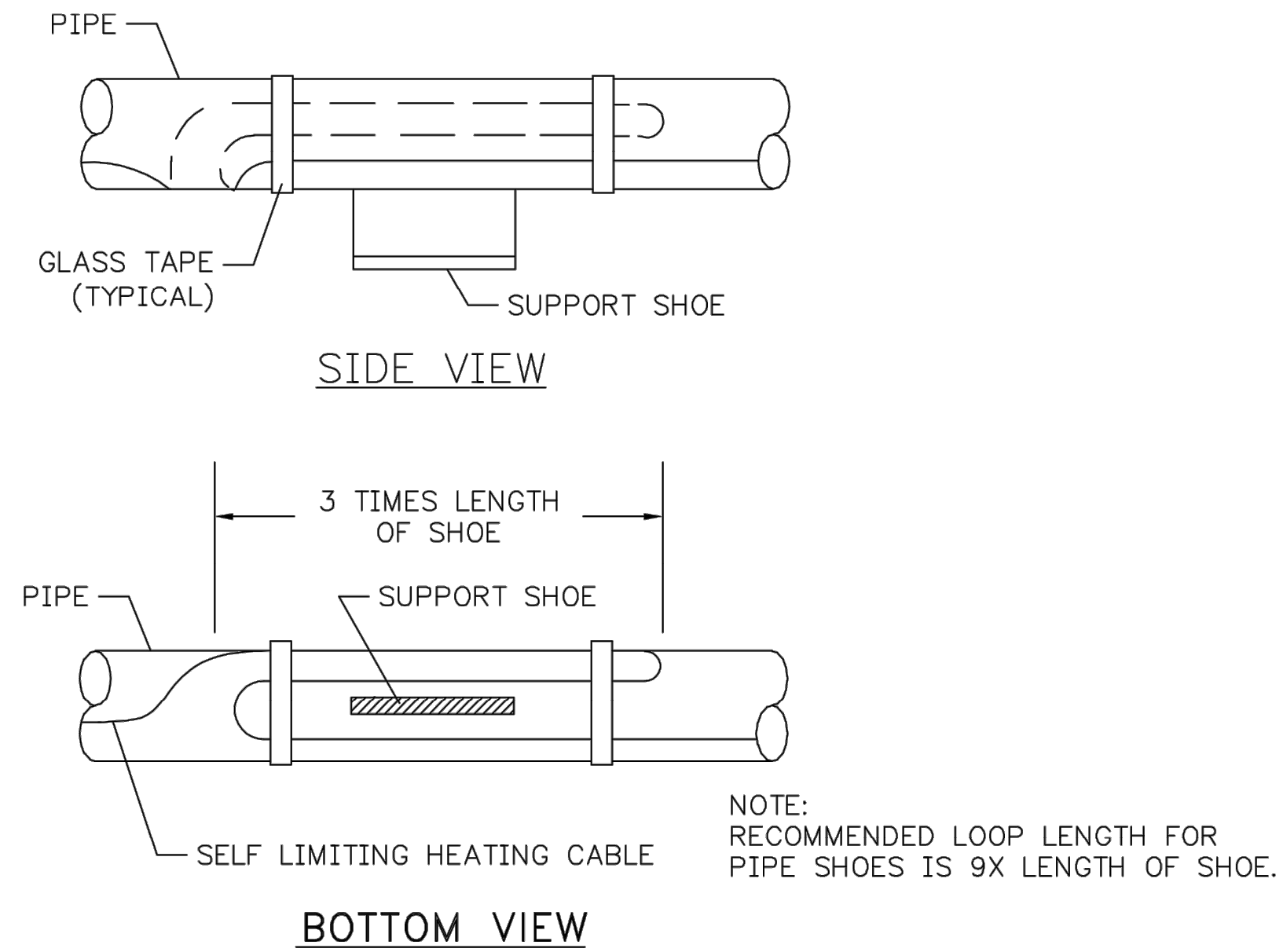
PRINTED: 10/26/2023 2:55 PM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-26 HEAT TRACE DETAILS 2 OF 3.dwg    SAVED: 9/14/2023 2:52 PM    USER: Riya Banerjee



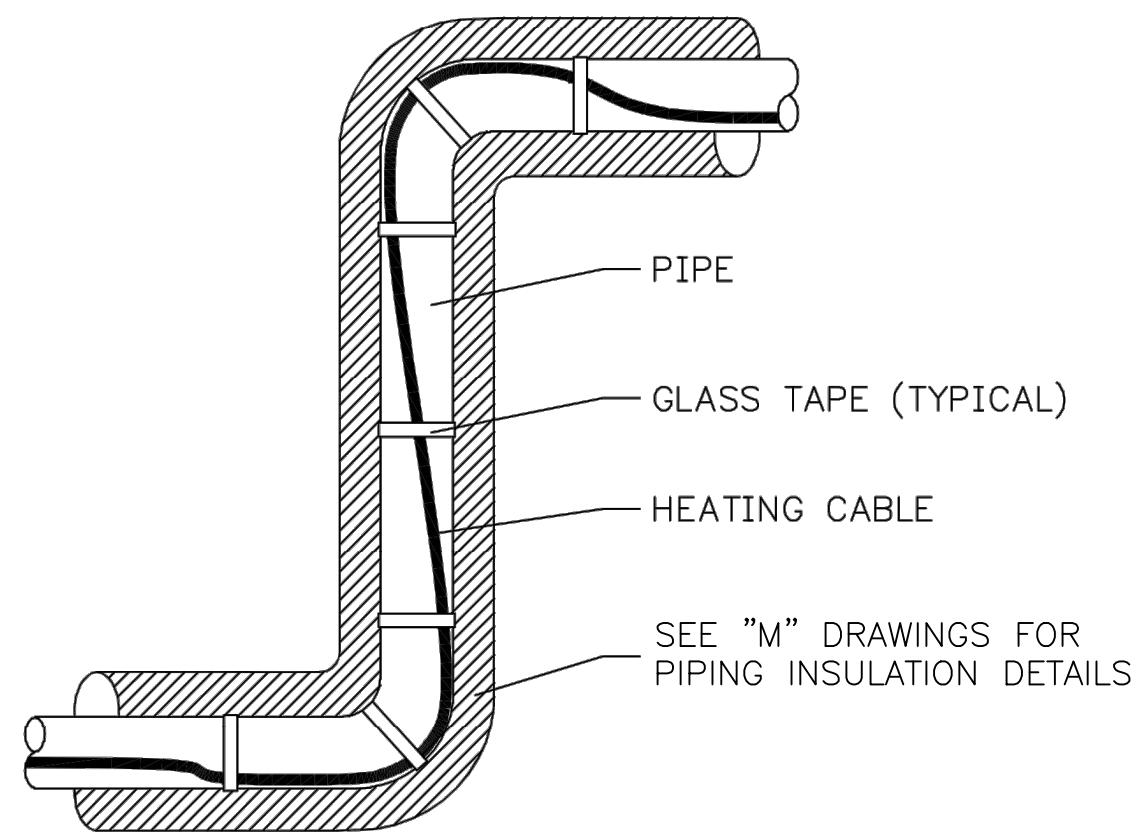
HT-7 HEATING CABLE ON FLANGE INSTALLATION  
SCALE: NTS



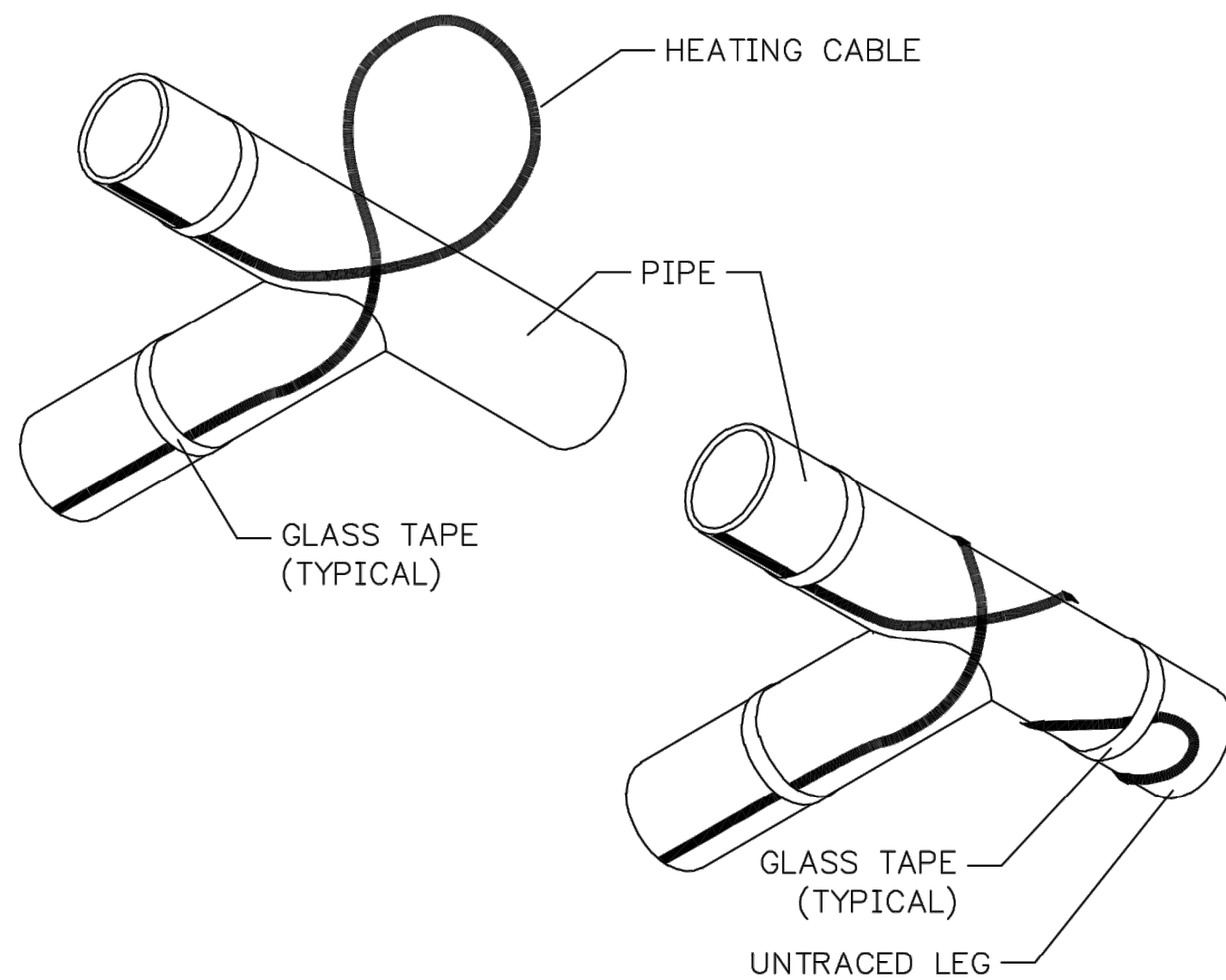
HT-8 HEATING CABLE FOR PIPE PENETRATION AT GRADE  
SCALE: NTS



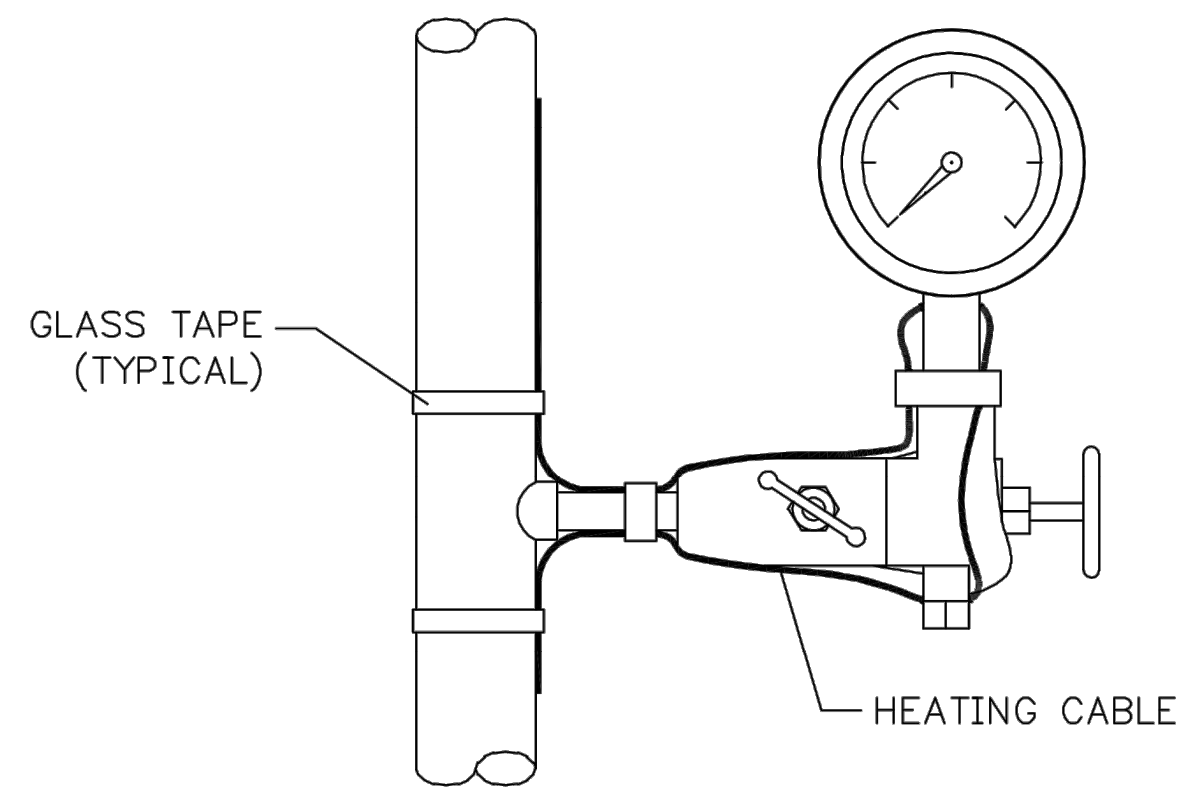
HT-9 HEATING CABLE FOR PIPE SUPPORTS  
SCALE: NTS



HT-10 HEATING CABLE FOR PIPE ELBOWS  
SCALE: NTS



HT-11 HEATING CABLE INSTALLATION FOR PIPE DEAD LEG TEE  
SCALE: NTS



HT-12 HEATING CABLE INSULATION FOR PIPELINE INSTRUMENT  
SCALE: NTS



NO.	DATE	REVISION	BY

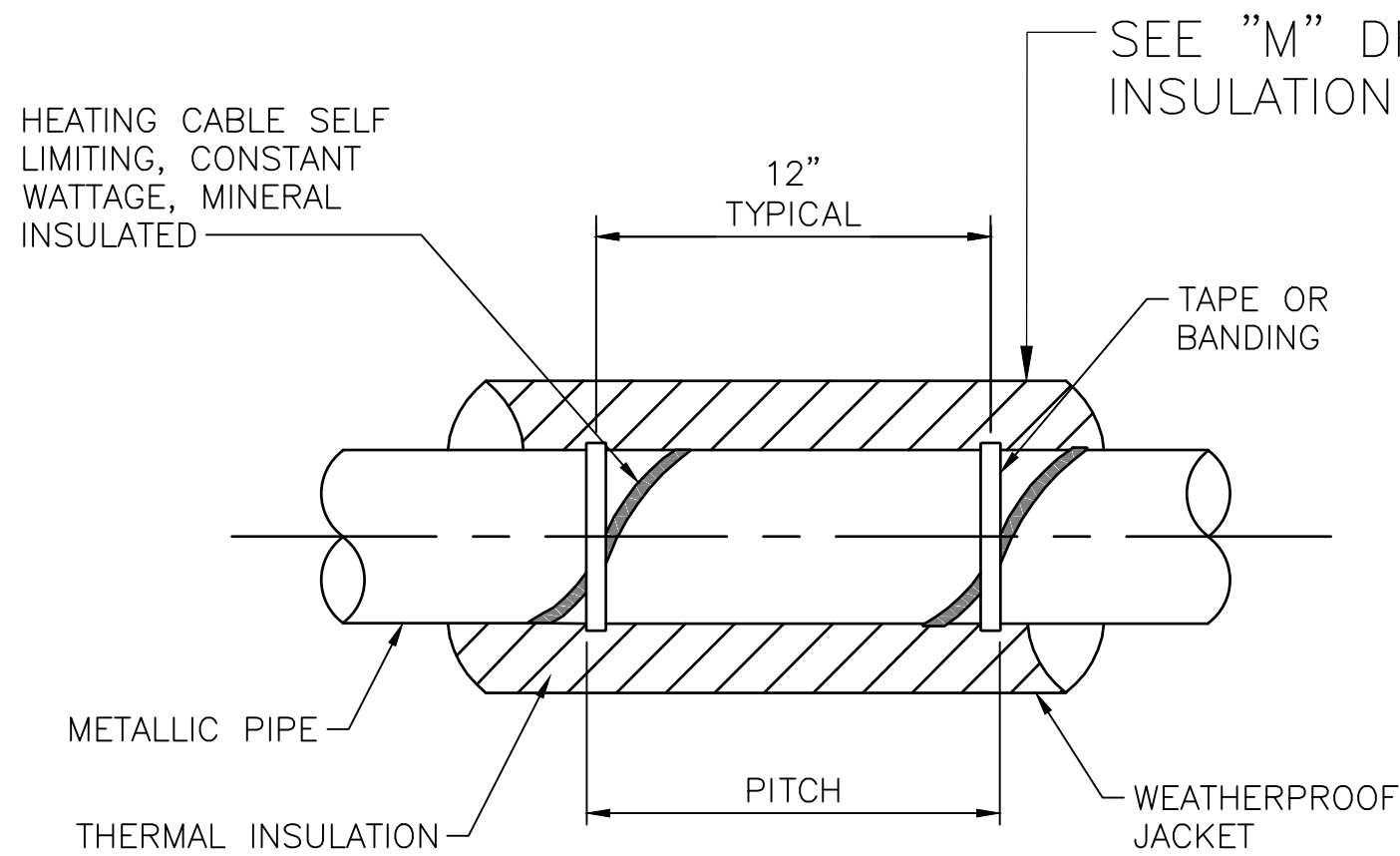


BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS  
ELECTRICAL  
HEAT TRACE DETAILS 2 OF 3

DESIGNED	P. LANDGRAF
DRAWN	I. FORNEY
CHECKED	A. RISTOW
REVIEWED	A. RISTOW
Seq.	of
Dwg. No.	XX XXX
E-26	
2023-0002-00	



PRINTED: 10/26/2023 2:55 PM I:\PROJECTS\brushy creek winterization and electrical improvements\8.0 drawings\8.3 sheets\Electrical\E-27 HEAT TRACE DETAILS 3 OF 3.dwg    SAVED: 9/15/2023 3:18 PM    USER: Riya Banerjee



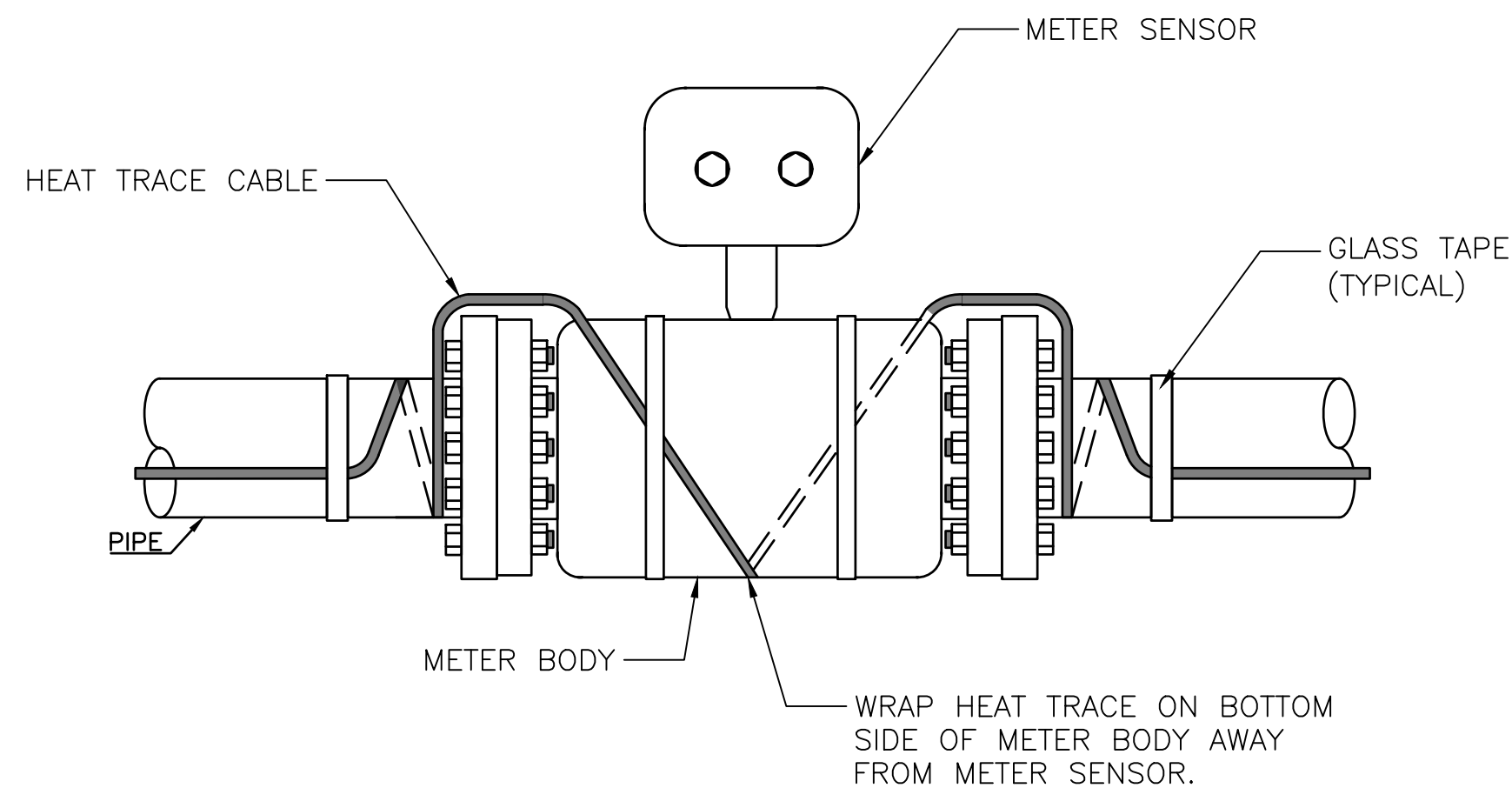
NOTE:

1. REFER TO PITCH CHART ON THIS SHEET FOR PROPER PITCH LENGTH.
2. IT IS NOT RECOMMENDED TO USE PITCH LENGTHS LESS THAN NPS SIZE. INSTEAD CHOOSE A HIGHER WATTAGE HEAT TRACE OR CONSULT WITH ENGINEER FOR ALTERNATIVES.

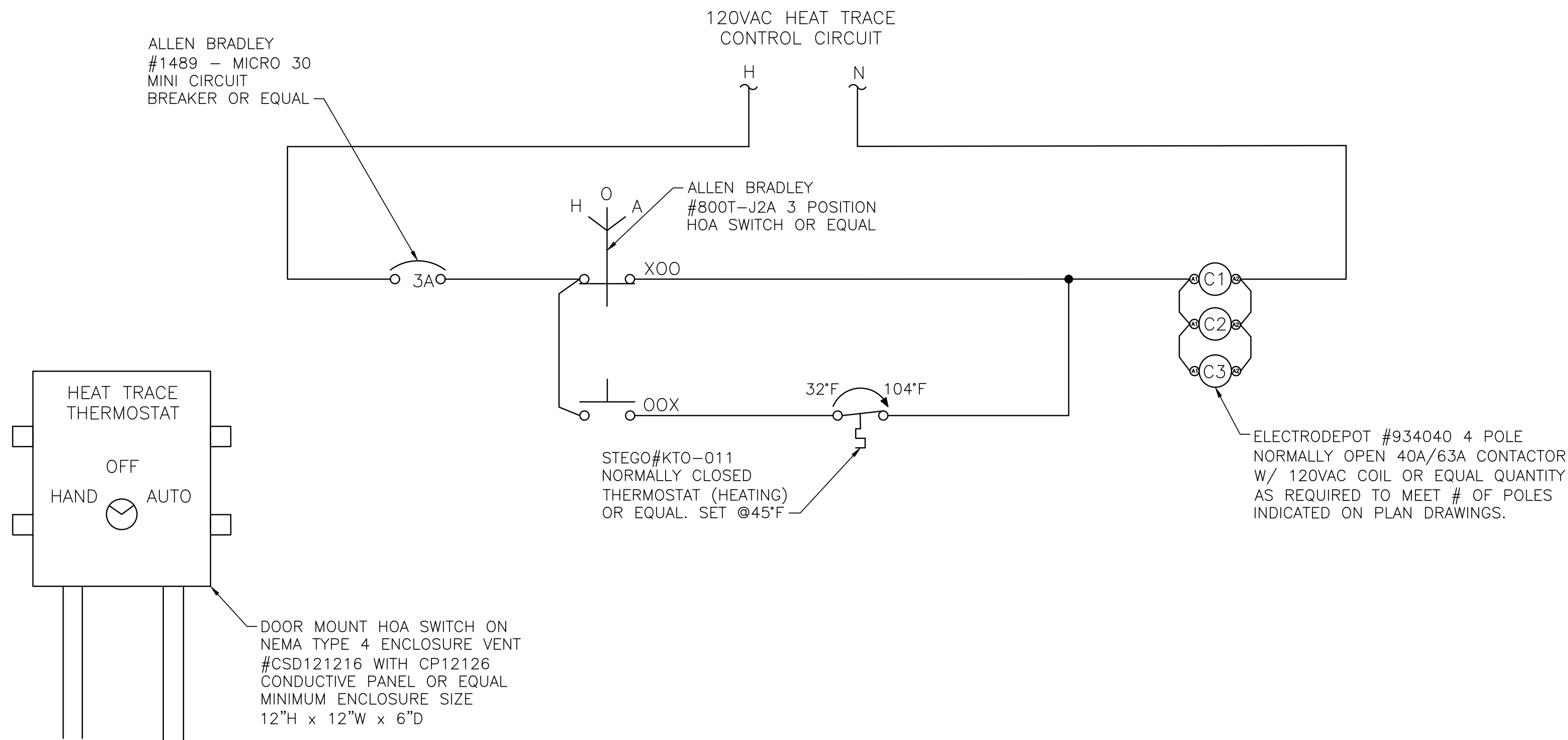
SPIRAL PITCH - (FEET OF HEAT TRACE PER FOOT OF PIPE) - NPS SIZE																
PITCH	0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00	6.00	8.00	10.00	12.00	24.00	30.00		
2.00	1.66	1.93	2.29	3.15	3.86	4.62	5.59	7.14	10.45	13.58	16.91	20.04	37.69	47.11		
3.00	1.33	1.49	1.70	2.23	2.68	3.17	3.80	4.81	7.01	9.08	11.30	13.38	25.14	31.42		
4.00	1.20	1.30	1.44	1.80	2.12	2.47	2.92	3.67	5.30	6.84	8.50	10.06	18.87	23.57		
5.00	1.13	1.20	1.30	1.56	1.80	2.06	2.41	3.00	4.28	5.51	6.82	8.07	15.11	18.87		
6.00	1.09	1.14	1.21	1.41	1.60	1.81	2.09	2.56	3.61	4.62	5.71	6.75	12.60	15.73		
7.00	1.07	1.11	1.16	1.31	1.46	1.63	1.86	2.25	3.14	4.00	4.92	5.81	10.81	13.49		
8.00	1.05	1.08	1.13	1.25	1.37	1.51	1.70	2.03	2.79	3.53	4.34	5.10	9.47	11.82		
9.00	1.04	1.06	1.10	1.20	1.30	1.42	1.58	1.86	2.52	3.17	3.88	4.56	8.43	10.51		
10.00	SR	1.05	1.08	1.16	1.25	1.35	1.49	1.73	2.31	2.89	3.52	4.13	7.60	9.47		
11.00	SR	1.04	1.07	1.14	1.21	1.29	1.41	1.63	2.14	2.66	3.23	3.77	6.92	8.62		
12.00	SR	SR	1.06	1.12	1.18	1.25	1.36	1.54	2.00	2.47	2.99	3.48	6.36	7.91		
14.00	SR	SR	SR	1.09	1.13	1.19	1.27	1.42	1.79	2.18	2.61	3.03	5.47	6.80		
16.00	SR	SR	SR	1.07	1.10	1.15	1.21	1.33	1.64	1.97	2.33	2.69	4.81	5.97		
18.00	SR	SR	SR	1.05	1.08	1.12	1.17	1.27	1.53	1.81	2.13	2.44	4.30	5.33		
24.00	SR	SR	SR	SR	1.05	1.07	1.10	1.16	1.32	1.51	1.73	1.94	3.30	4.05		
30.00	SR	SR	SR	SR	SR	1.04	1.06	1.11	1.22	1.35	1.51	1.67	2.70	3.30		

SR = STRAIGHT RUN

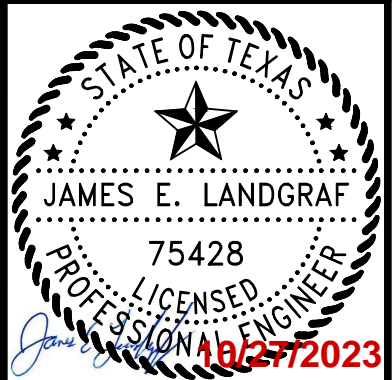
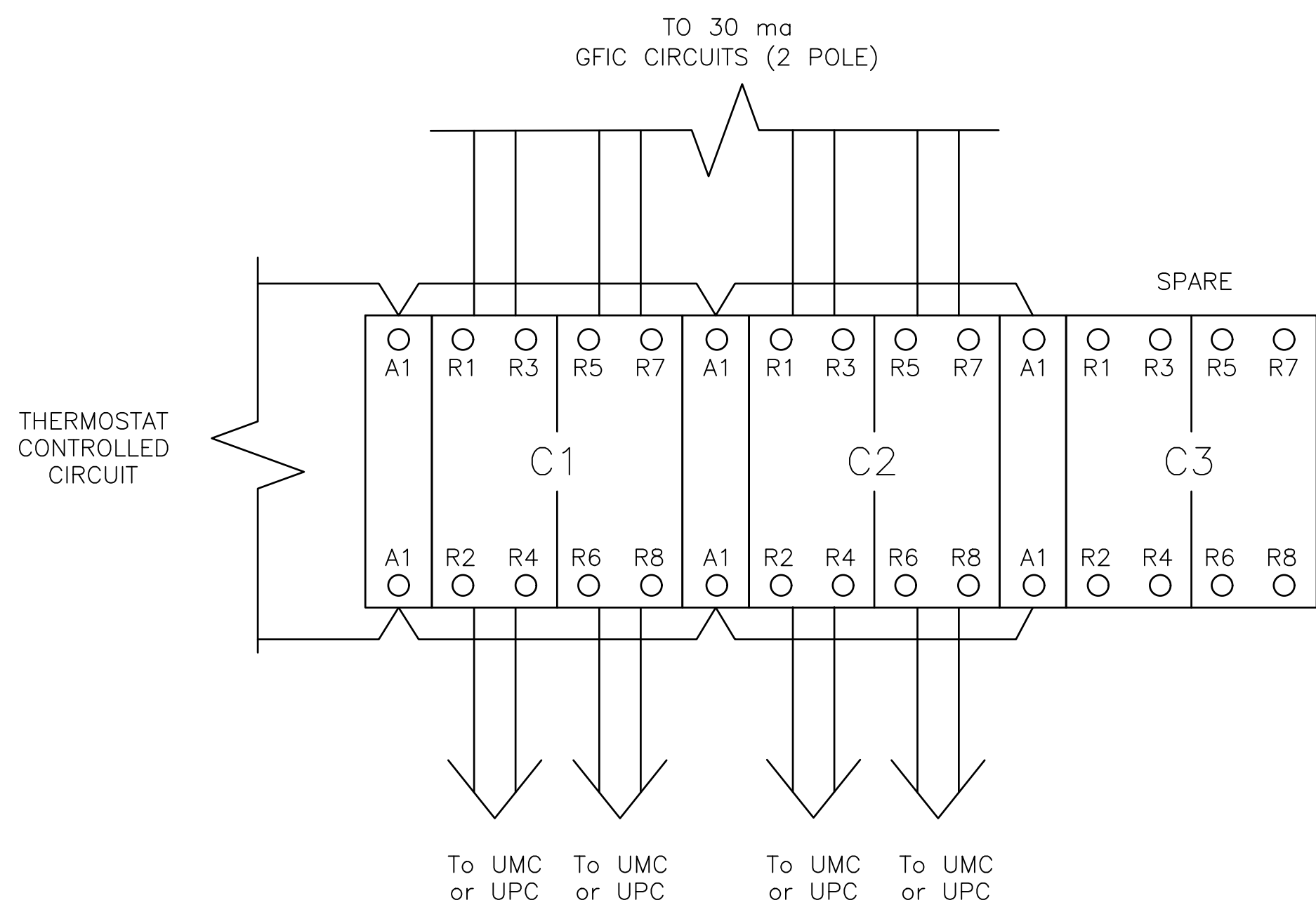
HT-13 ONE CABLE SPIRALLING METHOD  
SCALE: NTS



HT-14 HEAT TRACE IN-LINE FLOW METER INSTALLATION  
SCALE: NTS



HT-15 THERMOSTAT CONTROLLED CONTACTOR  
SCALE: NTS



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
HEAT TRACE DETAILS 3 OF 3

VERIFY SCALE  
0 1  
BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE.

DESIGNED P. LANDGRAF  
DRAWN T. FORNEY  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

Seq. of  
XX XXX

Dwg. No. E-27

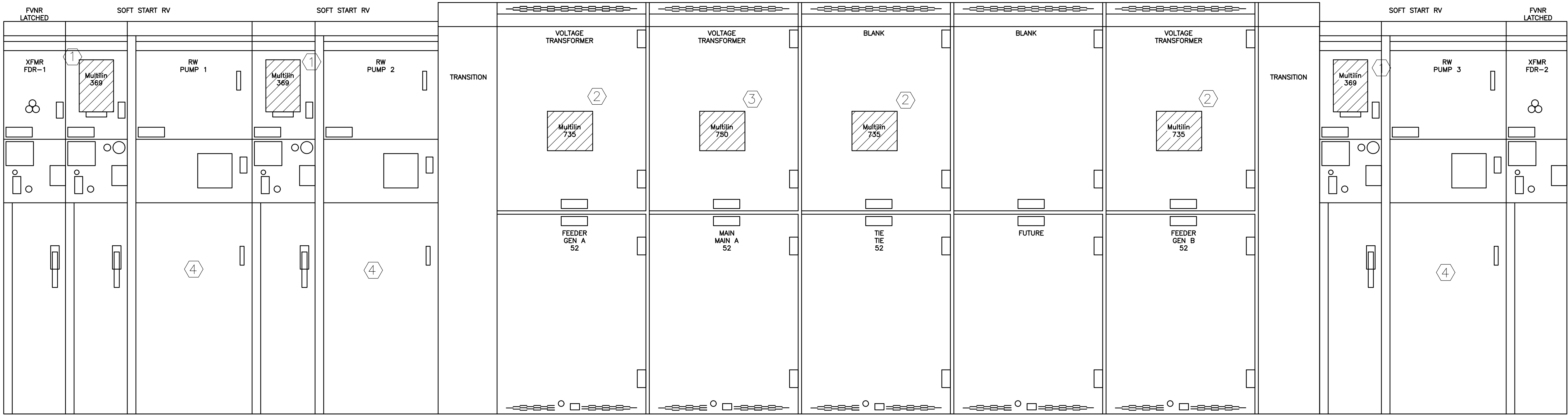
2023-0002-00

PRINTED: 10/26/2023 2:58 PM | PROJECT: Brushy Creek winterization and electrical improvements | 8.0 drawings | 8.3 sheets | Electrical | E-28 | INTAKE MV MCC ELEVATIONS.dwg | SAVED: 9/7/2023 11:38 AM | USER: Rya Bandjee

MV MOTOR CONROL

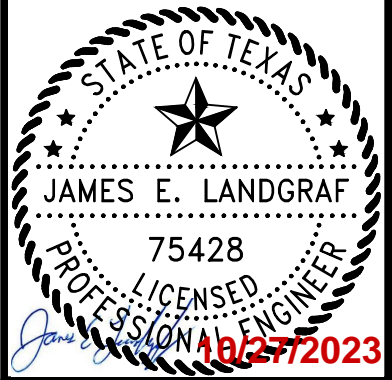
MV SWITCHGEAR

MV MOTOR CONROL



NOTES BY SYMBOL

- REPLACE (3) GE MULTILIN 735 WITH SEL-751 FEEDER PROTECTION RELAY USING VERTICAL RETROFIT (GE 469).
- REPLACE (1) GE MULTI 750 WITH SEL-751 FEEDER PROTECTION RELAY USING VERTICAL RETROFIT (GE469).
- REPLACE (3) GE MULTILIN 369 WITH SEL 710-5 MOTOR PROTECTION RELAY USING VERTICAL RETROFIT (GE 169/269/369).
- REPLACE (3) SQUARE D/SCHNEIDER REDUCE VOLTAGE STARTER WITH BENSHAW OR WEG RETROFIT MX3 SYSTEM.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

ELECTRICAL  
INTAKE MV MCC ELEVATIONS

VERIFY SCALE  
0 1  
BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE

DESIGNED P. LANDGRAF  
DRAWN R. CHISHOLM  
CHECKED A. RISTOW  
REVIEWED A. RISTOW

Seq. of  
XX XXX

Dwg. No. E-28

2023-0002-00







MEANINGS OF IDENTIFICATION LETTERS

THIS TABLE APPLIES TO THE FUNCTIONAL IDENTIFICATION OF INSTRUMENTS

Letter	First Letter		Succeeding Letters		
	Measured or Initiating Variable	Modifier	Readout or Passive Function	Output Function	Modifier
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		EMERGENCY	USER'S CHOICE	USER'S CHOICE
C	USERS CHOICE		CLEANER	CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH OR OPEN
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW OR CLOSED
M	USER'S CHOICE	MOMENTARY			MIDDLE OR INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)		
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE OR TOTALIZE			
R	RUN		RECORD		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY, VIBRATION			VALVE, DAMPER OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	FAILURE	X AXIS			
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVE, ACTUATE OR UNCLASSIFIED CONTROL ELEMENT	

PIPELINE MATERIAL CODE ABBREVIATION

SS-XX1	SECTION 15064, STAINLESS STEEL PIPE AND ALLOY PIPE, TUBING AND ACCESSORIES
PVC-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING AND ACCESSORIES
GPVC-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING AND ACCESSORIES
CS	SECTION 02318, STEEL PIPE AND FITTINGS FOR LARGE DIAMETER WATER LINES
CS	SECTION 02302, STEEL PIPE AND FITTINGS FOR 20 INCHES AND SMALLER
DI	SECTION 02301, DUCTILE IRON PIPE AND FITTING
PVC	SECTION 02306, POLYVINYL, CHLORINE PIPE AND FITTING

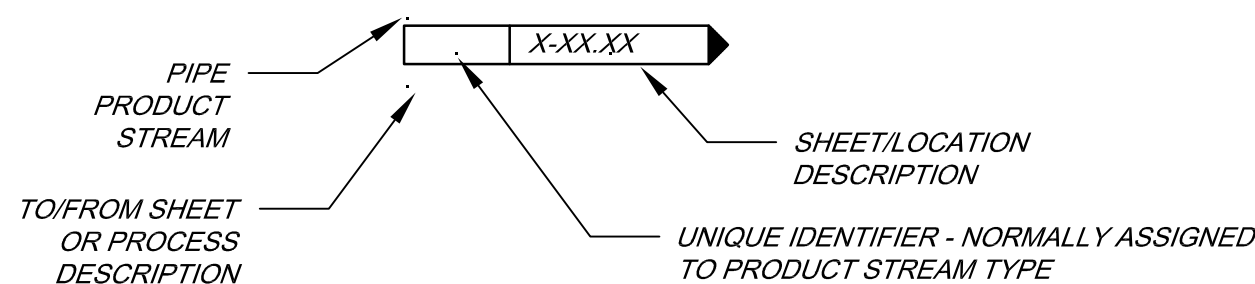
## PIPELINE MATERIAL CODE SUFIX

SS-5	SCHEDULED 40S PIPE WITH BEVELED ENDS
SS-8	SCHEDULED 40S PIPE WITH PLAIN ENDS
BR-1	REGULAR WEIGHT BRASS PIPE
BR-2	EXTRA STRONG WEIGHT BRASS PIPE
HS-1	HOSE WITH INSERT TYPE COUPLING
PVC-2	SCHEDULED 80 PVC PIPE WITH SOLVENT WELDED JOINTS
CPVC-1	SCHEDULED 80 CPVC PIPE WITH SOLVENT WELDED JOINTS

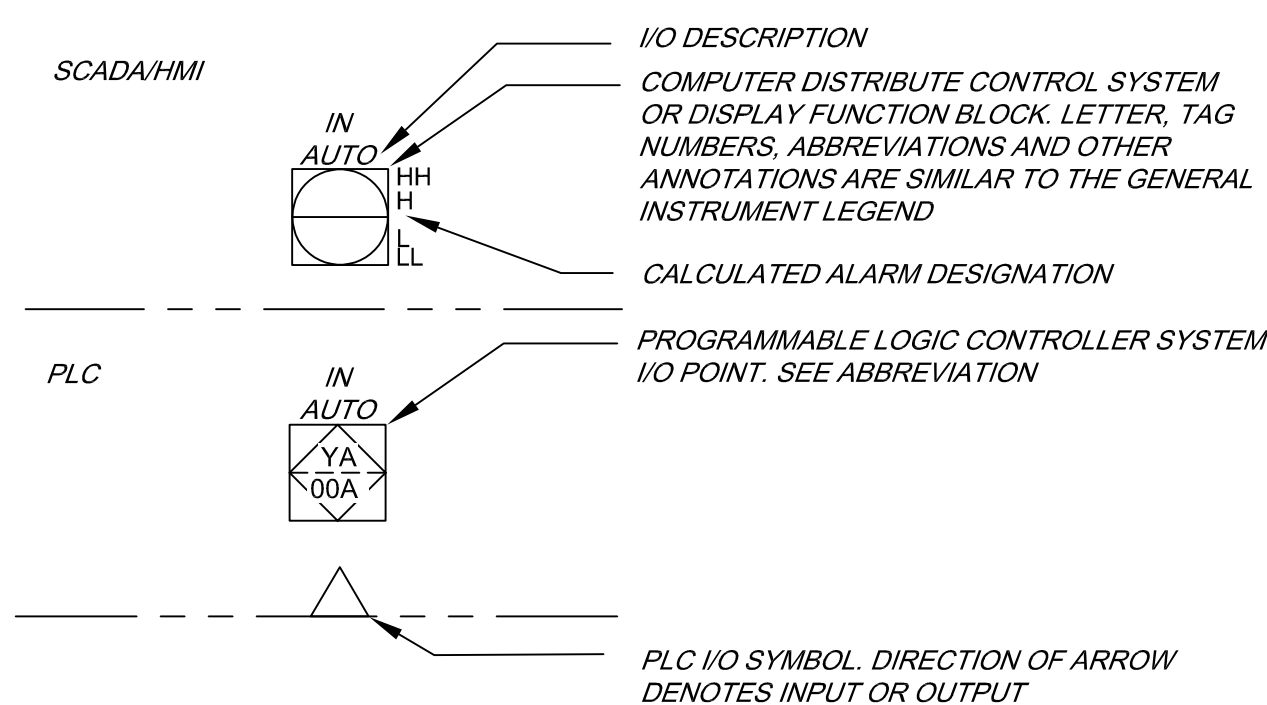
PIPE LINE GROUP SERVICE

FW FILTERED WATER  
PA PROCESS AIR  
PW PROCESS WATER  
TW TREATED WATER  
WW WASTE WATER

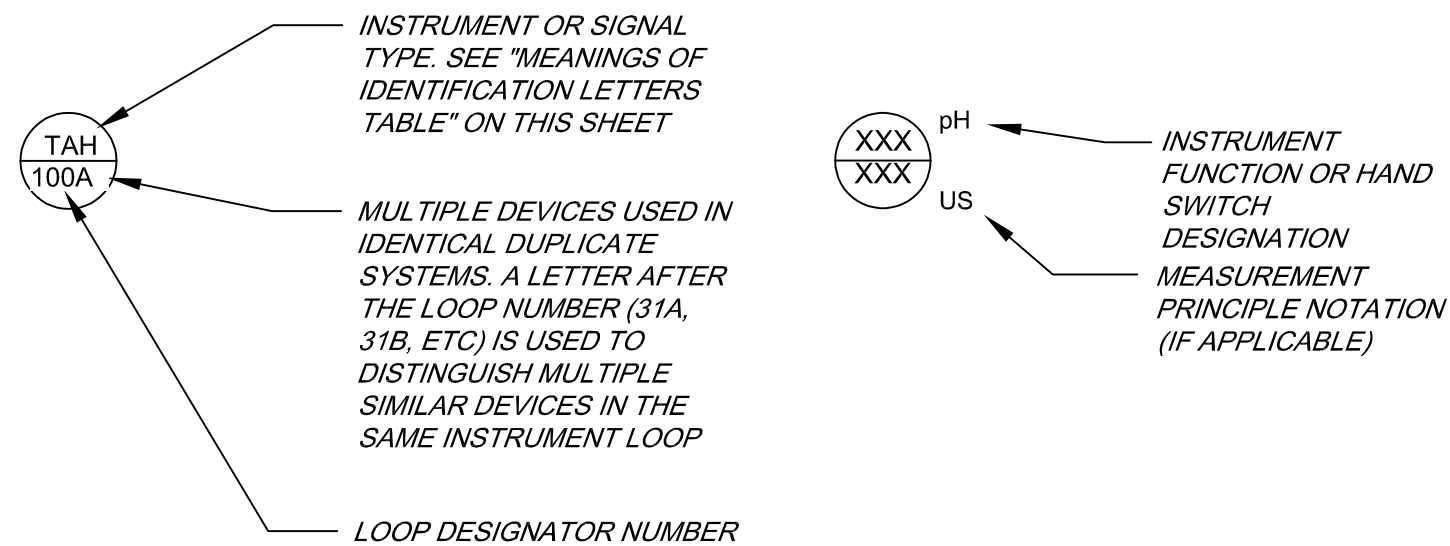
## CONNECTOR SYMBOLS & ABBREVIATIONS



### TYPICAL TAG NUMBERS & DESIGNATION



### INSTRUMENTATION SYMBOLOGY AND DESIGNATION



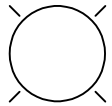





#### INSTRUMENT AND I/O ABBREVIATION DEFINITION

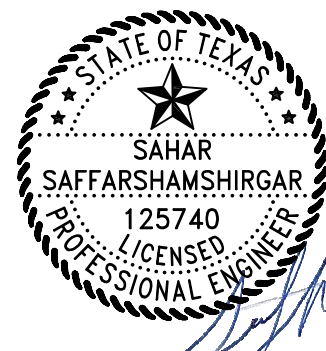
AAH	ANALYZER ALARM HIGH	PDAL	DIFFERENTIAL PRESSURE ALARM LOW
AAHH	ANALYZER ALARM HIGH-HIGH	PDALL	DIFFERENTIAL PRESSURE ALARM LOW-LOW
AAL	ANALYZER ALARM LOW	POAH	DIFFERENTIAL PRESSURE ALARM HIGH
AALL	ANALYZER ALARM LOW-LOW	POAHH	DIFFERENTIAL PRESSURE ALARM HIGH-HIGH
AAX	ANALYZER HORN	PSL	DIFFERENTIAL PRESSURE SWITCH LOW
AAL	STROBE ALARM LIGHT	PSLL	DIFFERENTIAL PRESSURE SWITCH LOW-LOW
AE	ANALYZER SENSOR	PSH	DIFFERENTIAL PRESSURE SWITCH HIGH
AI	ANALYZER INDICATION	PSHH	DIFFERENTIAL PRESSURE SWITCH HIGH-HIGH
AIT	ANALYZER INDICATING TRANSMITTER	PE	PRIMARY PRESSURE ELEMENT/SENSOR
ASH	ANALYZER SWITCH HIGH	PG	PRESSURE GAUGE
ASHH	ANALYZER SWITCH HIGH-HIGH	PI	PRESSURE INDICATOR
CB	CONTROL BLOCK REFERENCE (SCADA LEVEL)	PIT	PRESSURE INDICATING TRANSMITTER
FAL	FLOW ALARM LOW	PSL	PRESSURE SWITCH LOW
FAH	FLOW ALARM HIGH	PSH	PRESSURE SWITCH HIGH
FC	FLOW CONTROLLER	SI	SPEED INDICATION (LED OR SCREEN)
FI	FLOW INDICATOR (LED OR SCREEN)	SC	SPEED CONTROL
FIC	FLOW INDICATING CONTROLLER	SIT	SPEED INDICATING TRANSMITTER
FE	PRIMARY FLOW ELEMENT/SENSOR	SS	START-STOP SWITCH
FG	FLOW SIGHT GAUGE	SSL	SPEED SWITCH LOW
FIT	FLOW INDICATING TRANSMITTER	SSH	SPEED SWITCH HIGH
FOG	FLOW TOTALIZING GAUGE	TAL	TEMPERATURE ALARM LOW
FQIT	FLOW TOTALIZING INDICATING TRANSMITTER	TAH	TEMPERATURE ALARM HIGH
FSL	FLOW SWITCH LOW	TAHH	TEMPERATURE ALARM HIGH-HIGH
FSH	FLOW SWITCH HIGH	TDI	DIFFERENTIAL TEMPERATURE INDICATOR (LED OR SCREEN)
FY	FLOW SIGNAL CONVERTER, REPEATER OR ISOLATOR		
HIC	HAND INDICATING CONTROLLER	TDIT	DIFFERENTIAL TEMPERATURE TRANSMITTER
HMS	MOMENTARY PUSHBUTTON OR SELECTOR SWITCH	TE	TEMPERATURE SENSOR / RESISTANCE TEMPERATURE DETECTOR
HS	HAND SWITCH		
IE	CURRENT ELEMENT/SENSOR	TSL	TEMPERATURE SWITCH LOW
IAH	CURRENT ALARM HIGH (MOTOR OVERLOAD)	TSH	TEMPERATURE SWITCH HIGH
ISH	CURRENT SWITCH HIGH (USED TO DETECT HIGH TORQUE)	TSHH	TEMPERATURE SWITCH HIGH-HIGH
JA	POWER FAILURE	TG	TEMPERATURE GAUGE
JI	POWER INDICATOR	TI	TEMPERATURE INDICATOR (LED OR SCREEN)
JL	POWER INDICATING LIGHT	TIT	TEMPERATURE INDICATING TRANSMITTER
JIT	POWER INDICATING TRANSMITTER	UA	MULTIVARIABLE COMMON ALARM/COMMON FAULT
KQI	TIME TOTALIZING INDICATOR	UCR	RUN COMMAND
LAL	LEVEL ALARM LOW	UCS	STOP COMMAND
LALL	LEVEL ALARM LOW-LOW	VAH	VIBRATION ALARM HIGH
LAH	LEVEL ALARM HIGH	WE	PRIMARY WEIGHT SENSOR/LOAD CELL
LAHH	LEVEL ALARM HIGH-HIGH	WG	WEIGHT GAUGE
LE	PRIMARY LEVEL ELEMENT/SENSOR	WIT	WEIGHT INDICATING TRANSMITTER
LG	LEVEL SIGHT GAUGE	YA	GENERAL ALARM EVENT
LI	LEVEL INDICATOR (LED OR SCREEN)	YI	EVENT INDICATION (LED OR SCREEN)
LIT	LEVEL INDICATING TRANSMITTER	YR	RUNNING INDICATION
LJL	LEVEL SWITCH LOW	YIS	STOPPED INDICATION
LSLL	LEVEL SWITCH LOW-LOW	YL	EVENT INDICATING LIGHT
LSH	LEVEL SWITCH HIGH	YLR	RUNNING INDICATING LIGHT
LSHH	LEVEL SWITCH HIGH-HIGH	YLS	STOPPED INDICATING LIGHT
LY	LEVEL SIGNAL CONVERTER, REPEATER OR ISOLATOR	ZI	POSITION INDICATOR
NI	STROKE POSITION SWITCH	ZIC	CLOSED INDICATION
NC	STROKE POSITION COMMAND	ZIO	OPEN INDICATION
OAH	TORQUE ALARM HIGH	ZLC	CLOSED INDICATING LIGHT
OAHH	TORQUE ALARM HIGH-HIGH	ZLO	OPEN INDICATING LIGHT
OSH	TORQUE SWITCH HIGH	ZSC	CLOSED POSITION SWITCH
OSH	TORQUE SWITCH HIGH-HIGH	ZSO	OPEN POSITION SWITCH
PAH	PRESSURE ALARM LOW	ZIT	POSITION INDICATING TRANSMITTER
PALL	PRESSURE ALARM LOW-LOW	ZT	POSITION TRANSMITTER
PAH	PRESSURE ALARM HIGH		
PAHH	PRESSURE ALARM HIGH-HIGH		
PDG	DIFFERENTIAL PRESSURE GAUGE		
PDI	DIFFERENTIAL PRESSURE INDICATOR (LED OR SCREEN)		
PDIT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER		

### FUNCTION DESIGNATION AND ABBREVIATIONS

MEASUREMENT PRINCIPLE NOTATIONS		INSTRUMENT FUNCTION		HAND SWITCH DESIGNATION	
CON DP	CONDUCTANCE DIFFERENTIAL	K	GAIN OR ATTENUATE (INPUT-OUTPUT)	FR	FORWARD-REVERSE
FLN	PRESSURE SENSING	-K	GAIN AND REVERSE	HQA	HAND-OFF-AUTO
FLT	FLOW NOZZEL			HOR	HAND-OFF-REMOTE
GWR	FLOAT	S	ADD OR SUM (ADD AND SUBTRACT)	LOA	LOCAL-OFF-AUTO
RAD	GUIDE WAVE			LOR	LOCAL-OFF-REMOTE
US	RADAR	D	SUBTRACT (DIFFERENCE EXTRACT SQUARE)	LR	LOCAL-REMOTE
VENT	ULTRASONIC			OCA	OPEN-CLOSE-AUTO
	VENTURI TUBE			OOA	OPEN-OFF-AUTO
				OOR	OPEN-OFF-REMOTE
		✓—	ROOT	OC	OPEN-CLOSE
		÷	DIVIDE	OO	ON-OFF
				OSC	OPEN-STOP-CLOSE
				SS	START - STOP
		F(X)	CHARACTERIZE SIGNAL		
CALCULATED ALARM DESIGNATION		>	HIGH SELECT		
		<	LOW SELECT		TRANSDUCER & CONVERTER DESIGNATION
L	LOW	X	MULTIPLY	E	VOLTAGE
LL	LOW-LOW			FSK	FREQUENCY SHIFT KEYING
H	HIGH	∫	INTEGRATE	H	HYDRAULIC
HH	HIGH-HIGH			I	CURRENT
		CH4	METHANE	P	PNEUMATIC PULSE
				PD	PULSE DURATION
		CL2	CHLORINE RESIDUAL	PF	PULSE FREQUENCY
				R	RESISTANCE (ELECTRICAL)
		CO2	CARBON DIOXIDE		EXAMPLE: I/P CURRENT TO PNEUMATIC TRANSDUCER
INDICATING LIGHT/ALARM DESIGNATION		DO	DISSOLVE OXYGEN		
		H2S	HYDROGEN SULFIDE		
OVRLD	OVERLOAD	LEL	LOWER EXPLOSIVE LIMIT		POWER SUPPLY ABBREVIATIONS
TRQ HI	TORQUE HIGH			AS	AIR SUPPLY
TRQ HI-HI	TORQUE HIGH-HIGH	MCC	MOTOR CONTROL CENTER	ES	ELECTRIC SUPPLY
		MLSS	MIXED LIQUOR SUSPENDED SOLID	GS	GAS SUPPLY
		O2	OXYGEN (PURITY)	HS	HYDRAULIC SUPPLY
				NS	NITROGEN SUPPLY
				SS	STEAM SUPPLY
MISCELLANEOUS ABBREVIATION		O3	OZONE	WS	WATER SUPPLY
				120V	120VAC
		ORP	OXIDATION REDUCTION POTENCIAL	120V —	POWER SUPPLY SOURCE LABEL USED ONLY WHERE NECESSARY TO HELP CLARIFY AN INSTRUMENT OR SYSTEM FUNCTION.
CTUP	CHEMICAL TRUCK UNLOADING PANEL	pH	pH		
		TURB	TURBIDITY		
		TOC	TOTAL ORGANIC CARBON		
		TCL	TOTAL CHLORINE		

### GENERAL INSTRUMENT SYMBOLS

	FIELD MOUNTED DISCRETE INSTRUMENTS/SIGNALS		ANALOG INPUT
			ANALOG OUTPUT
	PILOT LIGHT		DIGITAL INPUT
			DIGITAL OUTPUT
	DISCRETE INSTRUMENT MOUNTED ON FACE OF PRIMARY PANEL		PULSE INPUT
	DISCRETE INSTRUMENT MOUNTED BEHIND OR INSIDE OF PRIMARY PANEL		GENERAL CONTROL INTERLOCK FUNCTION
	DISCRETE INSTRUMENT MOUNTED ON FACE OF LOCAL PANEL		
	DISCRETE INSTRUMENT MOUNTED BEHIND OR INSIDE OF LOCAL PANEL		
	PROGRAMMABLE LOGIC CONTROLLER SYSTEM I/O POINT. SEE ABBREVIATION		
	HMI INDICATOR/PLC SIGNAL		



## BRUSHY CREEK MUNICIPAL UTILITY DISTRICT WINTERIZATION AND ELECTRICAL IMPROVEMENTS

## INSTRUMENTATION

### LEGEND II



BAR IS ONE INCH ON ORIGINAL  
DRAWING. IF NOT ONE INCH ON  
THIS SHEET, ADJUST SCALE.

DESIGNED	<u>F. PADRON</u>
DRAWN	<u>M. TRAINER</u>
CHECKED	<u>M. TRAINER</u>
REVIEWED	<u>S. SAFFAR</u>

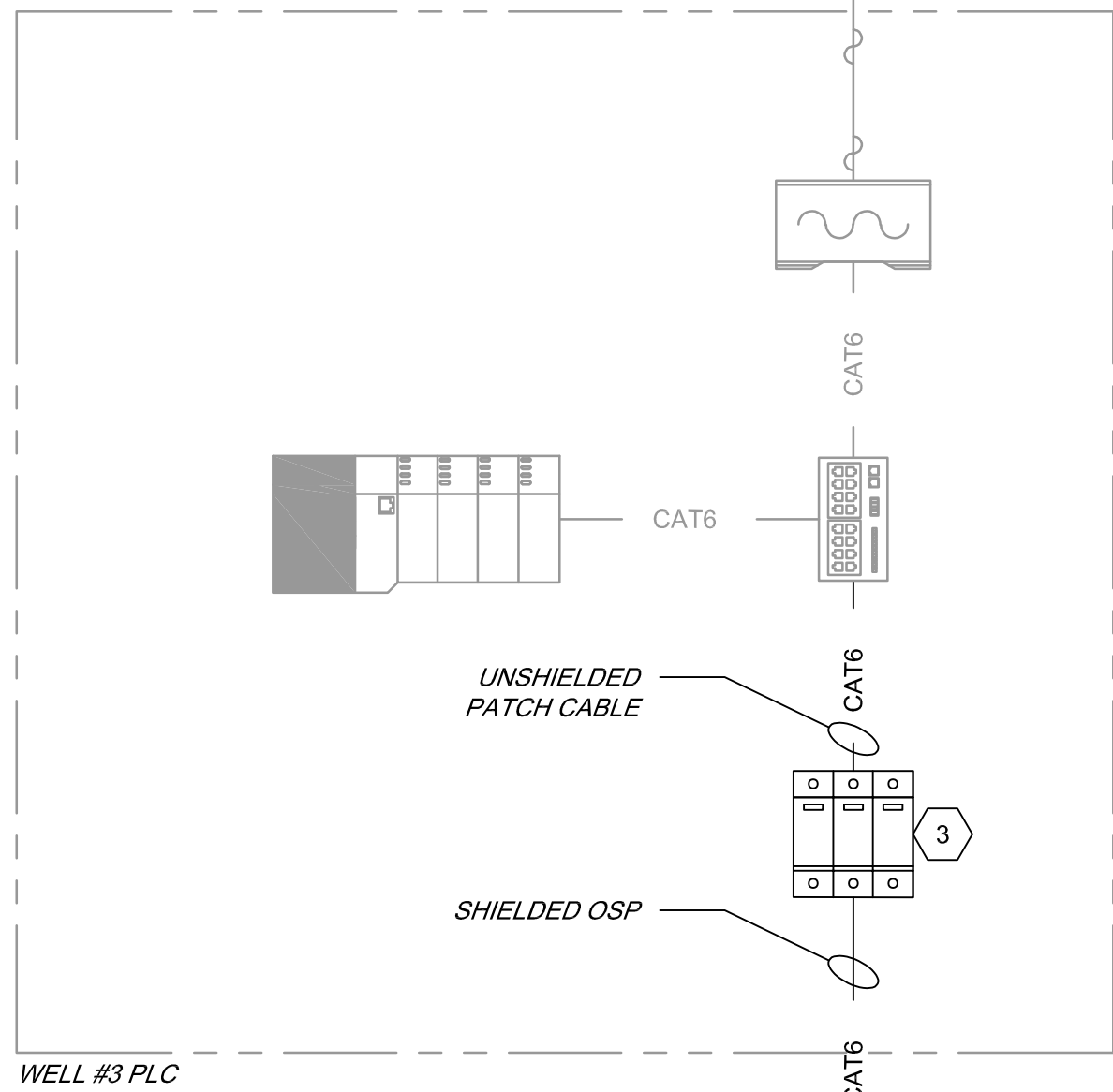
Seq. 2 of 10

2023-0002-00

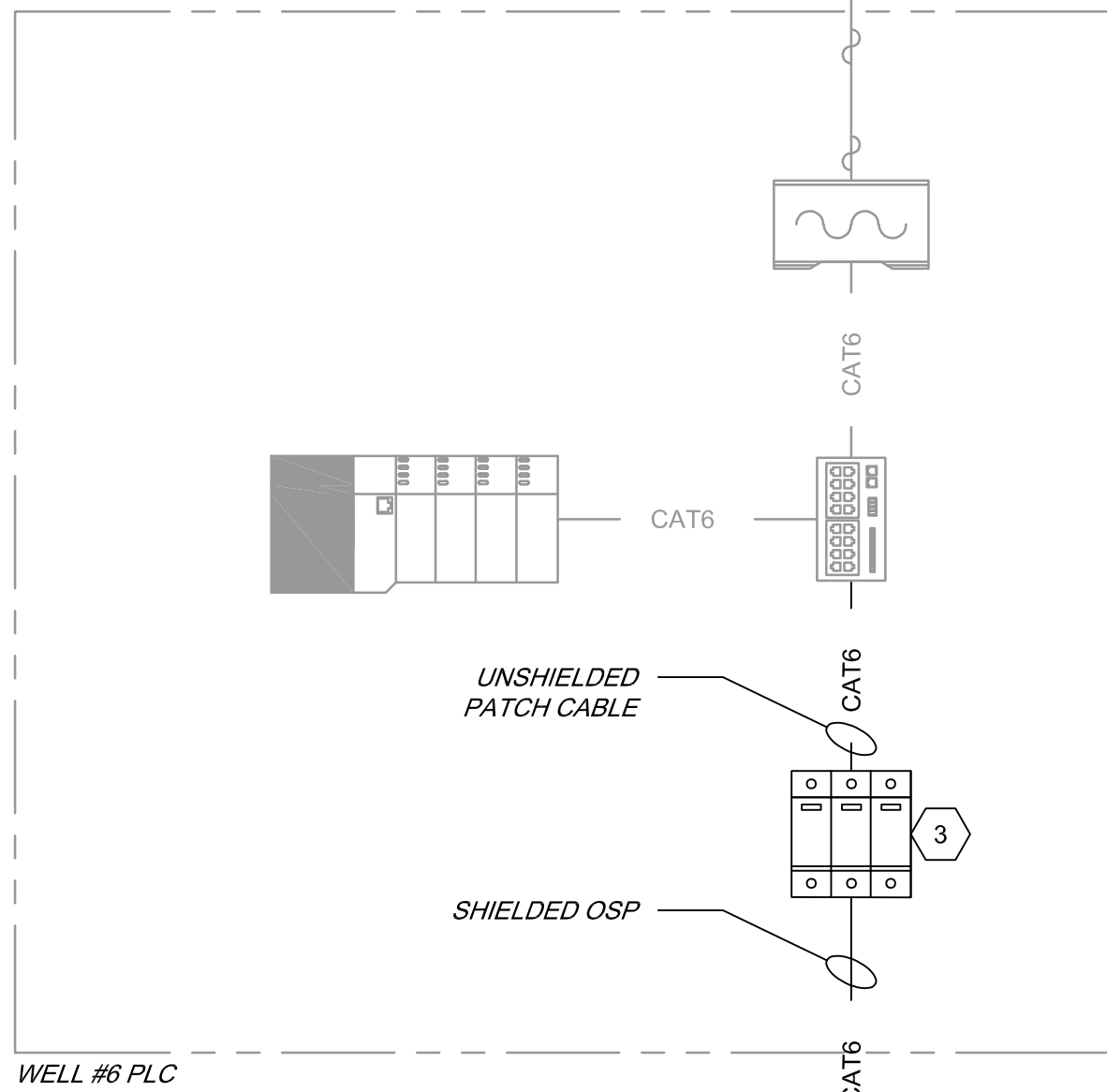


EXISTING SCADA NETWORK

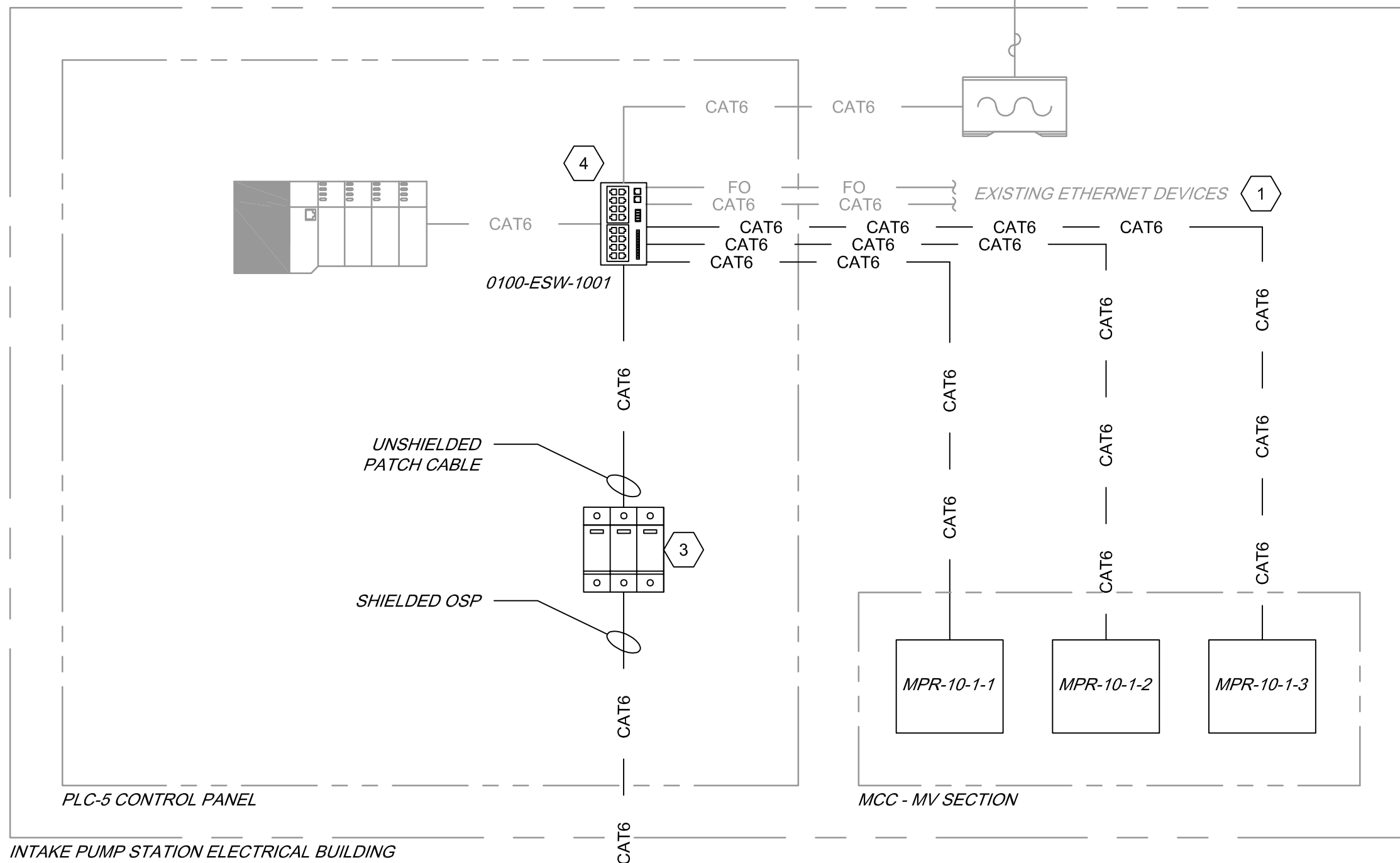
2



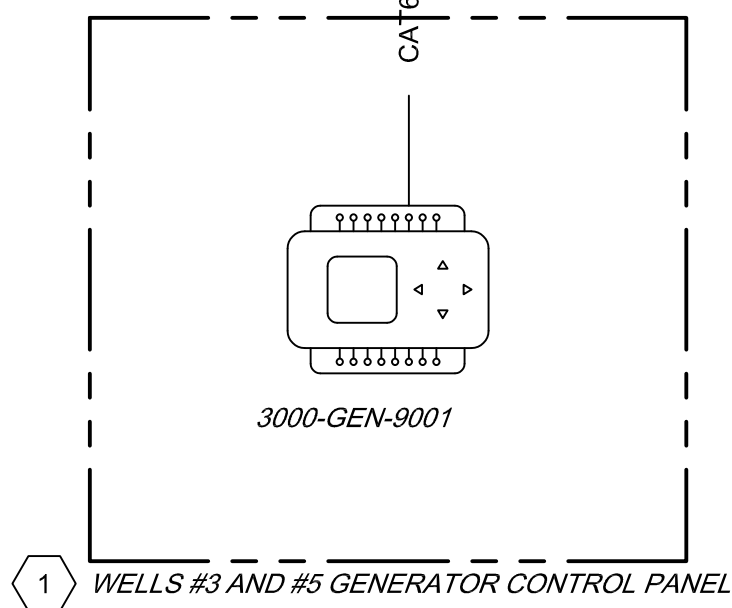
WELL #3 PLC



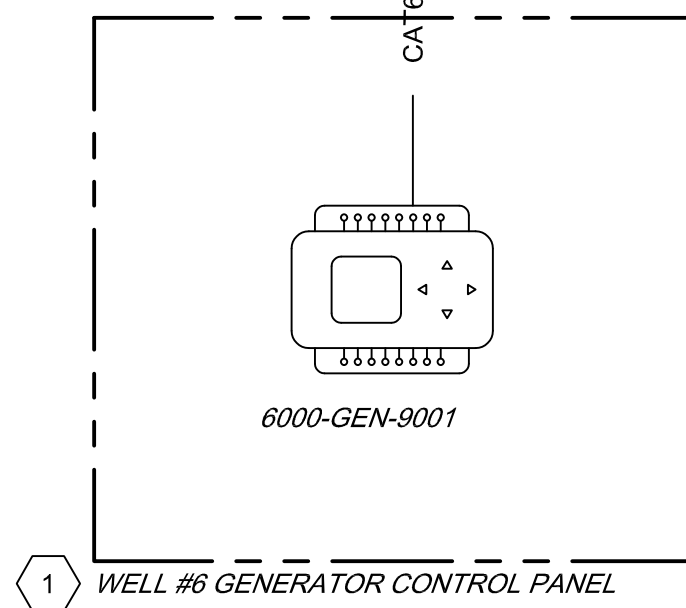
WELL #6 PLC



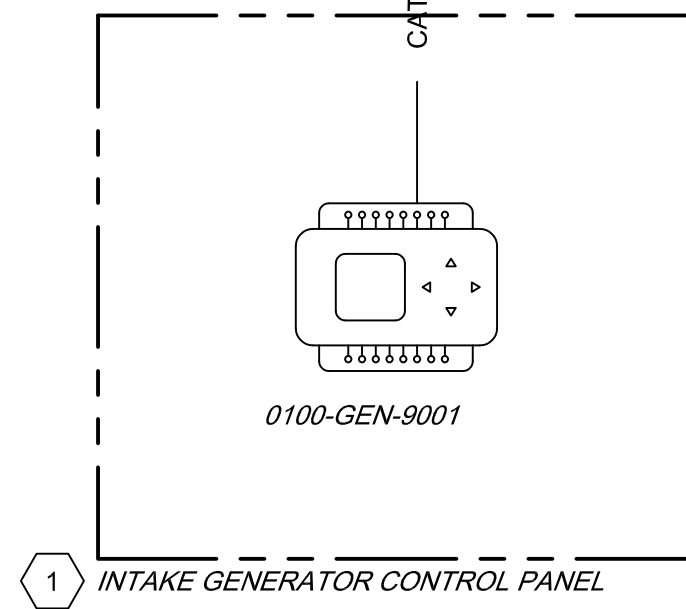
INTAKE PUMP STATION ELECTRICAL BUILDING



WELLS #3 AND #5 GENERATOR CONTROL PANEL



WELL #6 GENERATOR CONTROL PANEL



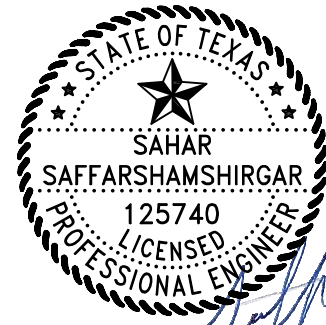
INTAKE GENERATOR CONTROL PANEL

KEYED NOTES:

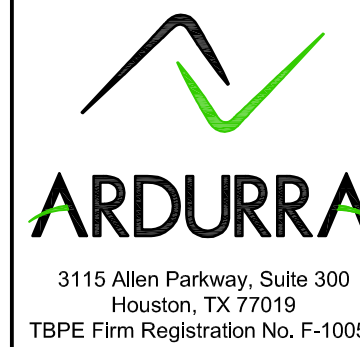
1. DISCONNECT ONE ETHERNET DEVICE FROM EXISTING NETWORK SWITCH. RECONNECT DEVICE TO NEW UNMANAGED ETHERNET SWITCH.
2. MAKE MODIFICATIONS TO EXISTING HMI APPLICATION TO MONITOR DEVICES AS SHOWN ON THE DRAWINGS AND DESCRIBED IN SPECIFICATION 40 61 96.
3. PROVIDE SURGE ARRESTORS ON EITHER SIDE OF NON-FIBER NETWORK CABLING RUN OUTDOORS. TRANSITION FROM SHIELDED OSP CABLE TO PATCH CABLE AT THE SURGE ARRESTOR.
4. EXISTING UNMANAGED SWITCH WILL BE REPLACED WITH A NEW ONE.

GENERAL NOTES:

1. FOR CLARITY, NOT ALL EXISTING CONNECTED EQUIPMENT IS SHOWN.
2. EXISTING EQUIPMENT IS SHOWN LIGHT.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

INSTRUMENTATION  
SCADA SYSTEM ARCHITECTURE DIAGRAM

VERIFY SCALE  
0 1

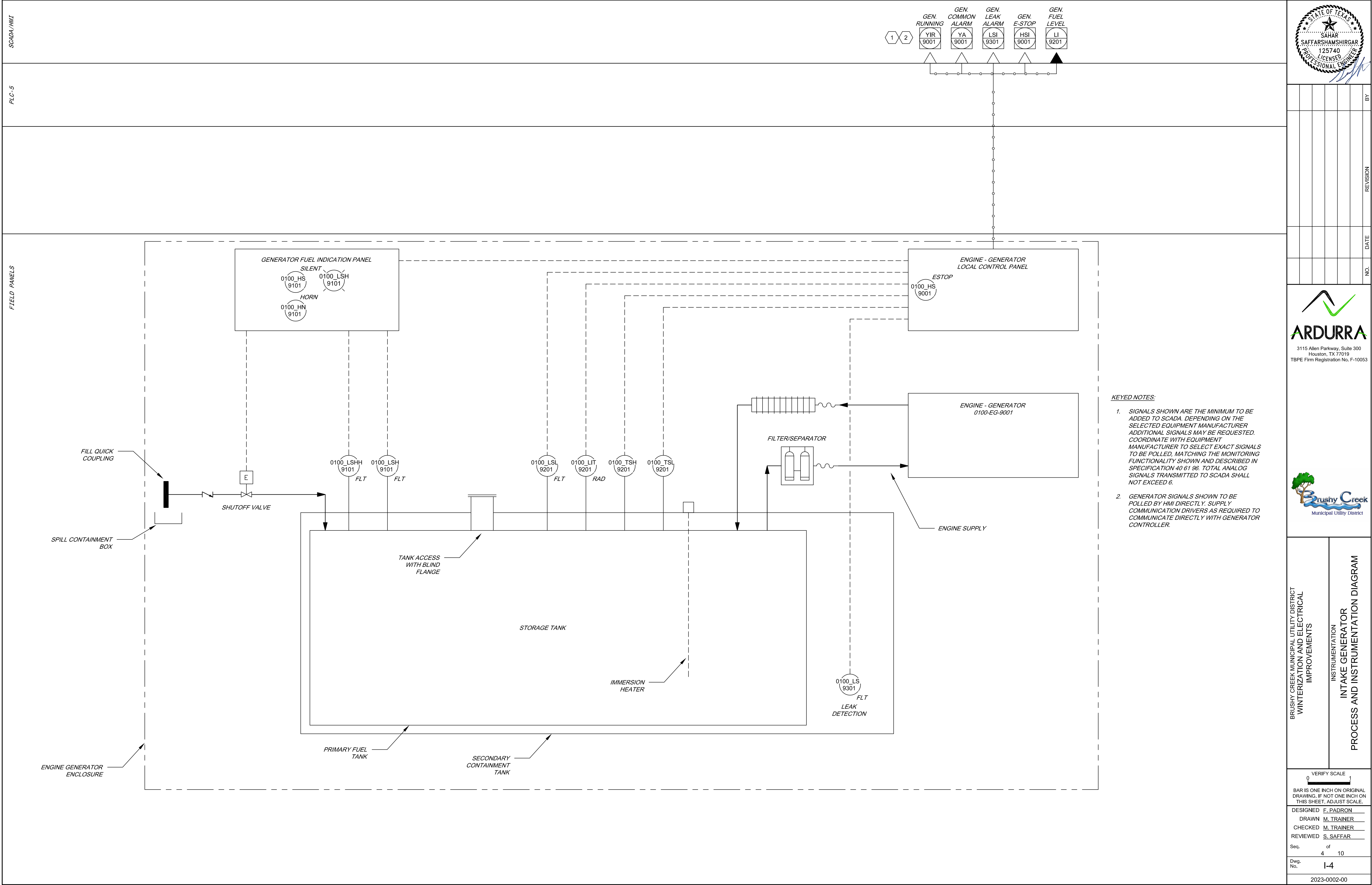
BAR IS ONE INCH ON ORIGINAL  
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DESIGNED F. PADRON  
DRAWN M. TRAINER  
CHECKED M. TRAINER  
REVIEWED S. SAFFAR

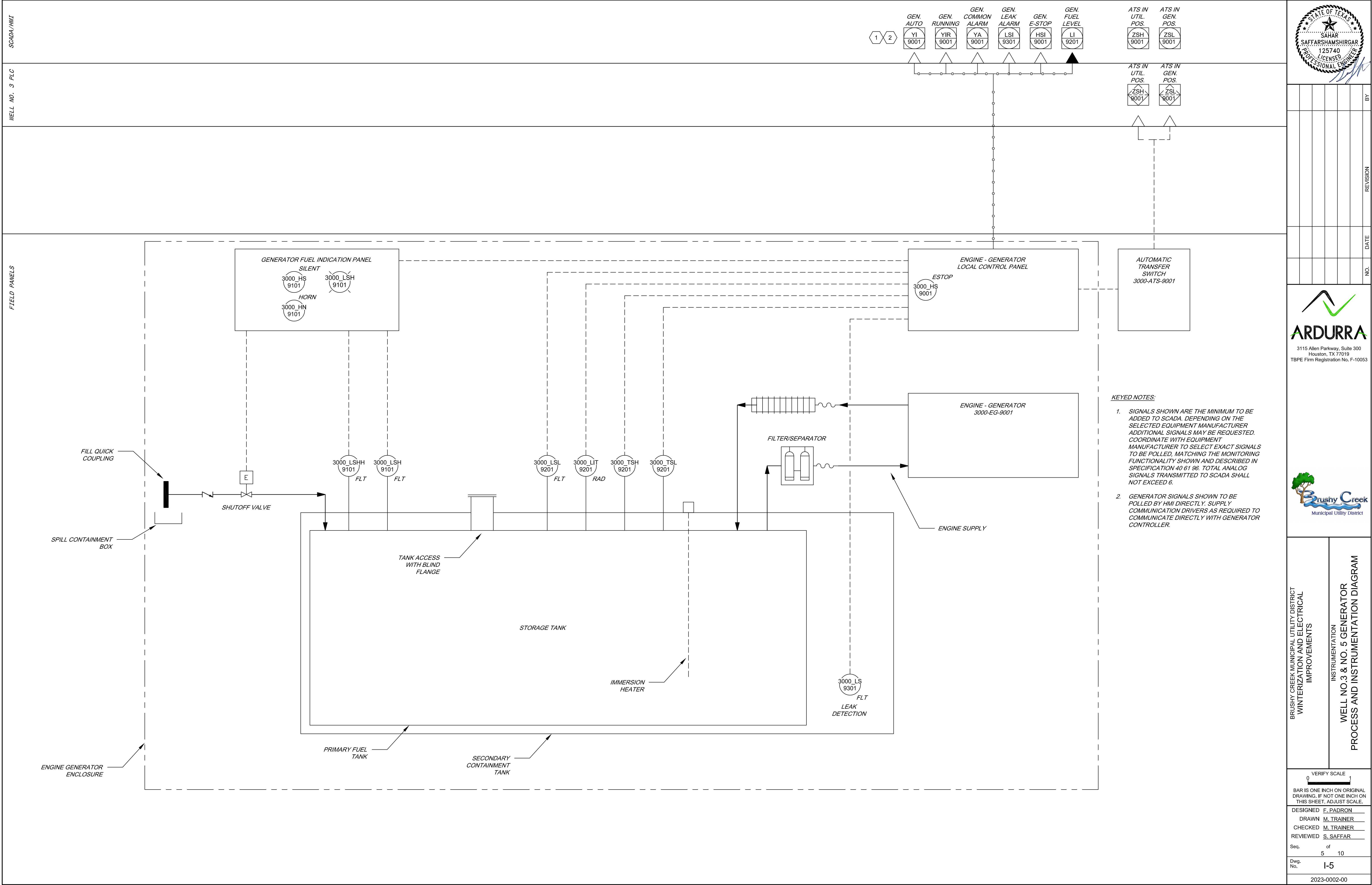
Seq. 3 of 10

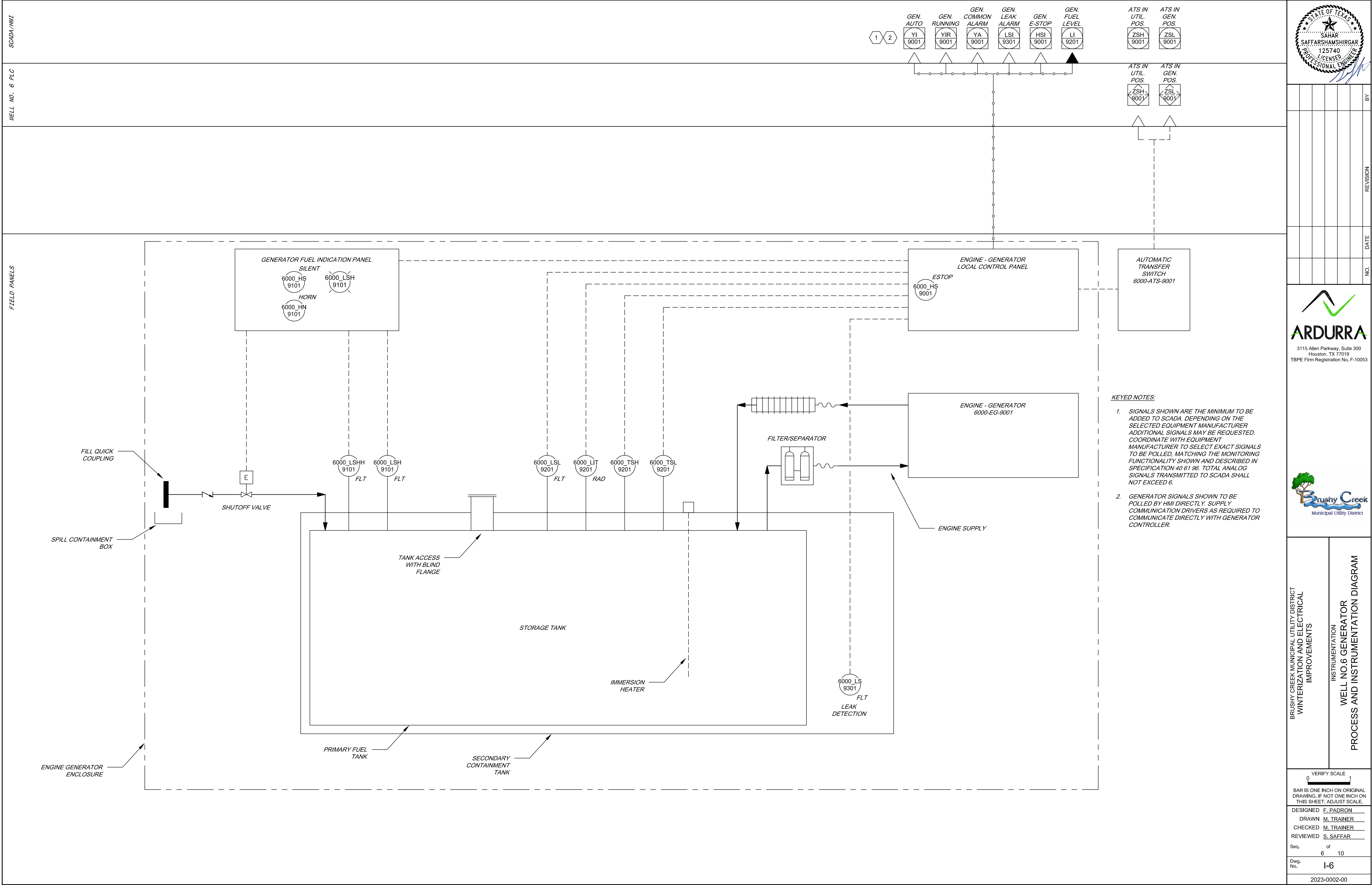
Dwg. No. I-3

2023-0002-00

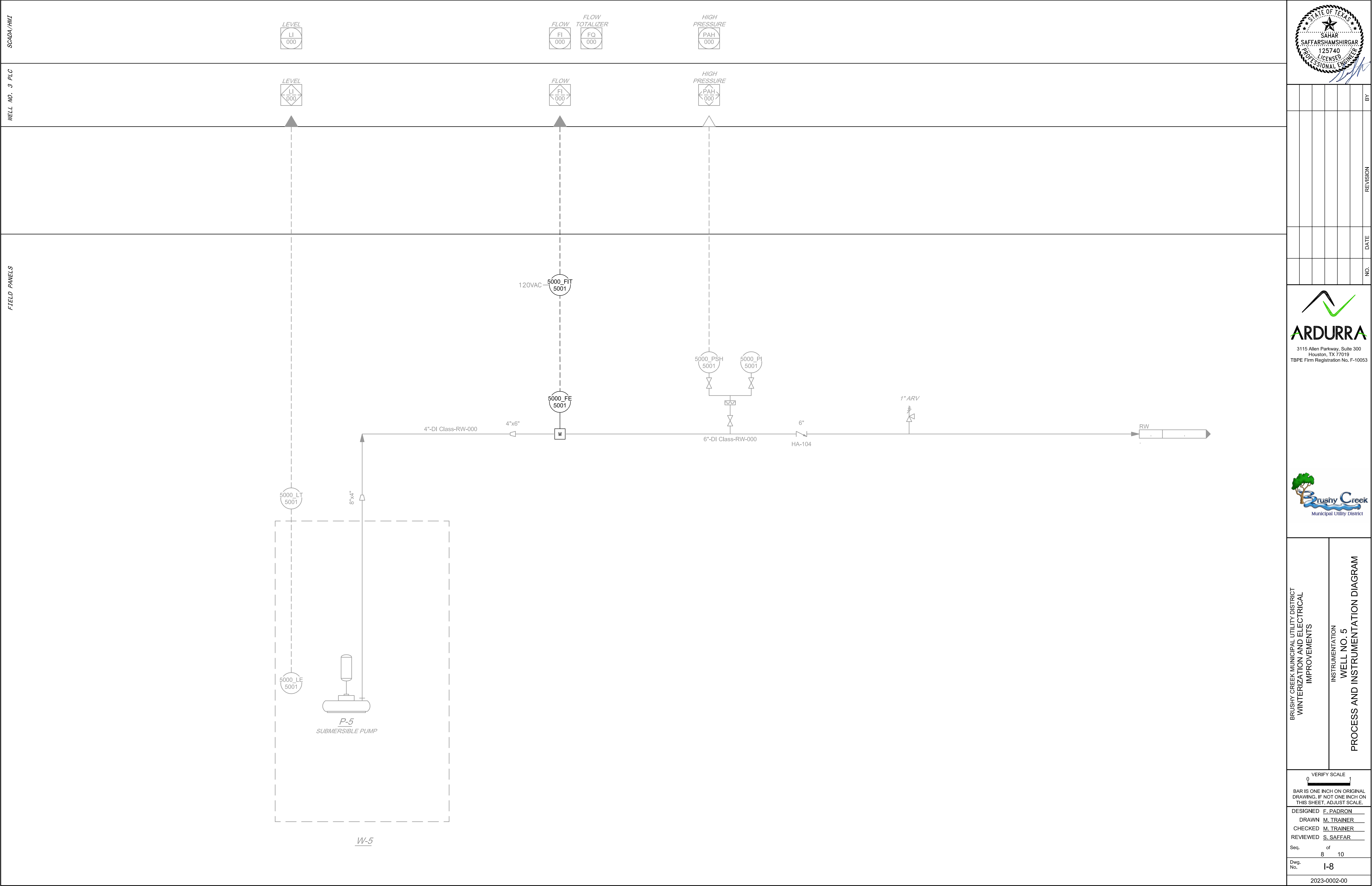






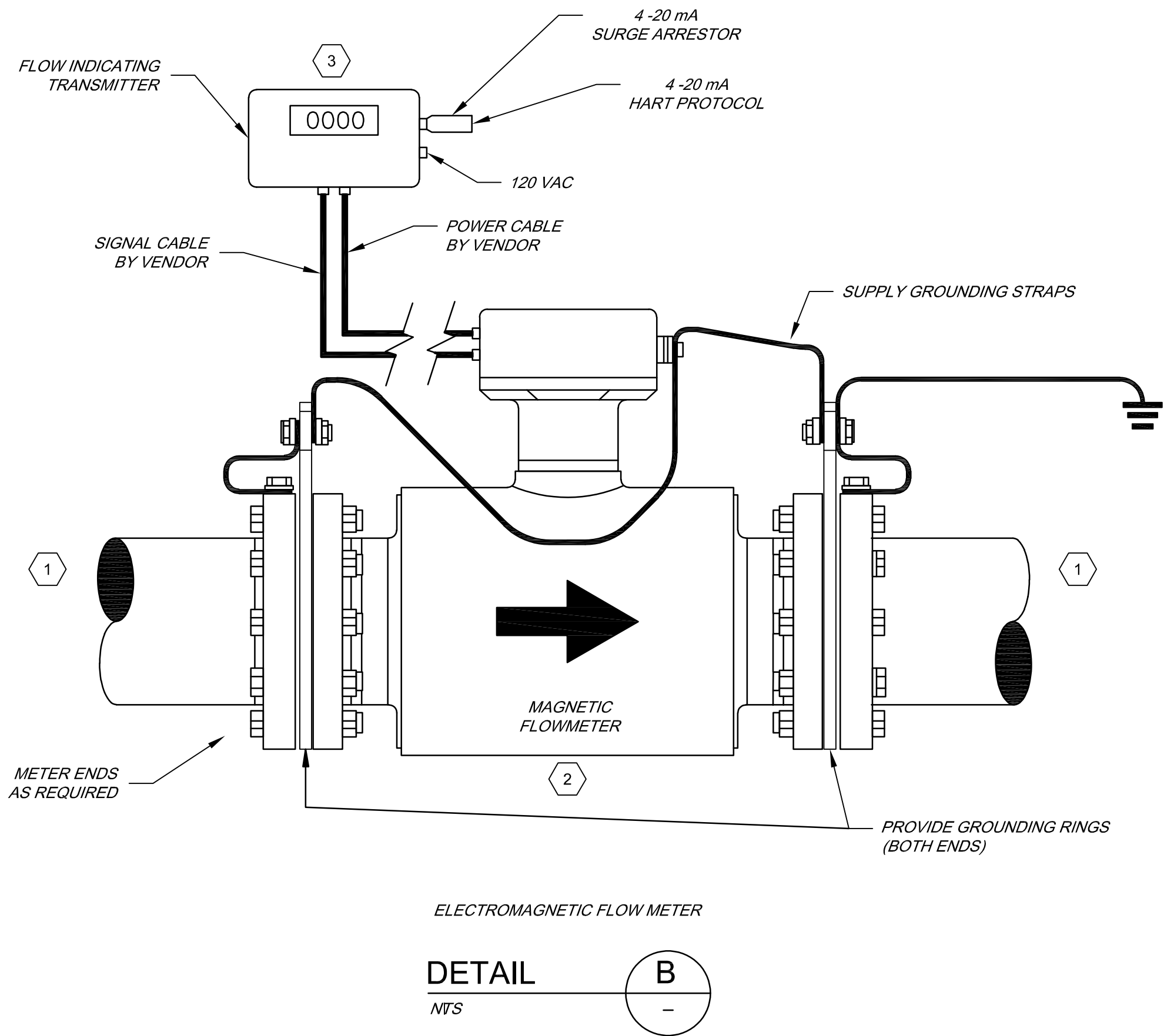
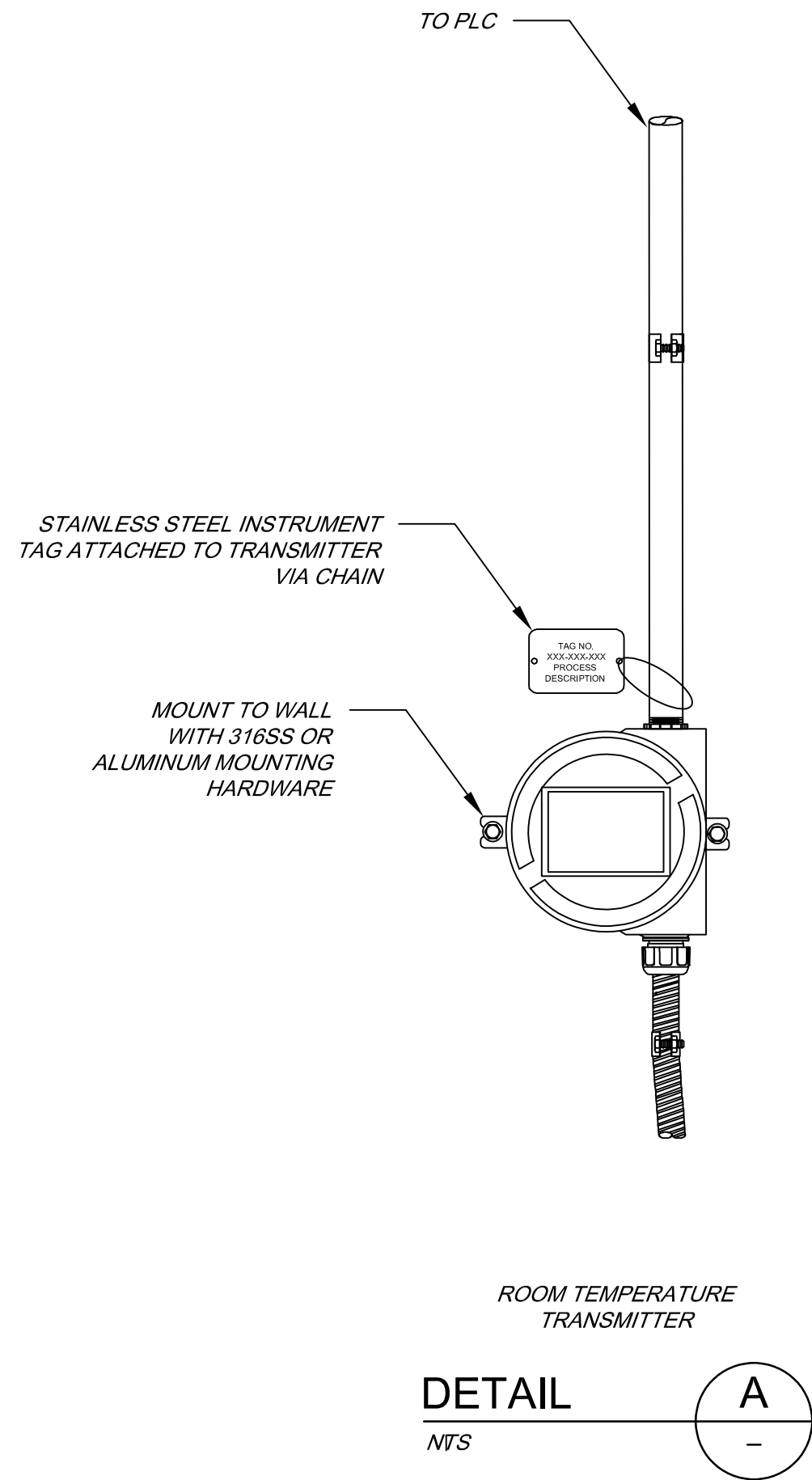






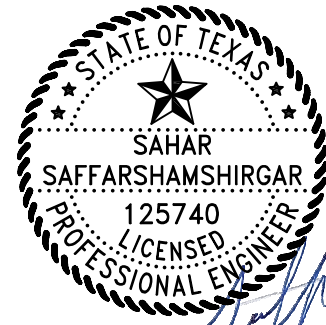






KEYED NOTES:

- METER INSTALLATION SHALL PROVIDE FOR 5 TIMES PIPE DIAMETERS UPSTREAM AND 5 TIMES PIPE DIAMETER DOWNSTREAM.
- METER SHALL BE ORIENTATED SO THAT THE ELECTRODE LIE IN PLANE PARALLEL TO THE FLOOR.
- TRANSMITTER WALL MOUNT SHALL BE NEAR TO THE METER. REFER TO ELECTRICAL DRAWINGS FOR TRANSMITTER RACK MOUNTING DETAILS.



NO.	DATE	REVISION	BY



BRUSHY CREEK MUNICIPAL UTILITY DISTRICT  
WINTERIZATION AND ELECTRICAL  
IMPROVEMENTS

INSTRUMENTATION  
INSTALLATION DETAILS

VERIFY SCALE  
0 1

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THIS SHEET, ADJUST SCALE.

DESIGNED F. PADRON

DRAWN M. TRAINER

CHECKED M. TRAINER

REVIEWED S. SAFFAR

Seq. of  
10 10

Dwg.  
No. I-10

2023-0002-00