

SANITARY DISTRICT NO. 5 OF MARIN COUNTY
2001 Paradise Drive
Tiburon, California 94920

AGENDA

Capital Improvement Program Committee Meeting
Wednesday, January 10th, 2024, 4:30 p.m.

I. Roll Call

II. Public Comments

III. New Business

1. VW Golf Status and possible Trade in option for Ford Maverick Hybrid
2. Update on Cove Road pump station improvements project 50% electrical design submittal
3. Verbal update on Paradise Cove Access Road Improvements
4. Update on Digester Rehab Project and design cost increase due to additional scope of work requests. Review 100% design submittal.

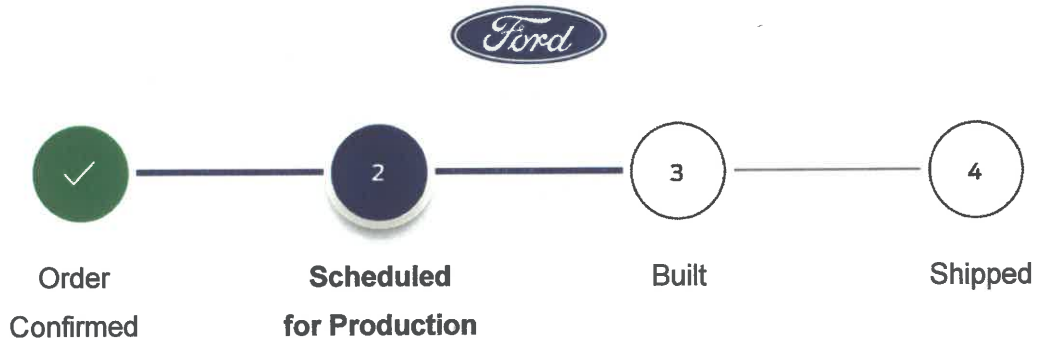
IV. Adjournment

*This Committee may be attended by Board Members who do not serve on this committee. In the event that a quorum of the entire Board is present, this Committee shall act as a Committee of the Whole. In either case, any item acted upon by the Committee or the Committee of the Whole will require consideration and action by the full Board of Directors as a prerequisite to its legal enactment. **Accessible public meetings**: Any member of the public who needs accommodations should email the Office Manager, at rdohrmann@sani5.org, who will use her best efforts to provide as much accessibility as possible while also maintaining public safety.*

Tony Rubio

From: Ford Motor Company <reply@msg.ford.com>
Sent: Thursday, November 30, 2023 9:44 AM
To: Tony Rubio
Subject: Order Update: Your Maverick XLT has been scheduled to be built

[View Online](#)



Antonio, your vehicle has been scheduled to be built.

Order ID: A01R

We're excited to let you know that we will begin building your 2024 Maverick XLT the week of February 5, 2024.

If there are any changes to this timeframe, we'll let you know.

\$ 21,900
OTA



Computer-generated image.

Your VIN: 3FTTW8H38RRA46746

Use your VIN to download your detailed window sticker.

Follow the status of your vehicle online.

[Track My Order](#)

What's Next?

We'll email you once your vehicle is built.

You'll also receive an email when your vehicle ships to Marin County Ford, with an estimate for when your vehicle will arrive. Your dealer will contact you when it's ready for pick up.

Please note: Sometimes unforeseen changes can affect the timing of vehicle production and delivery. Please know we're working hard to build your vehicle as quickly as we can.

Did you know? You can also receive updates via text message:

Get Text Updates

Reply **HELP** for help, **STOP** to cancel. Message frequency varies and data rates may apply.

[Terms and Conditions](#) [Privacy Policy](#)



Questions?

[Contact Us](#)



HERE WHEN YOU NEED US

When your new Maverick arrives, we are sure you will want to perform proper maintenance to keep it operating at peak performance. Below is a link with manufacturer recommendations on products and scheduled maintenance procedures to keep your new vehicle in top condition.

See Recommendations

How would you rate this email?

Select F-150 Lightning models are eligible for a potential \$7,500 electric vehicle tax credit

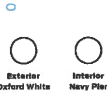
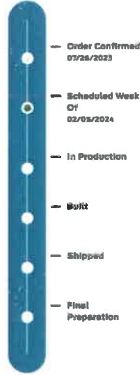
Welcome

Your 2024 Maverick XLT is "Scheduled for Production".

Scheduled To Week

The order has been assigned to a plant and scheduled to a week.

[Ford Accessories >](#)



Vehicle Details

Ordered On 01/26/2023
 Order Number A03R
 VIN 3FTTW8H38RRA46746
 Last Updated 03/02/2024

Delivery Details

Marin County Ford
 6965 Redwood Blvd.
 Novato, CA, 94945
<https://www.marincountyford.com>
 (888) 556-8775

[View Window Sticker >](#)

[Owner Registration](#)

[Accessories](#)

[Packages](#)

[Interior](#)

[Exterior](#)

[Model Information](#)

Disclosures



Set your appointment

Provide your details and a desired date and time to redeem your offer.



Your CarMax offer

\$8,400*

Offer code: LH2C5Y6F

Valid through 01/15/2024

* The offer from CarMax is contingent on your providing accurate information. CarMax will conduct a verification of your vehicle and evaluate other vehicle use and history information prior to finalizing the offer. Any differences between the information you provide about your vehicle and the vehicle's actual condition, use, and history may impact the offer you receive from CarMax.

* By clicking "Set Appointment" and providing your phone number, you agree that CarMax may call or text you (including via autodialer or prerecorded call) at the number you provide for marketing/sales purposes, information relating to your appointment(s), or any other servicing or informational purpose. You do not need to consent to receive calls/texts to purchase from or sell to CarMax. Msg & data rates may apply. Msg freq. varies. Text HELP for help. Text STOP to cancel. [Texting Terms](#), [Privacy Policy](#)

Appointment details

First name

Last name

Email

Phone number

Zip code

Store

Date



Time

FEEDBACK

SET APPOINTMENT

[PRIVACY POLICY](#) [DO NOT SELL MY INFO](#) [FINANCIAL PRIVACY POLICY](#) [TERMS OF USE](#) [INTEREST-BASED ADS](#) [RECALL POLICY](#)
[ACCESSIBILITY](#)

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FEEDBACK

Advertisement

My Car's Value

2015 Volkswagen Golf TDI S Hatchback Sedan 4D



4.3 ★ (29 Ratings) [Write a review](#)

VIN: **3VW2A7AU3FM063158**



Create a free account for quicker access to saved cars, recall alerts and more.



Recalls: 11 Recalls Found
Is my car affected?



Repair Estimator: See Pricing
What's a fair price?



Options Next Steps

1 Your Options

Instant Cash Offer

Trade-in

Private Party

Donate Your Car



Advertisement

Trade-in Range
\$11,144 - \$13,135

Trade-in Value
\$12,140



[Important info & definitions](#)

Value valid as of **01/08/2024**

Factors That Impact Value

Check that yours are correct below.

Mileage: **67,000**  ZIP Code: **94920** 

Condition
Good



[Edit Options](#)



Instant Cash Offer

Instant Cash Offer Advantages

- Get your Instant Cash Offer online
- Redeem it at a Participating Dealer
- Get cash for your car or trade it in today

Get Offer

Advertisement

Start the Trade-in Process Online

Plus, get a no-obligation quote for your next car.

Your Trade-in:

2015 Volkswagen Golf

[Change Vehicle](#)

What Vehicle Are You Shopping For?

| | | |
|-------|------------|---|
| Make | Volkswagen | ▼ |
| Model | | ▼ |
| ZIP | 04000 | |

3 Shop for Your Next Car - What Can I Afford?

| | |
|---------------------------|----------|
| Estimated Trade-in Amount | \$12,140 |
| Desired Monthly Payment * | \$400 |
| *This field is required. | |
| Terms (months) | 60 ▼ |
| Interest Rate (%) | 3.19 |
| Outstanding Loan Balance | \$0 |
| Additional Down Payment | |

Advertisement

Trade In Values
Price Range Up to **\$34,296**

Start the

Available for Down Payment

Total Down Payment

Vehicles in Your Price Range

2023 Chevrolet Bolt EUV

Est. \$367/mo*

2024 Volkswagen Golf GTI

Est. \$366/mo*

2023 Toyota Prius

Est. \$345/mo*

2023 Acura Integra

Est. \$339/mo*



*Based on the Blue Book® Fair Purchase Price (click vehicle to see) for 60 months, 3.19% APR, and Estimated Trade-in Amount. Taxes and Fees not included. For illustrative purposes only and not an offer/commitment to provide credit or financing.

ABBREVIATIONS

Table of abbreviations including A (AMPERES), AFF (ABOVE FINISHED FLOOR), AFG (ABOVE FINISHED GRADE), etc.

LEGEND

Legend table listing symbols for PNL 4A (NEW EMBEDDED OR ENCASED HOMERUN), CONDUIT BENDS, MOTOR STARTER, TRANSFORMER, etc.

Legend table listing symbols for FUSE, CONTROL RELAY, TIME DELAY RELAY, ALARM RELAY, etc.

Legend table listing symbols for PENDANT OR CEILING MOUNTED LIGHTING FIXTURE, POLE OR STANCHION MOUNTED LIGHTING FIXTURE, etc.

GENERAL NOTES:

- 1. NOT ALL EQUIPMENT INTERCONNECTIONS ARE SHOWN ON THE PLANS. REFER TO ALL DETAILS, SCHEMATIC DIAGRAMS, CONTROL DIAGRAMS, SINGLE LINE DIAGRAMS AND SPECIFICATIONS FOR ADDITIONAL FIELD WIRING REQUIRED.
2. ALL POWER CONDUIT RUNS SHALL CONTAIN A SEPARATE EQUIPMENT GROUNDING CONDUCTOR. IF NOT SHOWN ON THE PLANS, SIZE PER NEC.
3. COORDINATE ALL CONDUIT STUB-UP LOCATIONS INTO ELECTRICAL EQUIPMENT WITH ACCEPTED VENDOR DRAWINGS.
4. COORDINATE ALL NEW UNDERGROUND ELECTRICAL DUCTBANK RUNS WITH NEW AND EXISTING UNDERGROUND PIPING AND UTILITIES.
5. INSTALL 1/2" PULLTAPE IN ALL SPARE CONDUIT RUNS.
6. ALL OUTDOOR ENCLOSURES SHALL BE NEMA 3R, 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
7. THE CONDUIT ROUTES SHOWN ARE SCHEMATIC IN NATURE AND ARE INTENDED TO BE USED AS A GUIDE.
8. CONDUITS SHALL BE ROUTED TO AVOID INTERFERENCES WITH NEW AND EXISTING PROCESS PIPING, CONDUITS, STRUCTURES ETC.
9. SEAL ALL CONDUITS IN UNDERGROUND PULLBOXES AND CONDUITS THAT STUB-UP INTO THE BOTTOM OF ELECTRICAL EQUIPMENT USING PUTTY-TYPE DUCT SEAL, INCLUDING SPARE CONDUITS.
10. CONTRACTOR REQUIRED TO PROVIDE ALL WORK NECESSARY FOR COMPLETE AND OPERABLE SEWAGE PUMP STATION WITH STANDBY EMERGENCY GENERATOR AND VENDOR SUPPLIED CHEMICAL SYSTEM.
11. WORK TO BE PER 2020 NEC AND LATEST EDITION OF NFPA 820.

Vertical sidebar containing project information: JOB NUMBER, DATE (January 3, 2024), PAGE (--- of ##), and a professional seal for NUTE Engineering.

NOT APPROVED FOR CONSTRUCTION

SANITARY DISTRICT No. 5 COVE ROAD PUMP STATION REHABILITATION PROJECT ELECTRICAL LEGEND AND ABBREVIATIONS

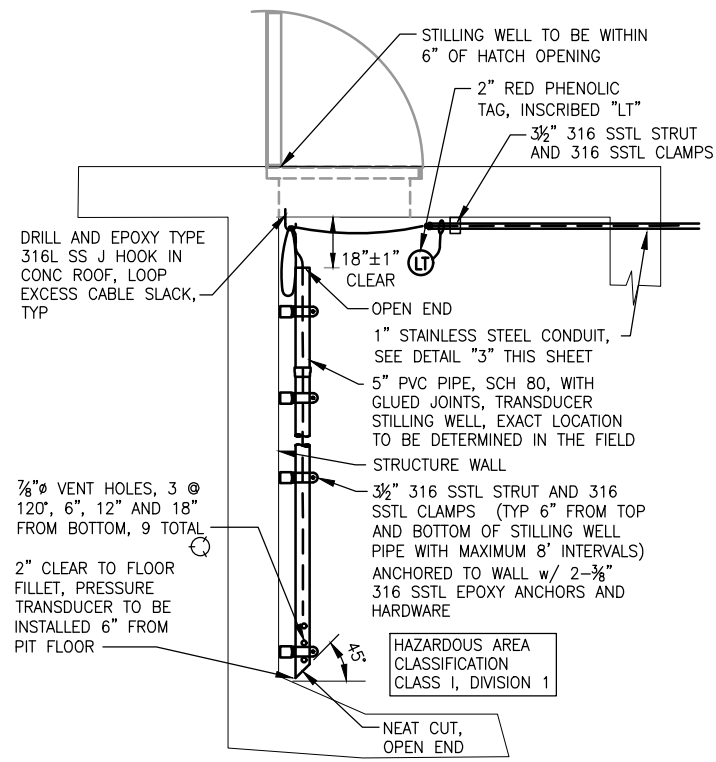


Construction contractor agrees that in accordance with generally accepted construction practices, construction contractor will be required to assume sole and complete responsibility for job site conditions during the course of the project, including safety of all persons and property; that this requirement shall be made to apply continuously and not be limited to normal working hours, and construction contractor further agrees to defend, indemnify and hold design professional harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of design professional.

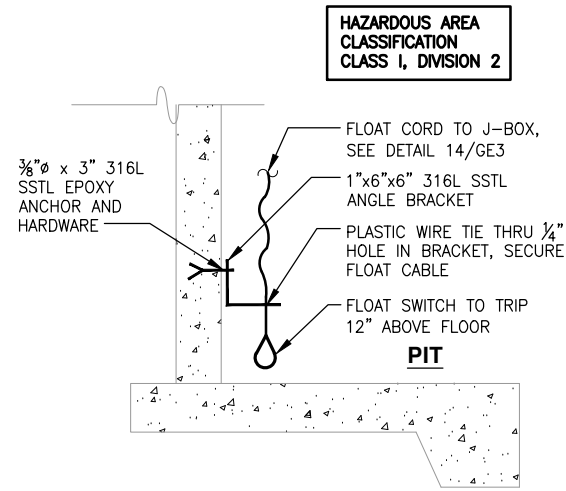


Vertical text on the left edge: Xref: S16 temp titleblock linework.dwg Printed: January 3, 2024 5:51 PM L:\Calton\SDS Cove Rd PS Rehabilitation\Drawings\8999 SDS GE-Details.dwg Layout: GE1 PageSetup: phaser2011 11x17 with beecher pens

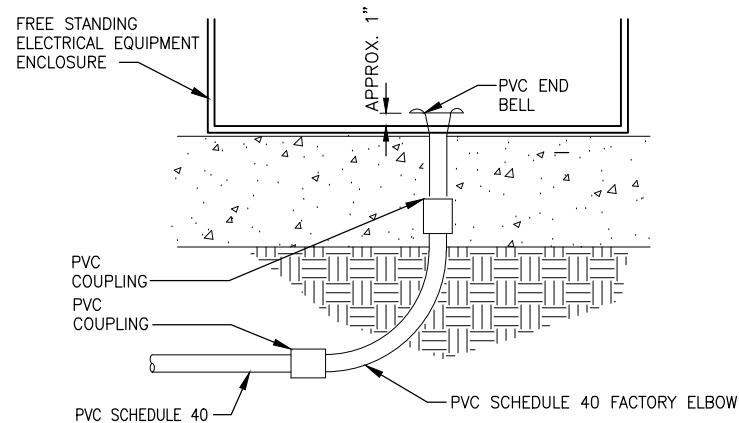




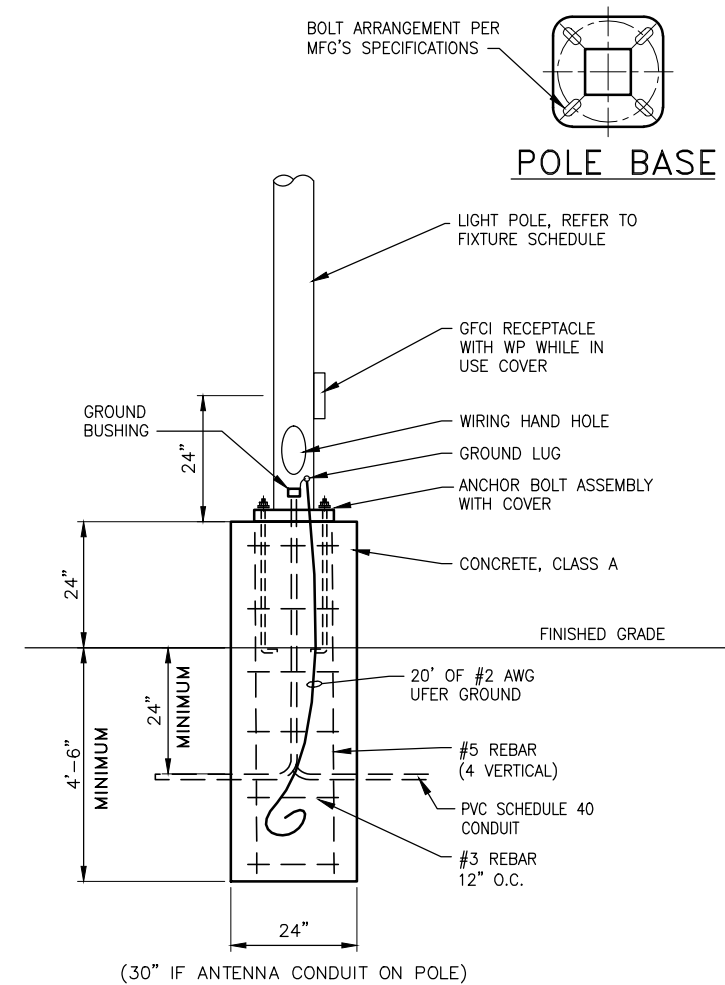
1 DETAIL - LEVEL TRANSDUCER STILLING WELL
ref. scale: none



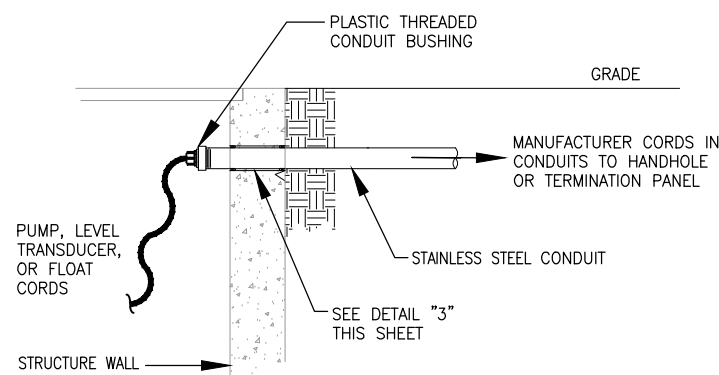
4 FLOWMETER PIT FLOAT - DETAIL
ref. scale: none



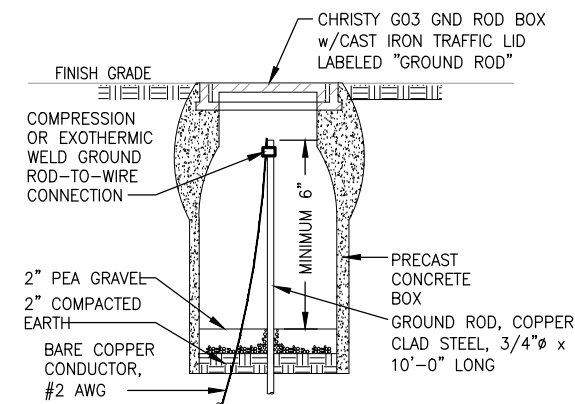
7 CONCEALED CONDUIT STUB-UP DETAIL
ref. scale: none



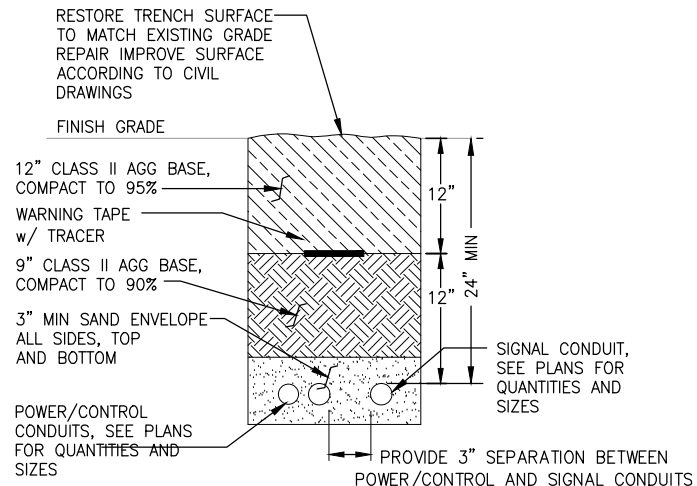
10 SITE LIGHT BASE
ref. scale: none



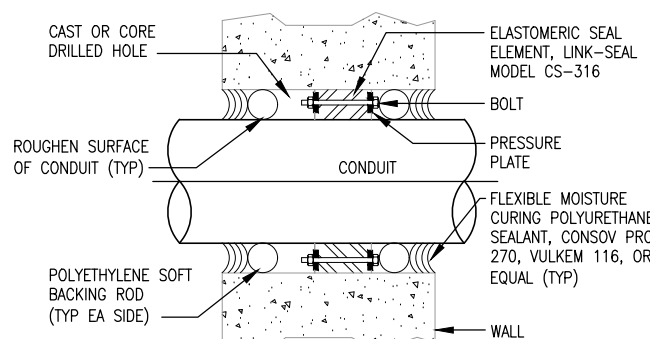
2 CONDUIT PENETRATION DETAIL
ref. scale: none



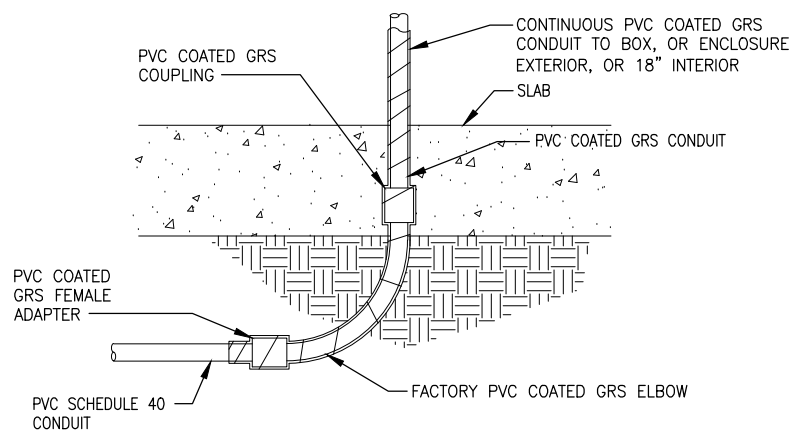
5 GROUND ROD BOX - DETAIL
ref. scale: none



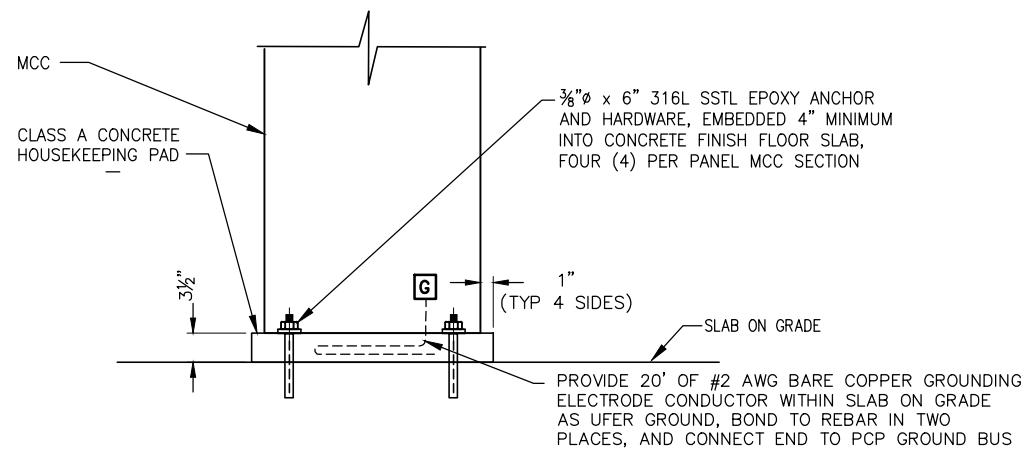
8 UNDERGROUND CONDUIT DETAIL
ref. scale: none



3 LINK SEAL THRU WALL DETAIL
ref. scale: none



6 EXPOSED CONDUIT STUB-UP DETAIL
ref. scale: none



9 MCC ANCHORING AND UFER DETAIL
ref. scale: none

| NO. | DESCRIPTION | DATE | INIT. |
|-----|-------------|------|-------|
| | | | |
| | | | |
| | | | |

DESIGNED BY: JC
DRAWN BY: PM
CHECKED BY: [Signature]

PROFESSIONAL ENGINEER
No. E 14099
Exp. 6-30-25
STATE OF CALIFORNIA

PREPARED BY: NUIE
Civil and Sanitary Consultants
907 MISSION AVE. SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NUIE.BIZ

PREPARED FOR: SANITARY DISTRICT No. 5
2001 PARADISE DRIVE
TIBURON, CA 94920
PHONE: (415) 435-1501
FAX: (415) 435-0221

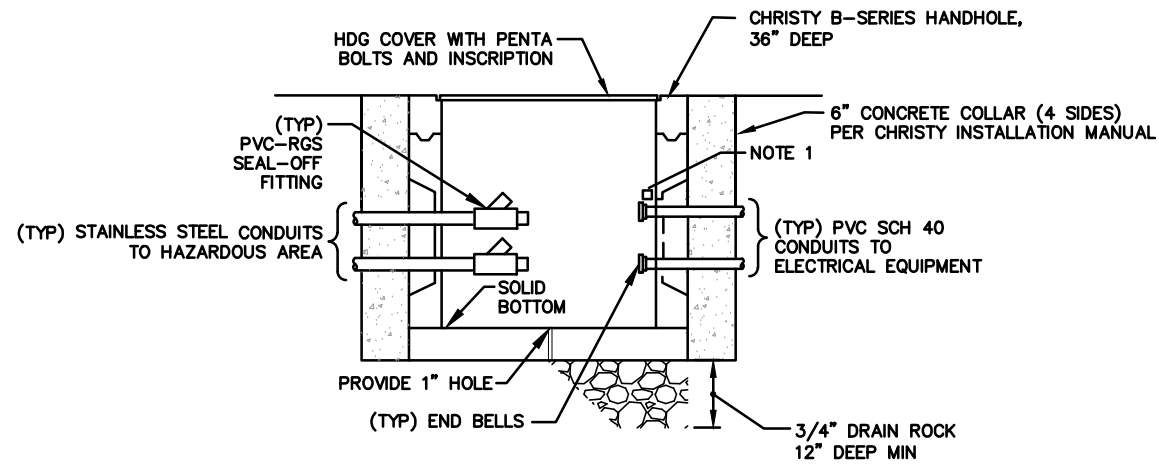
SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
ELECTRICAL
DETAILS - 1

| | |
|-------------|-----------------|
| JOB NUMBER: | |
| DATE: | January 3, 2024 |
| PAGE: | --- of ## |

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FOR CONSTRUCTION

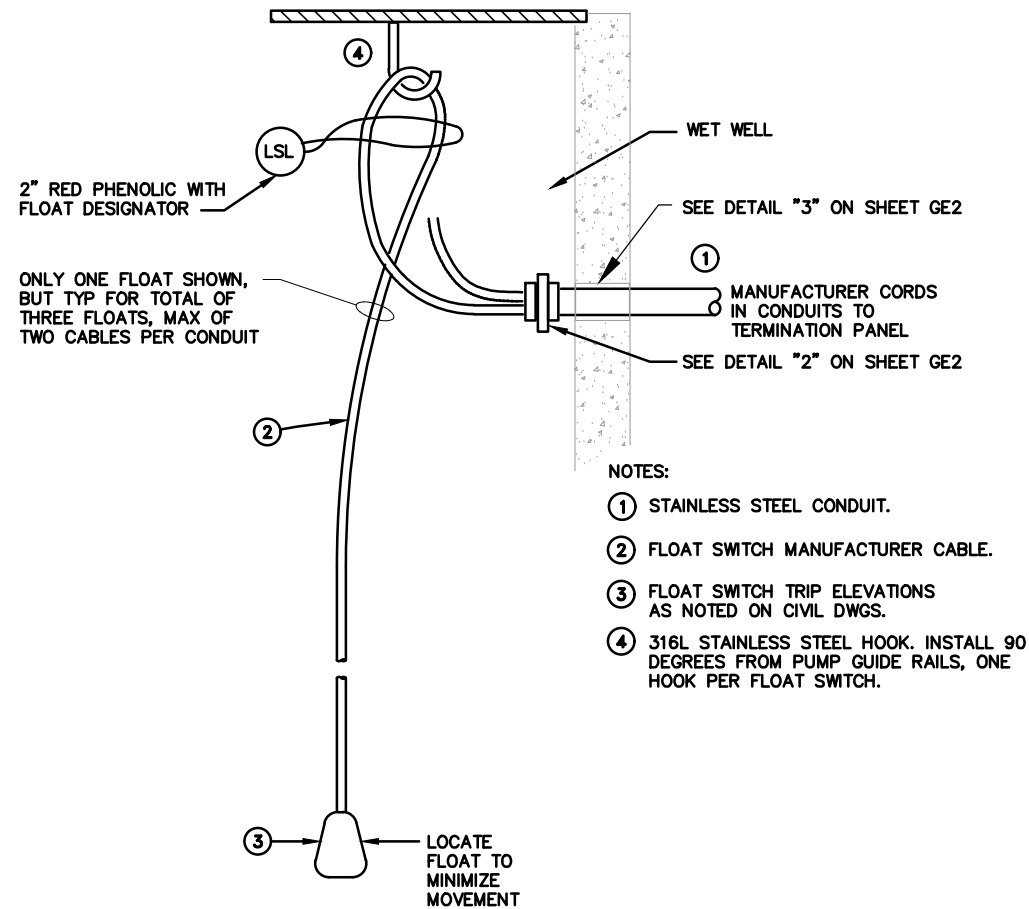
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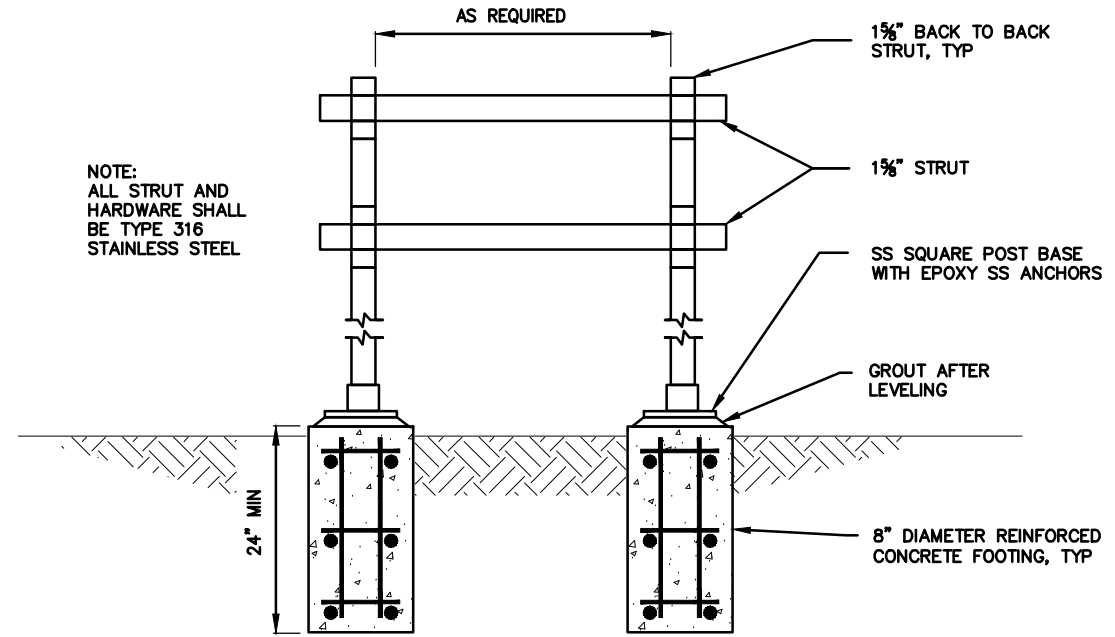
NOTES:
 1. PROVIDE AND INSTALL PHENOLIC TAG, INSCRIBED WITH CONDUIT NUMBER, ATTACHED TO EACH CONDUIT.

11 PRE-CAST HANDHOLE
 ref. scale: none



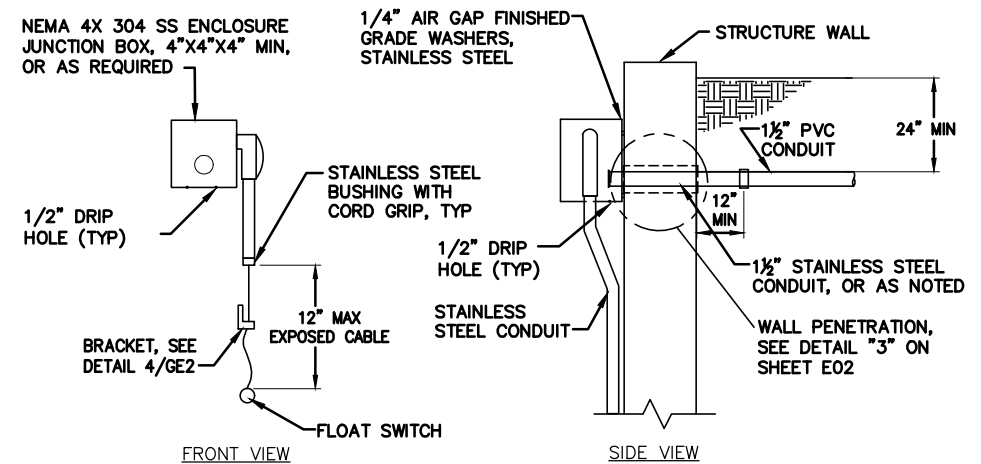
NOTES:
 ① STAINLESS STEEL CONDUIT.
 ② FLOAT SWITCH MANUFACTURER CABLE.
 ③ FLOAT SWITCH TRIP ELEVATIONS AS NOTED ON CIVIL DWGS.
 ④ 316L STAINLESS STEEL HOOK. INSTALL 90 DEGREES FROM PUMP GUIDE RAILS, ONE HOOK PER FLOAT SWITCH.

12 TYPICAL WET WELL FLOAT SWITCH
 ref. scale: none



NOTE:
 ALL STRUT AND HARDWARE SHALL BE TYPE 316 STAINLESS STEEL

13 STANCHION
 ref. scale: none



14 JUNCTION BOX, BELOW GRADE DETAIL
 ref. scale: none

| NO. | DESCRIPTION | DATE | INIT. |
|-----|-------------|------|-------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

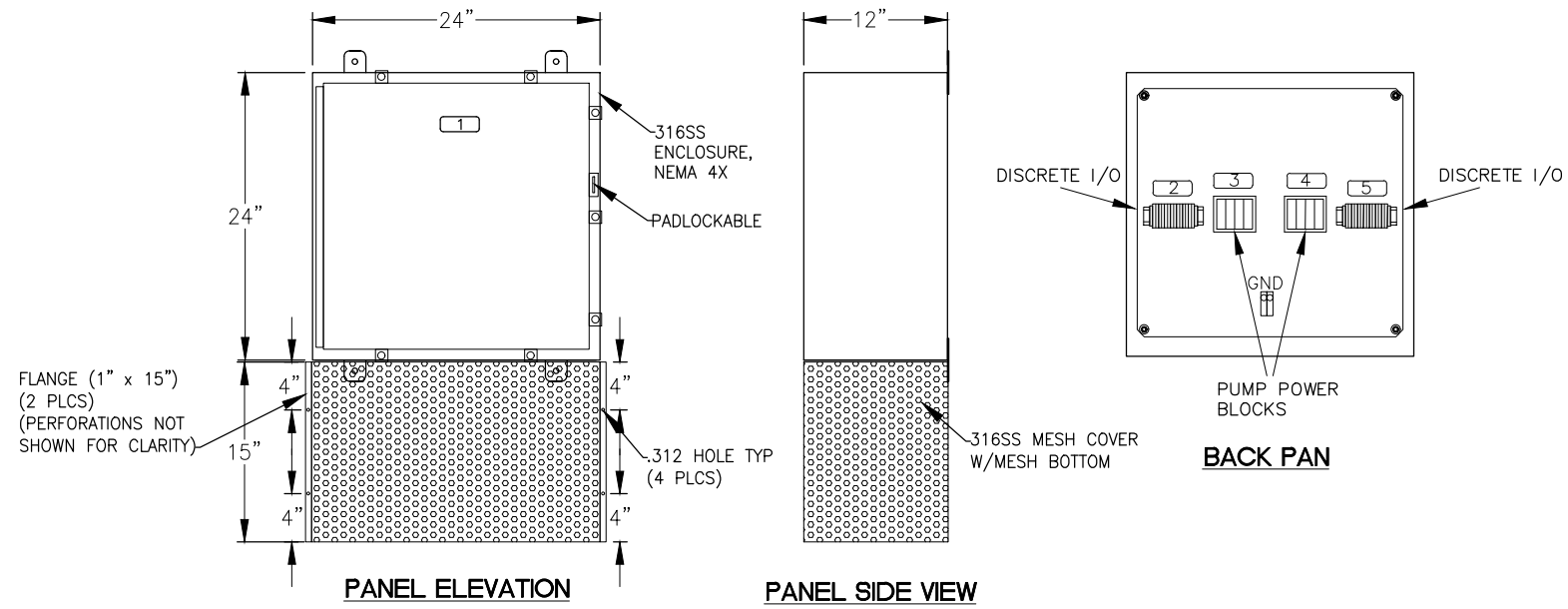
DESIGNED BY: JC
 DRAWN BY: PM
 CHECKED BY: [Signature]
 PROFESSIONAL ENGINEER
 No. E 14099
 Exp. 6-30-25
 CIVIL ENGINEER
 STATE OF CALIFORNIA

PREPARED BY:
NUJE
 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUJE.BIZ

PREPARED FOR:
 SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
 CALIFORNIA
 MARIN COUNTY

SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
 ELECTRICAL
 DETAILS - 2

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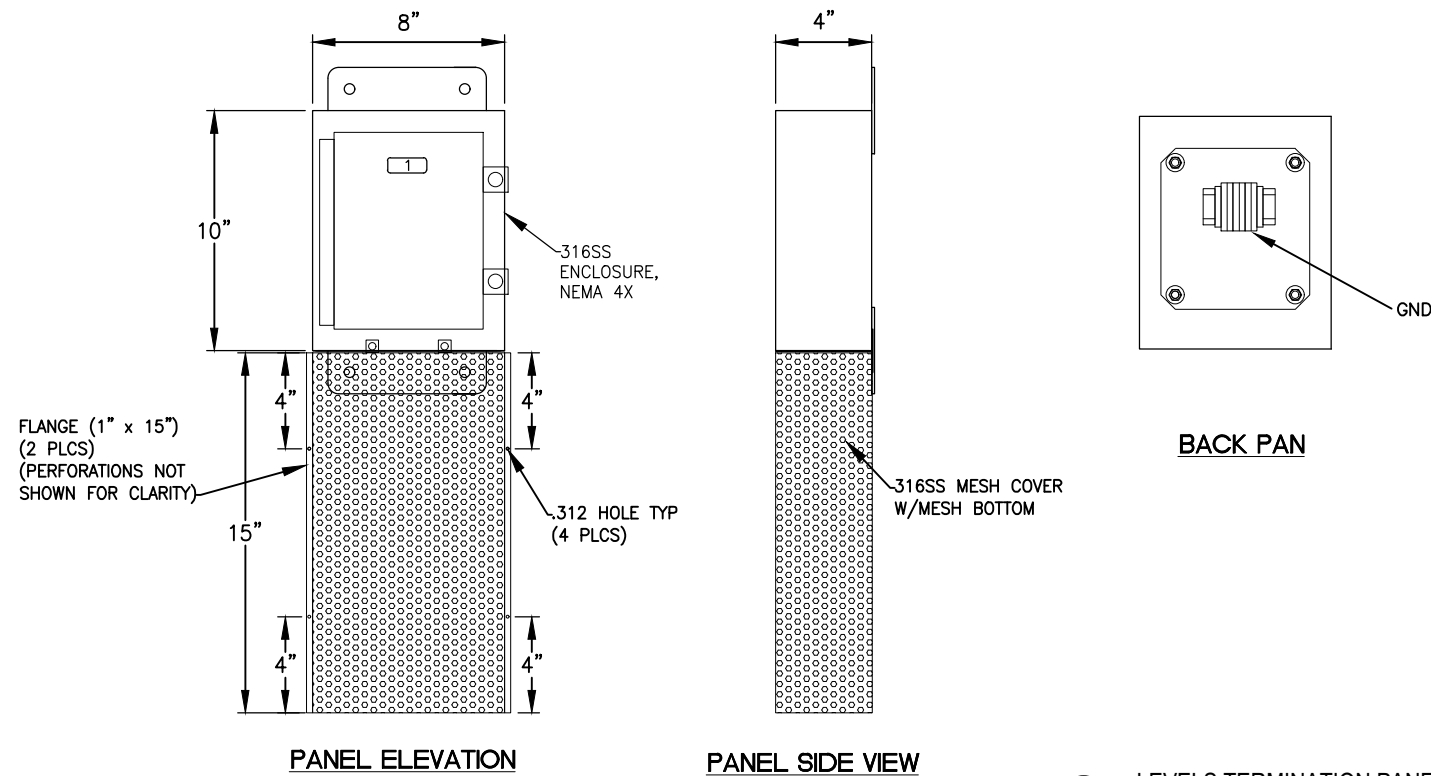


21 TYPICAL TWO-PUMP TERMINATION PANEL
ref. scale: none

| NAME PLATE SCHEDULE | | | | |
|---------------------|-----|-------|-----------|---------------------------------------|
| TAG # | QTY | TYPE | SIZE | INSCRIPTION |
| 1 | 1 | PLATE | 1" X 4" | PUMP 1/PUMP 2 CABLE TERMINATION PANEL |
| 2 | 1 | PLATE | 3/4" X 3" | PUMP 1 CONTROLS |
| 3 | 1 | PLATE | 3/4" X 3" | PUMP 1 POWER |
| 4 | 1 | PLATE | 3/4" X 3" | PUMP 2 POWER |
| 5 | 1 | PLATE | 3/4" X 3" | PUMP 2 CONTROLS |

(SIMILAR FOR PUMPS 3 AND 4)

- NOTES:**
1. DEVICE NAMEPLATE WITH 3/16" ENGRAVED LETTERING (3/4 X 3 TYP & RING).
 2. DEVICE NAMEPLATE WITH 1/4" ENGRAVED LETTERING (1 X 4 TYP).



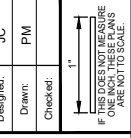
22 LEVELS TERMINATION PANEL
ref. scale: none

| NAME PLATE SCHEDULE | | | | |
|---------------------|-----|-------|---------|------------------------|
| TAG # | QTY | TYPE | SIZE | INSCRIPTION |
| 1 | 1 | PLATE | 1" X 4" | LEVELS TERMINATION BOX |

- NOTES:**
1. DEVICE NAMEPLATE WITH 3/16" ENGRAVED LETTERING (3/4 X 3 TYP & RING).
 2. DEVICE NAMEPLATE WITH 1/4" ENGRAVED LETTERING (1 X 4 TYP).

- NOTES:**
1. ALL FASTENERS SHALL BE TYPE 316L STAINLESS STEEL.
 2. FOR ALL DRILL & EPOXIED THREADED RODS - DRILL HOLE, CLEAN HOLE W/ WIRE BRUSH & COMPRESSED AIR, SET TYPE 316L SS THRD ROD OR ANCHOR IN NON-SAG EPOXY, TEMPLATE SIZE & LOCATION FROM EQUIPMENT.

| NO. | DESCRIPTION | DATE | INIT. |
|-----|-------------|------|-------|
| | | | |
| | | | |
| | | | |



PREPARED BY: **NUJE**
Civil and Sanitary Consultants
907 MISSION AVE. SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NUJE.BIZ

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MARIN COUNTY

SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
ELECTRICAL
DETAILS - 3

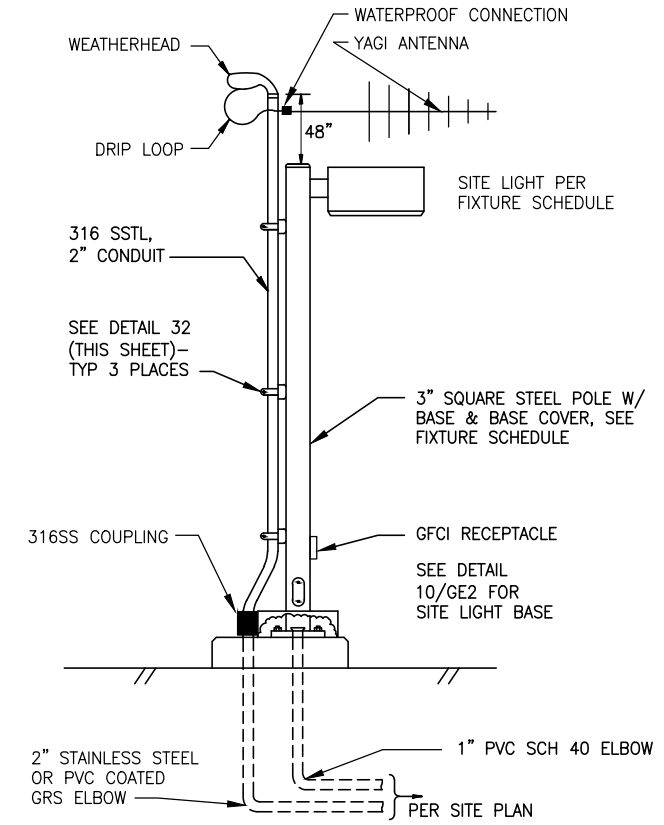
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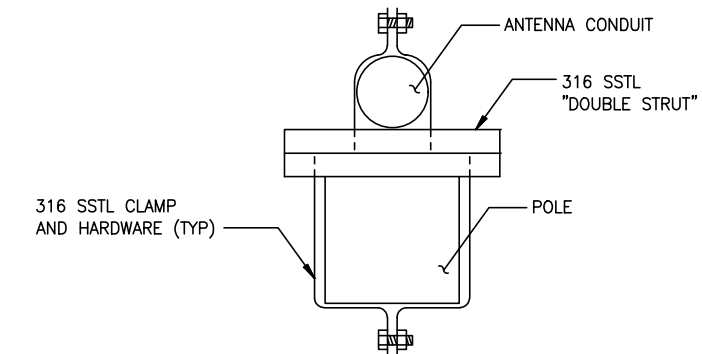


33 PROJECT WIRE REQUIREMENTS
ref. scale: none

| DESCRIPTION | PHASE / CODE LETTER | NON-FIELD WIRE COLOR (ENCLOSURE) | FIELD WIRE COLOR | FIELD WIRE AWG | INSULATION CLASS |
|---------------------------------|---------------------|------------------------------------|-----------------------|----------------|------------------|
| 240 VAC OR 208 VAC, 3 ϕ | A | BLACK | BLACK | PER DWGS | 600V |
| | B | RED, ORG. IF HI LEG | RED, ORG. IF HIGH LEG | | |
| | C | BLUE | BLUE | | |
| | N | WHITE | WHITE | | |
| | G | GREEN | GREEN | | |
| 240/120 VAC, 1 ϕ | L1 | BLACK | BLACK | PER DWGS | 600V |
| | L2 | RED | RED | | |
| | N | WHITE | WHITE | | |
| | G | GREEN | GREEN | | |
| AC CONTROL | N/A | RED (YELLOW FOR FOREIGN CIRCUITS) | VIOLET | 14 | 600V |
| AC DIGITAL INPUT STATUS | N/A | RED | VIOLET | 14 | 600V |
| AC DIGITAL OUTPUT | N/A | RED (YELLOW FOR FOREIGN CIRCUITS) | VIOLET | 14 | 600V |
| DC CONTROL | N/A | BLUE | BLUE | 14 | 600V |
| DC DIGITAL INPUT STATUS | N/A | BLUE | BLUE | 14 | 600V |
| DC DIGITAL INPUT STATUS (TESCO) | N/A | BLUE/WHITE | BLUE | 14 | 600V |
| DC COMMON | N/A | GRAY | N/A | 14 | 600V |
| DC DIGITAL OUTPUT | N/A | BLUE (YELLOW FOR FOREIGN CIRCUITS) | BLUE | 14 | 600V |
| 24 VDC POS. | N/A | PINK | PINK | 14 | 600V |
| 24 VDC NEG. | N/A | BLACK | BLACK | 14 | 600V |
| 12 VDC POS. | N/A | PINK/WHITE | PINK/WHITE | 14 | 600V |
| 12 VDC NEG. | N/A | BLACK/WHITE | BLACK/WHITE | 14 | 600V |
| 5 VDC POS. | N/A | VIOLET | VIOLET | 14 | 600V |
| 5 VDC NEG. | N/A | BLACK/WHITE | BLACK/WHITE | 14 | 600V |
| SHIELDED PAIR | + | RED | BLACK | 16 | 600V |
| | - | BLACK | CLEAR | | |
| INTRINSICALLY SAFE WIRING | N/A | LT. BLUE | LT. BLUE | 14 | 600V |



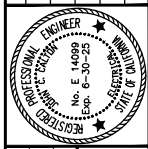
31 ANTENNA ON LIGHT POLE
ref. scale: none



32 ANTENNA CONDUIT SUPPORT
ref. scale: none

- NOTES:
- ALL FASTENERS SHALL BE TYPE 316L STAINLESS STEEL.
 - FOR ALL DRILL & EPOXIED THREADED RODS - DRILL HOLE, CLEAN HOLE W/ WIRE BRUSH & COMPRESSED AIR, SET TYPE 316L SS THRD ROD OR ANCHOR IN NON-SAG EPOXY, TEMPLATE SIZE & LOCATION FROM EQUIPMENT.

| INIT. | NO. | DESCRIPTION |
|-------|-----|-------------|
| | 1 | |
| | 2 | |
| | 3 | |
| | 4 | |



| DESIGNED BY | DRAWN BY | CHECKED BY |
|-------------|----------|------------|
| JC | PM | |

NUJE
Civil and Sanitary Consultants
907 MISSION AVE. SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NUJE.BIZ

PREPARED FOR:
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TIBURON, CA 94920
PHONE: (415) 435-1501
FAX: (415) 435-0221
CALIFORNIA
MARIN COUNTY

SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
ELECTRICAL
DETAILS - 4

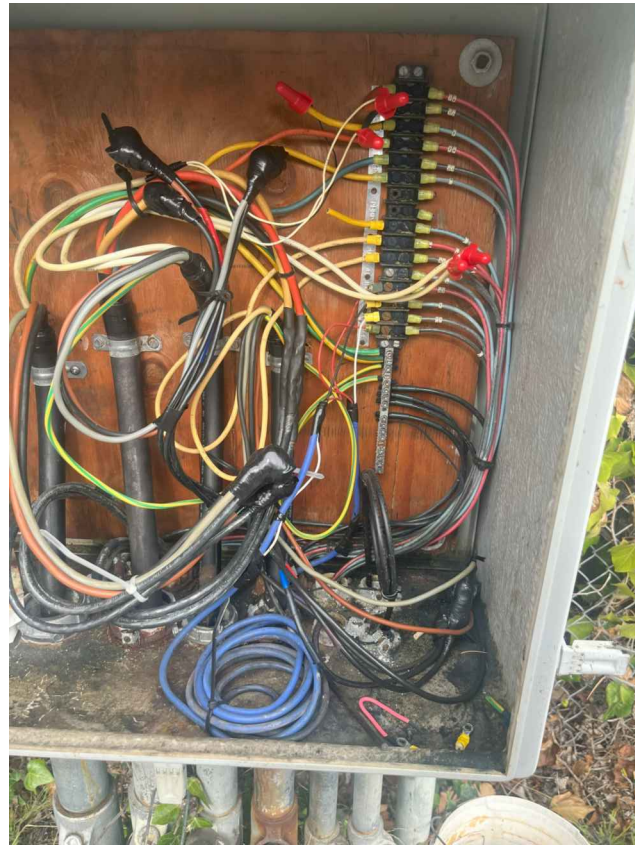
| | |
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| JOB NUMBER: | |
| DATE: | January 3, 2024 |
| PAGE: | --- of ## |

NOT APPROVED
FOR CONSTRUCTION

GE5

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EXISTING TERMINATION PANEL



EXISTING MCC



EXISTING CHEM PANELS & ANTENNAS



EXISTING FORCE MAIN FLOW TUBE



EXISTING PUMP FLOW TRANSMITTER

**NOT APPROVED
FOR CONSTRUCTION**

**SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
ELECTRICAL
DETAILS - 5**

PREPARED FOR:

SANITARY DISTRICT No. 5
2001 PARADISE DRIVE
TIBURON, CA 94920
PHONE: (415) 435-1501
FAX: (415) 435-0221
CALIFORNIA
MARIN COUNTY

PREPARED BY:
NUJIE
Civil and Sanitary Consultants
907 MISSION AVE., SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NUJIE.BIZ

DESIGNED: JC
DRAWN: PM
CHECKED: [Signature]
1"
IF THIS DOES NOT MEASURE
PLEASE REFER TO SCALE
REGISTERED PROFESSIONAL ENGINEER
No. E 14099
Exp. 6-30-25
STATE OF CALIFORNIA

| NO. | DESCRIPTION | DATE | INIT. |
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GENERAL NOTES:

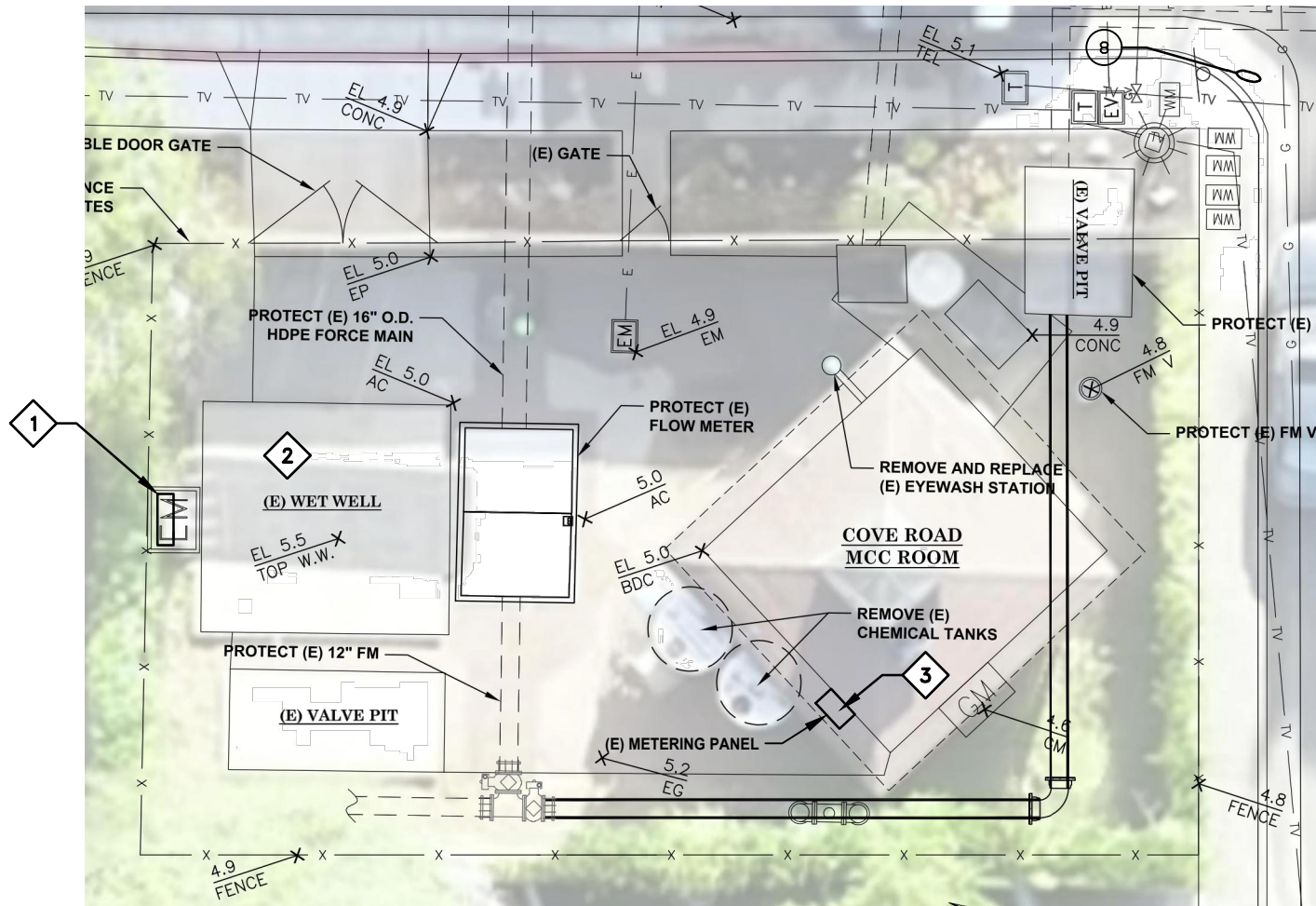
1. CONTRACTOR TO COORDINATE ELECTRICAL SUPPLY AND CONNECTIONS WITH SUPPLIED EQUIPMENT AND APPLIANCES.
2. ALL EXPOSED CONDUITS, FITTINGS, CONDUITS TO BE GRS.
3. CONTRACTOR IS RESPONSIBLE FOR INTERIM CABLES AND CONDUITS.
4. PROVIDE ALL NECESSARY ANCHORS, SUPPORTS, UNISTRUT, BOXES, ETC. FOR MOUNTING EQUIPMENT.
5. REFER TO GE6 FOR PICTURES OF EXISTING EQUIPMENT.
6. CONTRACTOR TO COORDINATE WITH PG&E FOR TEMPORARY POWER AND METERING PANEL RELOCATION. PROVIDE ALL WORK NECESSARY FOR TEMPORARY POWER.
7. ALL CABLES TO BE DEMOLISHED SHALL BE REMOVED END TO END. EXPOSED CONDUITS TO BE REMOVED TO 6" BELOW GRADE.

KEY NOTES:

1. PROVIDE TEMPORARY, OUTDOOR RATED, MOTOR CONTROL CENTER TO OPERATE PUMPS OFF FLOAT SYSTEM. PROVIDE CABLES AND SPICE TO EXISTING PUMPS CABLES IN EXISTING TERMINATION PANEL. PUMPS ARE 10 HP, 10 HP, 20 HP, 15 HP. POWER TEMPORARY MCC FROM PG&E SERVICE. MCC TO HAVE AUTODIALER TO ALARM CONTRACTOR OF HIGH LEVEL.
2. PROVIDE FLOAT SYSTEM WITHIN EXISTING WET WELL FOR: PUMP STOP, 10 HP START, 10 HP START, HIGH LEVEL, 15 HP START, 20 HP START. FLOAT ELEVATIONS TO BE PROVIDED BY DISTRICT.
3. EXISTING METERING PANEL TO BE RELOCATED FOR INTERIM SERVICE TO TEMPORARY MCC.
4. DEMOLISH EXISTING TERMINATION PANEL, SALVAGE PUMP CABLES. REMOVE 15 HP PUMP AND PROVIDE TO DISTRICT.
5. PROTECT EXISTING ELECTRICAL HANDHOLE WITH FEEDER TO PS 7.
6. RELOCATE AND PROVIDE SUPPORT OF EXISTING METERING PANEL TO FACILITATE NEW BUILDING.

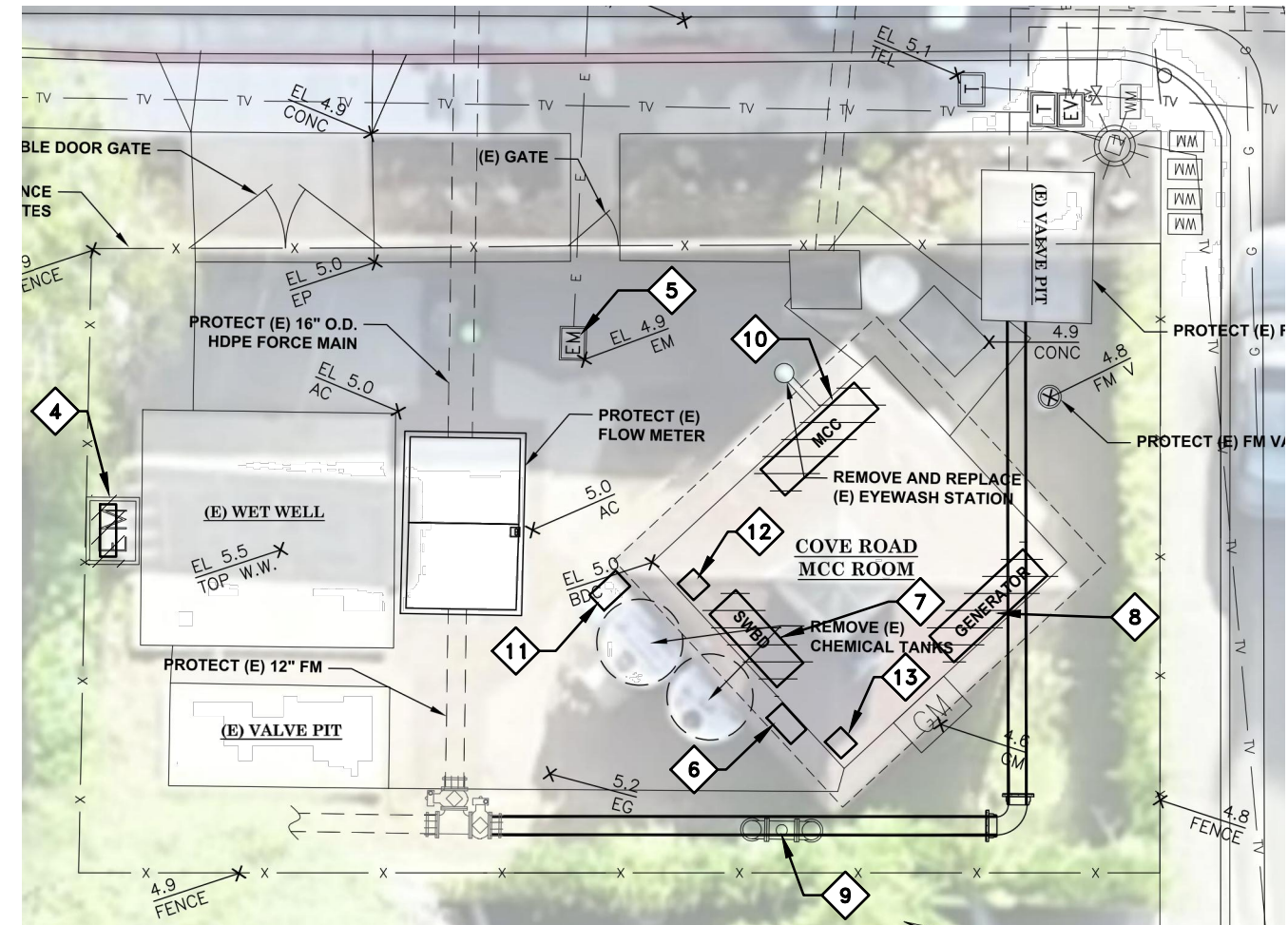
KEY NOTES (CONTINUED):

7. DEMOLISH EXISTING MAIN BREAKER ENCLOSURE AND SWITCHBOARD.
8. DEMOLISH EXISTING NATURAL GAS GENERATOR.
9. PROTECT EXISTING FORCE MAIN FLOW TUBE.
10. DEMOLISH EXISTING MCC, WITH EXCEPTION OF RADIOS. SALVAGE RADIOS FOR REINSTALLATION IN NEW BUILDING. MCC HARDWARE COULD BE USED FOR TEMPORARY MCC HARDWARE.
11. PROTECT EXISTING CHEMICAL FEED ELECTRICAL EQUIPMENT.
12. SALVAGE EXISTING PUMP FLOW INDICATING TRANSMITTER (FIT) FOR REINSTALLATION IN NEW BUILDING. SALVAGE WIRING FROM FIT TO FLOW TUBE FOR RE-INSTALLATION.
13. SALVAGE EXISTING FORCE MAIN FIT FOR REINSTALLATION IN NEW BUILDING. SALVAGE WIRING FROM FIT TO FLOW TUBE FOR RE-INSTALLATION.



INTERIM PLAN

SCALE IN FEET
0 5 10



DEMOLITION PLAN

SCALE IN FEET
0 5 10

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DESIGNED BY: JC
DRAWN BY: PM
CHECKED BY: [Signature]

PROFESSIONAL ENGINEER
No. E 14099
Exp. 6-30-25
STATE OF CALIFORNIA

IF THIS DOES NOT MEASURE CAREFULLY TO SCALE

PREPARED BY:

NSUE
Civil and Sanitary Consultants
907 MISSION AVE. SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NSUE.BIZ

PREPARED FOR:

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CALIFORNIA

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DATE: January 3, 2024
PAGE: --- of ##

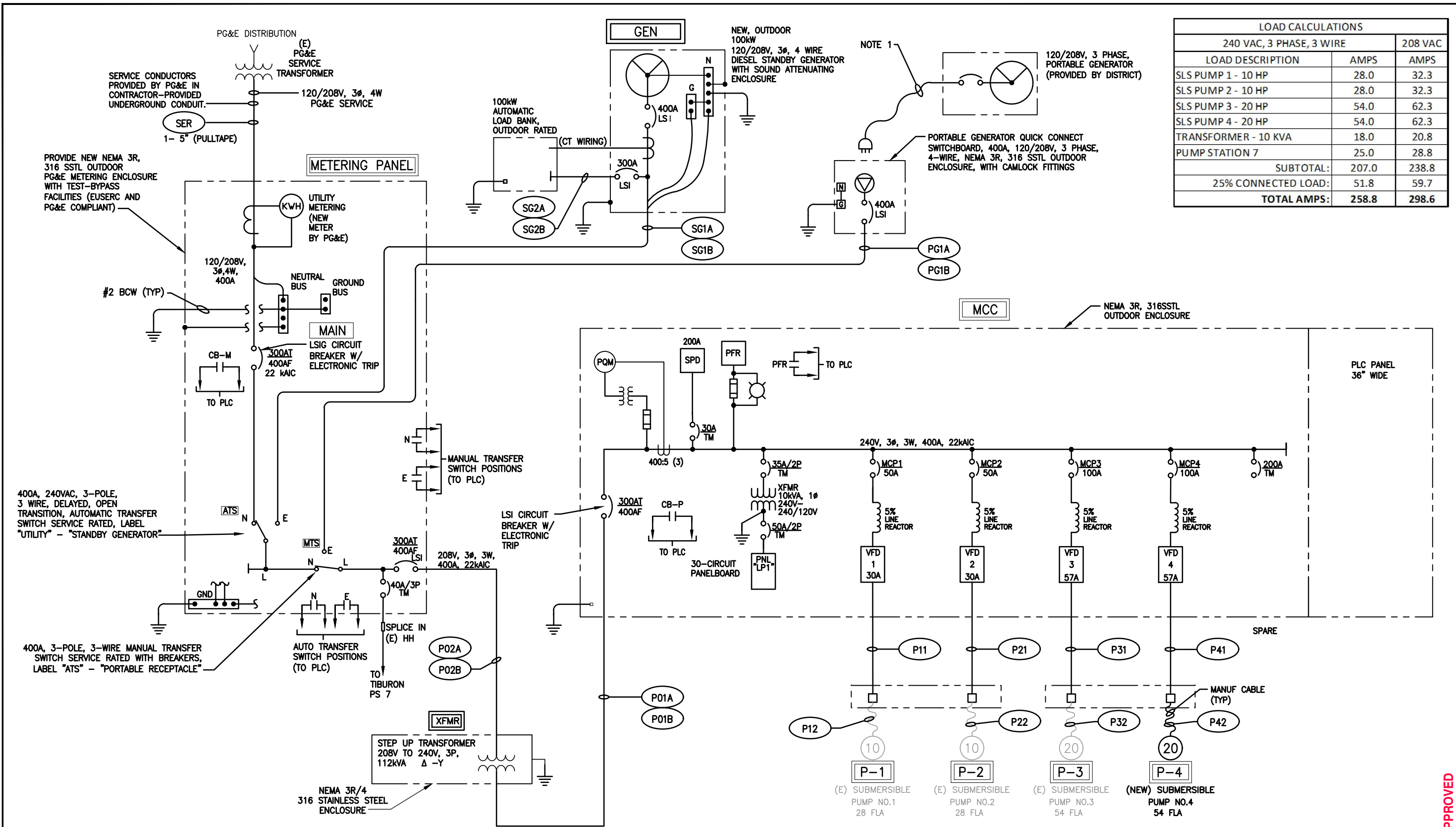
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SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
INTERIM AND DEMOLITION SITE PLANS

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| LOAD CALCULATIONS | | |
|----------------------|--------------------------|--------------|
| | 240 VAC, 3 PHASE, 3 WIRE | 208 VAC |
| LOAD DESCRIPTION | AMPS | AMPS |
| SLS PUMP 1 - 10 HP | 28.0 | 32.3 |
| SLS PUMP 2 - 10 HP | 28.0 | 32.3 |
| SLS PUMP 3 - 20 HP | 54.0 | 62.3 |
| SLS PUMP 4 - 20 HP | 54.0 | 62.3 |
| TRANSFORMER - 10 KVA | 18.0 | 20.8 |
| PUMP STATION 7 | 25.0 | 28.8 |
| SUBTOTAL: | 207.0 | 238.8 |
| 25% CONNECTED LOAD: | 51.8 | 59.7 |
| TOTAL AMPS: | 258.8 | 298.6 |

0 SINGLE LINE DIAGRAM
ref: scale: none

- NOTES:
1. PROVIDE 20' DCO TYPE CABLE, RATED FOR 300 AMPS MINIMUM, AND PLUG TO PORTABLE GENERATOR RECEPTACLE. PROVIDE TO OWNER.

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 T. 415.453.4480 WWW.NSUE.BIZ

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 2001 PARADISE DRIVE
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 PHONE: (415) 435-1501
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 CALIFORNIA MARIN COUNTY

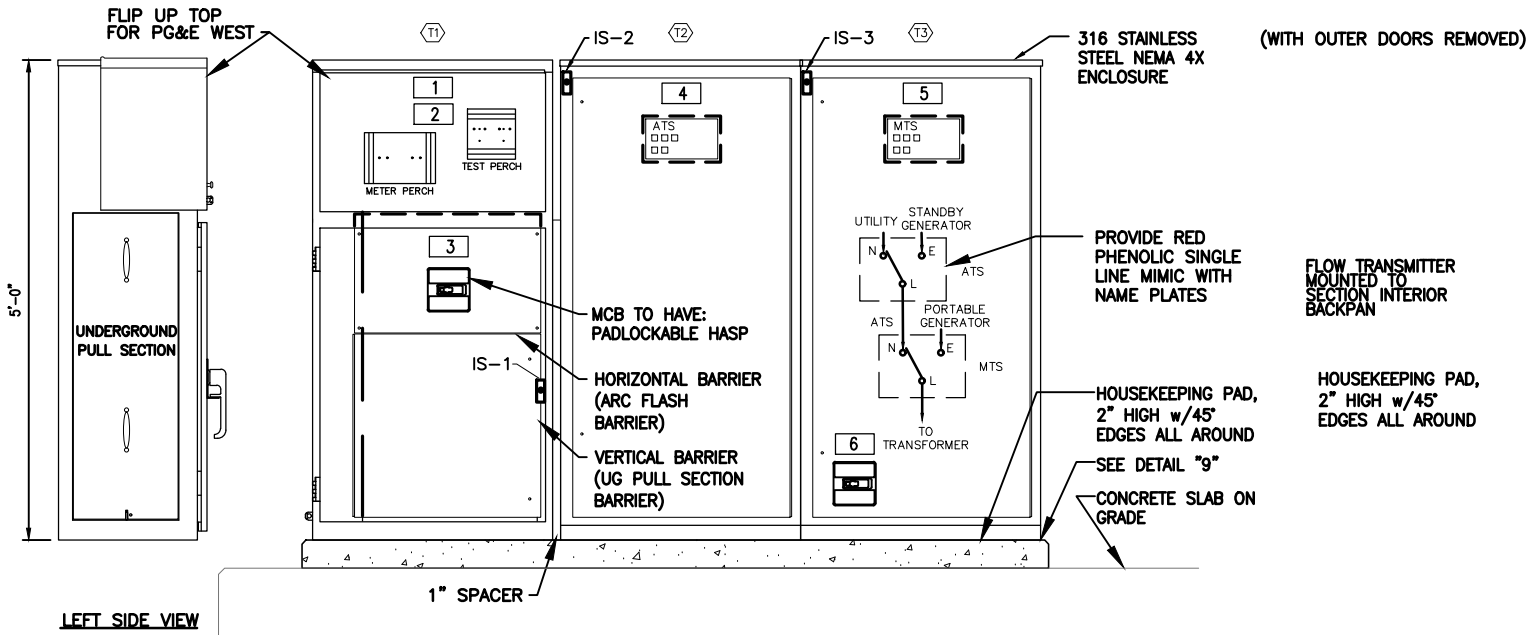
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SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
SINGLE LINE DIAGRAM,
LOAD CALCULATIONS

JOB NUMBER: _____
 DATE: January 3, 2024
 PAGE: _____ of _____

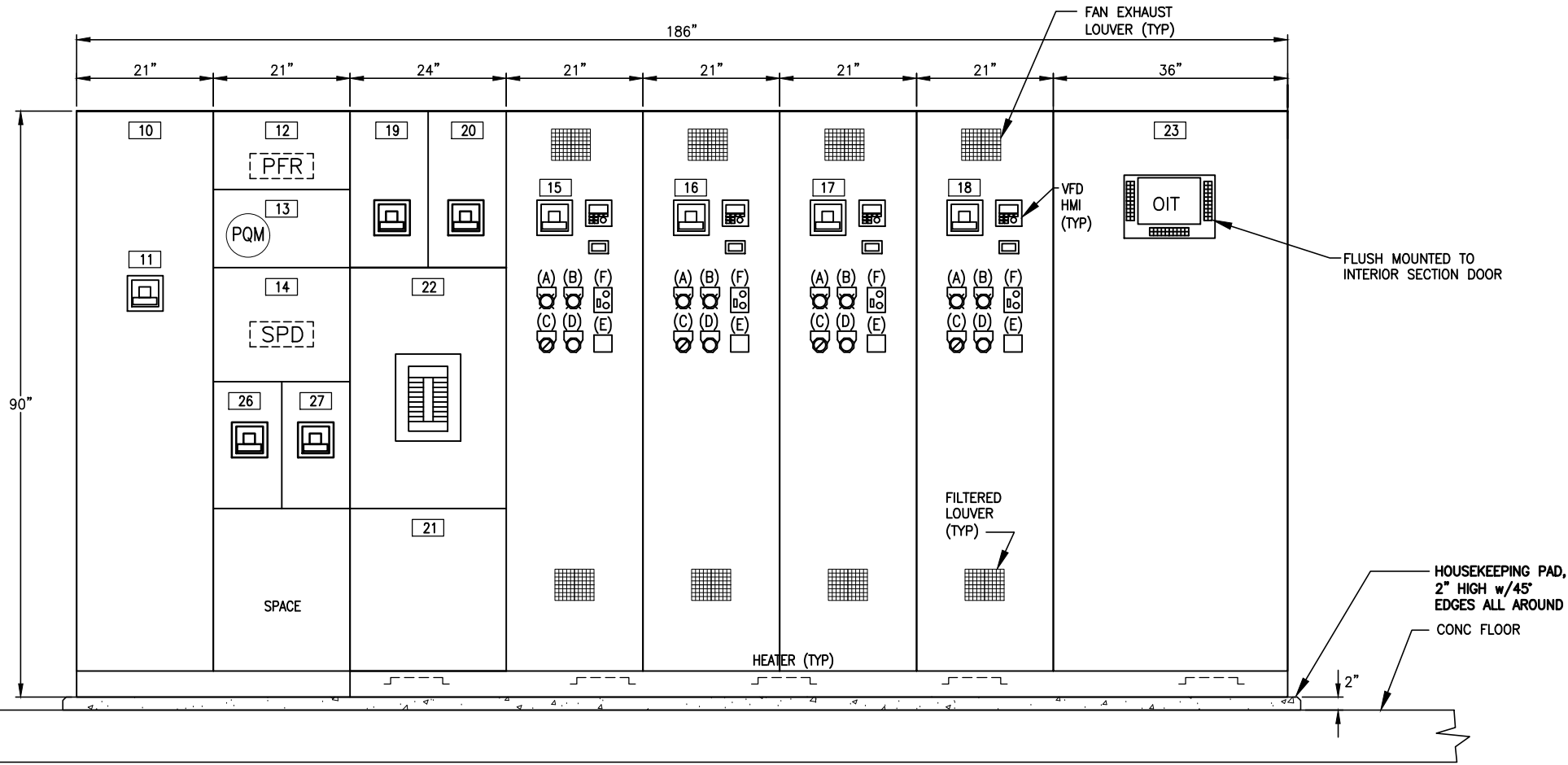


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METERING PANEL WITH MAIN, ATS, MTS - ELEVATION
 NO SCALE
 (WITH OUTER DOORS REMOVED)

| NAMEPLATE SCHEDULE | | | |
|--------------------|-------|-----------|---|
| TAG # | TYPE | SIZE | INSCRIPTION |
| 1 | PLATE | 2" X 6" | COVE PS METERING PANEL |
| 2 | PLATE | .75" X 3" | PG&E METERING SECTION |
| 3 | PLATE | .75" X 3" | MAIN BREAKER |
| 4 | PLATE | 2" X 6" | ATS UTILITY - STANDBY GENERATOR |
| 5 | PLATE | 2" X 6" | MTS ATS - PORTABLE RECEPTACLE |
| 6 | PLATE | .75" X 3" | STEP UP TRANSFORMER FEEDER |
| 10 | PLATE | 2" X 6" | COVE PS MCC |
| 11 | PLATE | .75" X 3" | MAIN BREAKER |
| 12 | PLATE | .75" X 3" | PWR FAIL RELAY |
| 13 | PLATE | .75" X 3" | POWER MONITOR |
| 14 | PLATE | .75" X 3" | SPD |
| 15 | PLATE | .75" X 3" | PUMP NO. 1 |
| 16 | PLATE | .75" X 3" | PUMP NO. 2 |
| 17 | PLATE | .75" X 3" | PUMP NO. 3 |
| 18 | PLATE | .75" X 3" | PUMP NO. 4 |
| 19 | PLATE | .75" X 3" | TRANSFORMER PRIMARY BREAKER |
| 20 | PLATE | .75" X 3" | TRANSFORMER SECONDARY BREAKER |
| 21 | PLATE | .75" X 3" | 10 KVA TRANSFORMER 240-120/240 VAC, 1 PH |
| 22 | PLATE | .75" X 3" | PANELBOARD LP-1, 120/240 VAC, 1 PH |
| 23 | PLATE | .75" X 3" | PLC PANEL |
| 24 | PLATE | 2" X 6" | LOW LOW LEVEL SWITCH INTERLOCK BYPASSED - ACTIVE |
| 25 | PLATE | .75" X 3" | LEVEL ALARM RESET |
| 26 | PLATE | .75" X 3" | TIBURON PS 7 BREAKER |
| 27 | PLATE | .75" X 3" | SPARE |
| A | RING | N/A | PUMP RUNNING |
| B | RING | N/A | VFD FAIL |
| C | PLATE | .75" X 2" | HAND-OFF-AUTO |
| D | RING | N/A | RESET |
| E | PLATE | .75" X 2" | ETM AND START COUNTER |
| F | PLATE | .75" X 2" | MPR |



MCC - ELEVATION
 NO SCALE

PREPARED BY: JC PM
 Drawn: PM
 Checked: PM
 1" SCALE
 # THIS DOES NOT MEASURE # ARE NOT TO SCALE

PREPARED FOR:

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 PHONE: (415) 435-1501
 FAX: (415) 435-0221

NUJE
 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUJE.BIZ

CALIFORNIA
 MARIN COUNTY

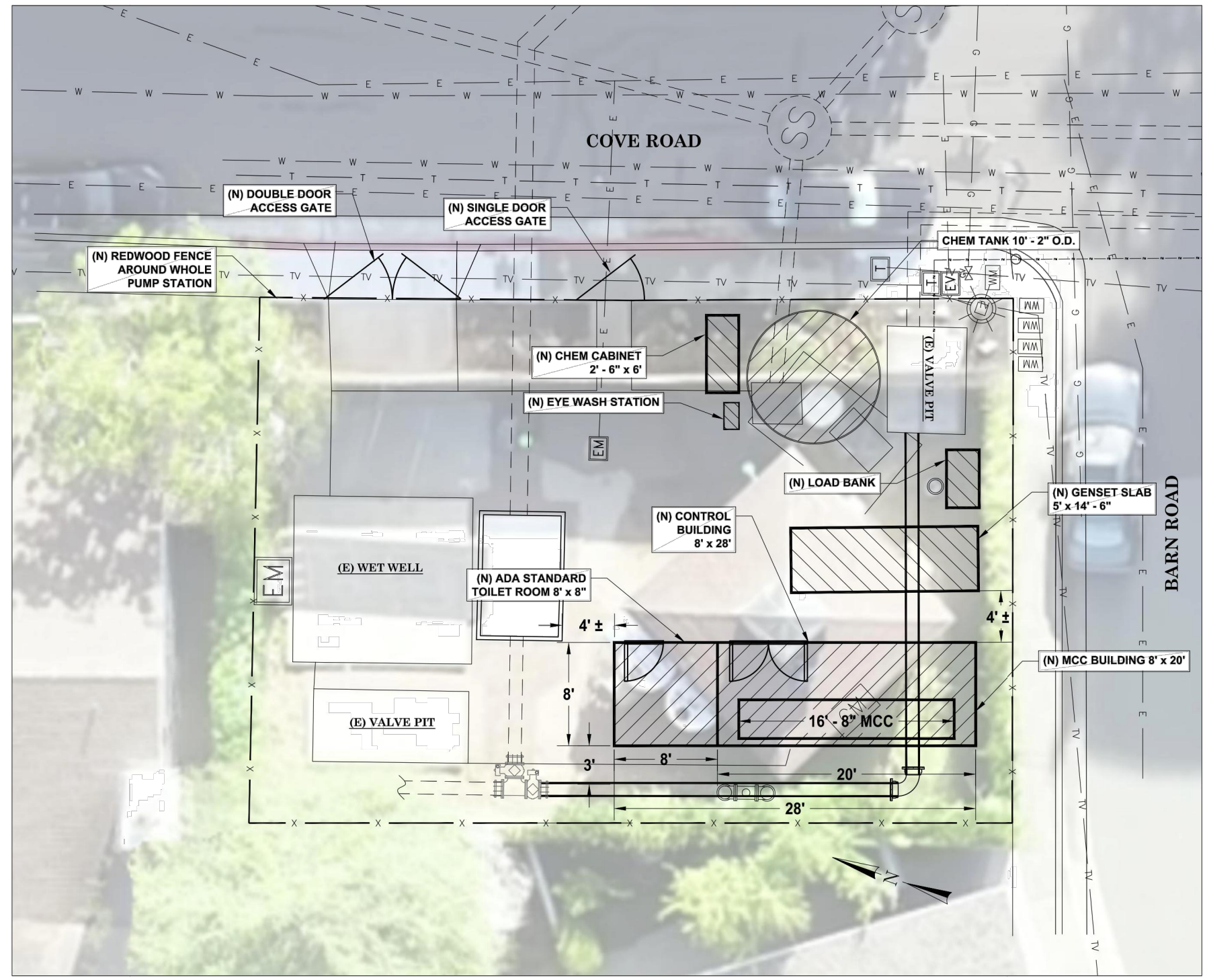
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SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
EQUIPMENT ELEVATIONS

JOB NUMBER: _____
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 PAGE: E03 of ##



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PLAN
 SCALE IN FEET
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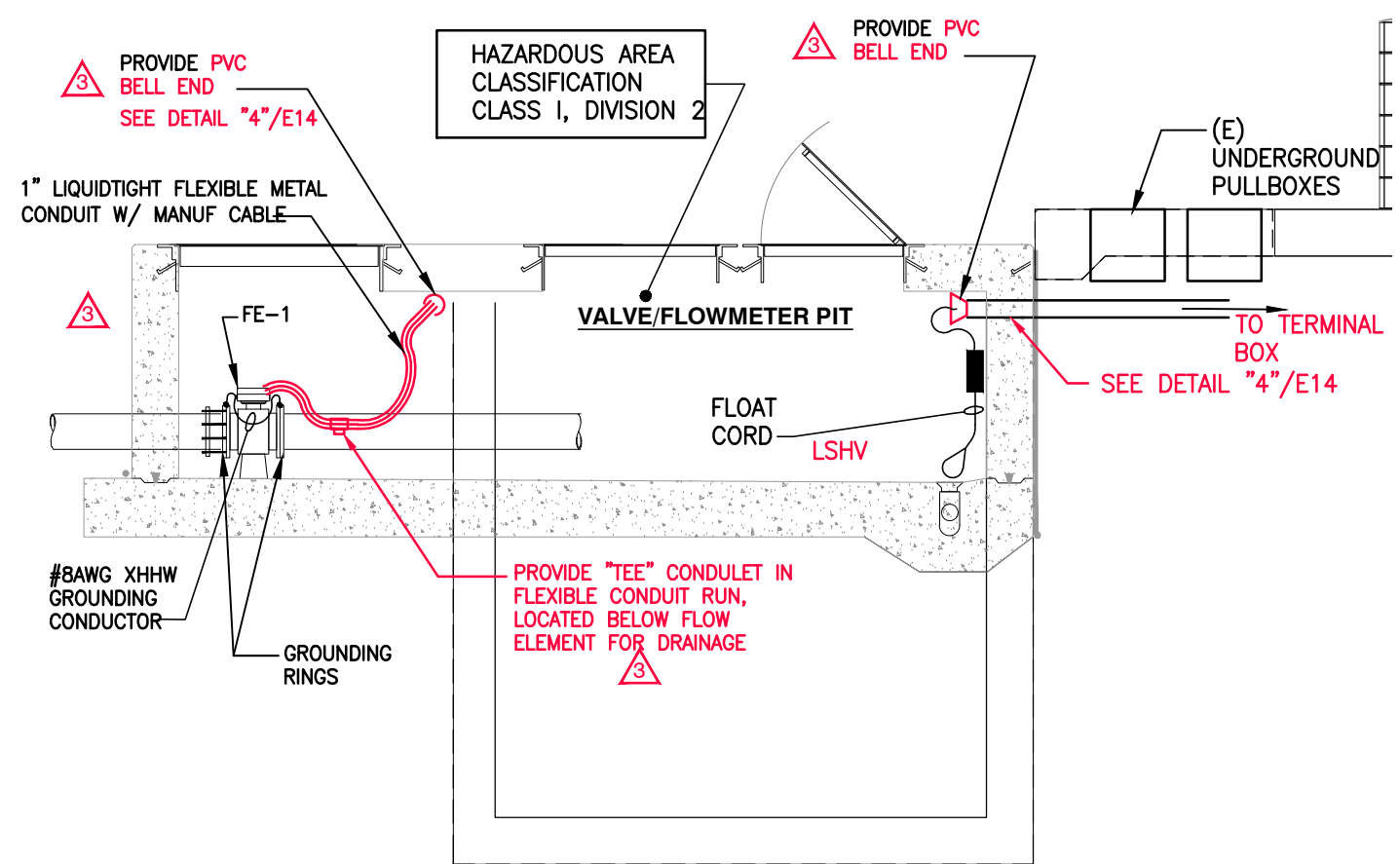
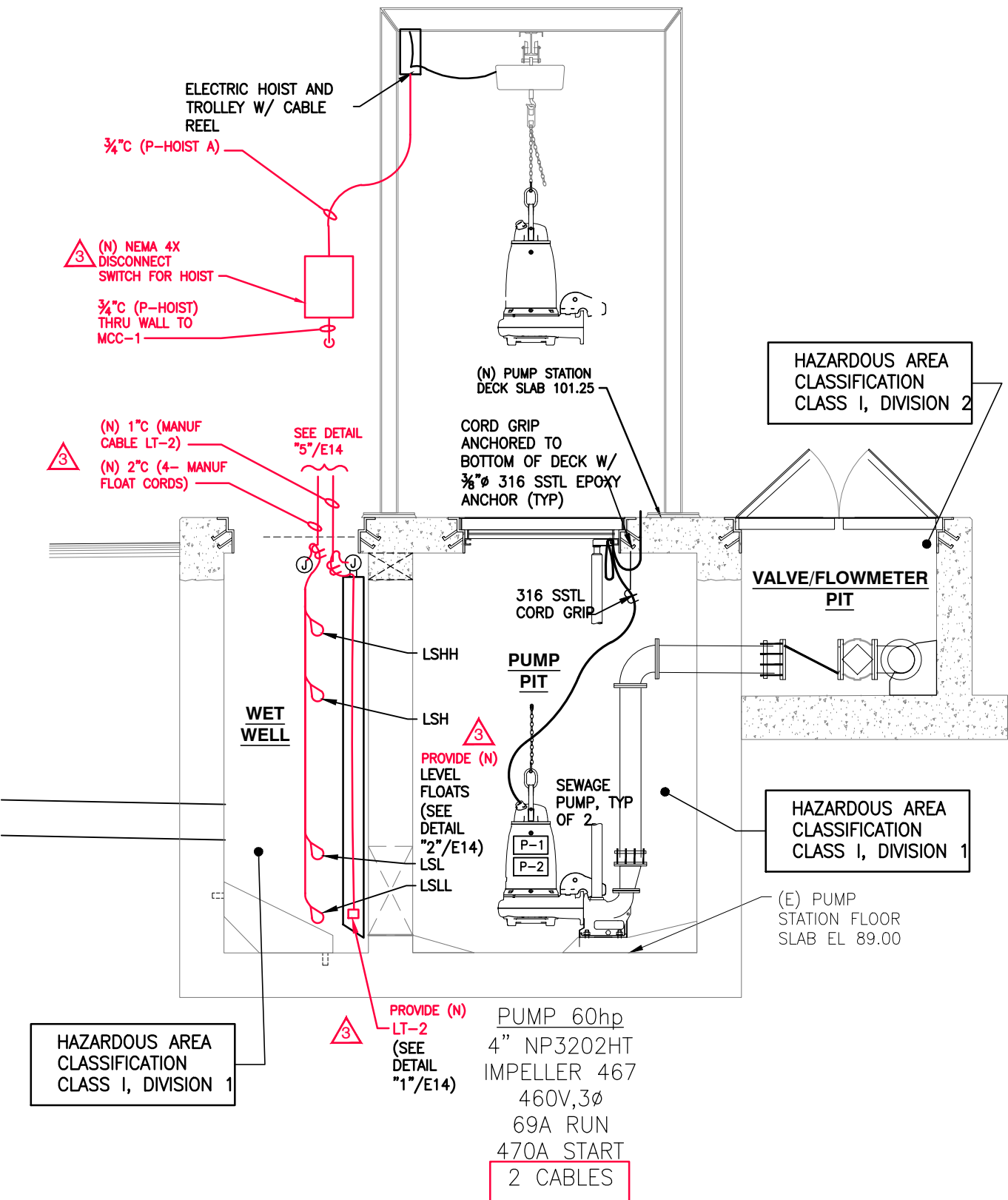
SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
ELECTRICAL SITE PLAN

PREPARED FOR:
SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
 CALIFORNIA

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NUIE
 Civil and Sanitary Consultants
 907 MISSION AVE., SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUIE.BIZ

DESIGNED BY: JC
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 IF THIS DOES NOT MEASURE
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| NO. | DATE | DESCRIPTION | INIT. |
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- NOTES:
1. PROVIDE 10' SLACK LOOP FOR ALL PUMP CORDS AND FLOAT SWITCHES WITHIN WET WELL AND FLOWMETER PIT. EXCESS SLACK SHALL BE COILED AND TIE-WRAPPED WITH PLASTIC TIES.
 2. ROUTE ALL CABLES TO NOT INTERFERE WITH PERSONNEL ACCESS.

| NO. | DESCRIPTION | DATE |
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Civil and Sanitary Consultants
907 MISSION AVE. SAN RAFAEL, CA 94901
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SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT

SECTIONS AND DETAILS

JOB NUMBER: _____
DATE: January 3, 2024
PAGE: E05 of ##

J Calton Engineering

E06

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PAGE: --- OF ##

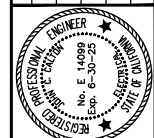
SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT
BUILDING PLANS

PREPARED FOR:

MARIN COUNTY
SANITARY DISTRICT No. 5
2001 PARADISE DRIVE
TIBURON, CA 94920
PHONE: (415) 435-1501
FAX: (415) 435-0221
CALIFORNIA

PREPARED BY:
NUTE
Civil and Sanitary Consultants
907 MISSION AVE, SAN RAFAEL, CA 94901
T. 415.453.4480 WWW.NUTE.BIZ

Designed: JC
Drawn: PM
Checked:
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IF THIS DOES NOT MEASURE
PLEASE CONTACT US
WE ARE NOT TO SCALE



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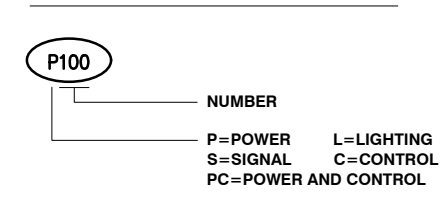
CONDUIT AND CABLE SCHEDULE

| CONDUIT | | CABLE SIZE AND QUANTITIES | FROM | TO | REMARKS |
|---------|------------------------|---------------------------|----------------------------|----------------------------------|---|
| NO. | SIZE MATERIAL (NOTE 1) | | | | |
| SER | 3" PVC 40 | PULL TAPE | PADMOUNT TRANSFORMER | METERING PANEL | CONDUCTORS BY PG&E |
| P100 | 2" PVC 40 | 3-#4/0, #2G | STANDBY GENERATOR | MTS PANEL (SOURCE 1) | 480VAC FROM STANDBY GENERATOR. |
| P101 | 1" PVC 40 | 2-#12, 2-#12N, #12G | STANDBY GENERATOR | PCP - PANELBOARD | 2-120VAC. GEN BATTERY CHARGER, BLOCK HEATER |
| P102 | 1 1/2" PVC 40 | 3-#2/0, #4G | STANDBY GENERATOR | AUTOMATIC LOAD BANK | 480VAC. |
| P200 | 2" PVC 40 | 3-#4/0, #2G | PORT GEN QUICK CONN. SWBD | MTS PANEL (SOURCE 2) | 480VAC FROM PORTABLE GENERATOR QUICK CONN SWBD |
| P201 | 1" PVC 40 | #12, #12N, #12G | PORT GEN QUICK CONN. SWBD | PCP - PANELBOARD | 120VAC. RECEPTACLE AT PORT GEN QUICK CONN SWBD |
| P300 | 2" PVC 40 | 3-#4/0, #2G | ATS PANEL (LOAD) | PCP - MAIN BKR | 480VAC. PCP INCOMING FEEDER. |
| P301 | 1" PVC 40 | #12, #12N, #12G | ATS PANEL | PCP - PANELBOARD | 120VAC. ATS AND MTS PANEL HEATERS |
| P501 | 1" PVC 40 | #12, #12N, #12G | PCP - PANELBOARD | IRRIGATION CONTROLLER | 120VAC. |
| P502 | 1" PVC 40 | PULL TAPE | PCP - PANELBOARD | FUTURE GATE CONTROLLER 1 | SPARE. |
| P503 | 1" PVC 40 | PULL TAPE | FUTURE GATE OPERATOR 1 | FUTURE GATE CONTROLLER 2 | SPARE. |
| P504 | 1" 316 SS | 3-#10, #10G | PCP - ODOR SYSTEM BREAKER | ODOR CONTROL PANEL | 480VAC. |
| P505 | 1" 316 SS | #12, #12N, #12G | PCP - PANELBOARD | ODOR CONTROL PANEL | 120VAC. |
| P506 | 1" PVC 40 | #12, #12N, #12G | PCP - PANELBOARD | AUTOMATIC LOAD BANK | 120VAC. |
| P507 | 1" 316 SS | #12, #12N, #12G | PCP - PANELBOARD | ODOR ROOM FAN, VIA SWITCH | 120VAC. |
| P508 | 3/4" 316 SS | 3-#12, #12G | ODOR CONTROL PANEL | ODOR BLOWER | 480VAC. |
| PC401 | 1 1/2" 316 SS | 1-4/C #8, #14 TWSP | PCP - PUMP 1 STARTER | TB-1 | PUMP 1 FEEDER, OVERTEMP/LEAK MONITORING. |
| PC402 | 1 1/2" 316 SS | 1-4/C #8, #14 TWSP | PCP - PUMP 2 STARTER | TB-1 | PUMP 2 FEEDER, OVERTEMP/LEAK MONITORING. |
| PC403 | 1 1/2" 316 SS | 1-4/C #8, #14 TWSP | PCP - PUMP 3 STARTER | TB-1 | PUMP 3 FEEDER, OVERTEMP/LEAK MONITORING. |
| PC404 | 1 1/2" 316 SS | MANU CABLE (POWER, TS/MS) | TB-1 | WET WELL - PUMP 1 | PUMP 1 FEEDER, OVERTEMP/LEAK MONITORING. |
| PC405 | 1 1/2" 316 SS | MANU CABLE (POWER, TS/MS) | TB-1 | WET WELL - PUMP 2 | PUMP 2 FEEDER, OVERTEMP/LEAK MONITORING. |
| PC406 | 1 1/2" 316 SS | MANU CABLE (POWER, TS/MS) | TB-1 | WET WELL - PUMP 3 | PUMP 3 FEEDER, OVERTEMP/LEAK MONITORING. |
| C101 | 1" PVC 40 | 6-#14, #14G | STANDBY GENERATOR | ATS PANEL | START COMMAND, SPARES. |
| C102 | 1 1/2" PVC 40 | 10-#14, #16 TWSP, #14G | STANDBY GENERATOR | PCP - PLC | STANDBY GENERATOR ALARMS, STATUS, FUEL LEVEL, SPARES. |
| C201 | 1" PVC 40 | PULL TAPE | PORTABLE GENERATOR CABINET | PCP - PLC | SPARE. |
| C301 | 1" PVC 40 | 12-#14, #14G | ATS AND MTS | PCP - PLC | ATS AND MTS ALARMS, STATUS, SPARES. |
| C401 | 1" 316 SS | PULL TAPE | PCP - PLC | TB-1 | SPARE. |
| L801 | 1" PVC 40 | #12, #12N, #12G | PCP - LIGHT SWITCH | SITE LIGHT | LIGHTS POWER. |
| L802 | 1" 316 SS | #12, #12N, #12G | PCP - PANELBOARD | ODOR CONTROL ROOM | LIGHTS POWER VIA SWITCH. |
| L803 | 1" 316 SS | #12, #12N, #12G | PCP - PANELBOARD | CANOPY, DOOR LIGHTS | LIGHTS POWER VIA SWITCHES. |
| S901 | 1 1/2" 316 SS | FE MANU CABLES, #10G | PCP - PLC FIT | FLOW PIT - FLOW TUBE | FLOW METER CABLES. EYS FITTING WITHIN PIT |
| S902 | 1" 316 SS | 2 - LT MANU CABLES, #14G | PCP - PLC | JB-1 | LEVEL TRANSDUCER CABLES. LT BELLOWS IN PCP. |
| S903 | 1" 316 SS | 2 - LT MANU CABLES | JB-1 | WET WELL | LEVEL TRANSDUCER CABLES |
| S904 | 1 1/2" 316 SS | 4 - FS MANU CABLES, #14G | PCP - PLC | JB-1 | WET WELL FLOAT SWITCH CABLES |
| S905 | 1 1/2" 316 SS | 4 - FS MANU CABLES | JB-1 | WET WELL | WET WELL FLOAT SWITCH CABLES |
| S906 | 1" 316 SS | FLOAT SWITCH MANU CABLE | PCP - PLC | FLOW PIT - FLOAT SWITCH | FLOW PIT FLOAT SWITCH CABLE. EYS FITTING WITHIN PIT |
| S907 | 1" 316 SS | FLOAT SWITCH MANU CABLE | PCP - PLC | VALVE PIT - FLOAT SWITCH | VALVE PIT FLOAT SWITCH CABLE. EYS FITTING WITHIN PIT |
| S908 | 1" PVC 40 | PULL TAPE | PCP - PLC | SITE LIGHT | SPARE. STUB UP INTO POLE AND CAP, FUTURE CCTV. |
| S909 | 1 1/2" 316 SS | PULL TAPE | PCP - PLC | JB-1 | SPARE. |
| S910 | 1" 316 SS | 10-#14, #14G | PCP - PLC | ODOR CONTROL SYSTEM | STATUS AND ALARMS |
| S911 | 1" PVC 40 | 4-#10, #14G | STANDBY GENERATOR | AUTOMATIC LOAD BANK | CT WIRING |
| S912 | 1" PVC 40 | 10-#14, #14G | PCP - PLC | AUTOMATIC LOAD BANK | STATUS AND ALARMS |
| S913 | 1" PVC 40 | ANTENNA CABLE | PCP - PLC | YAGI ANTENNA | PROVIDE WEATHERPROOF CONNECTIONS AT ANTENNA |
| S914 | 1" 316 SS | #16 TWSP, #14G | PCP - PLC | FLOW PIT - PRESS TRANSMITTER | EYS FITTING WITHIN PIT |
| S915 | 1 1/2" PVC 40 | PULL TAPE | PCP - PLC | CAP AT SIDEWALK NEAR STREET | SPARE. CAP BOTH ENDS, FUTURE INTERNET CONNECTION |
| S916 | 1" PVC 40 | PULL TAPE | PCP - PLC | CAP AT INSIDE CORNER OF BUILDING | SPARE. STUB UP TO 6' AFF AND CAP, FUTURE CCTV |

LIGHTING FIXTURE SCHEDULE

| TYPE | VAC | DESCRIPTION | LAMPS | MOUNTING | MANUFACTURER / MODEL NO. |
|------|-----|--|--------------------------|---|---|
| 1 | 120 | FIXTURE HOUSING SHALL BE DARK BRONZE POWDER COAT FINISHED DIE-CAST ALUMINUM HOUSING. MOUNTING SHALL BE YOKE. DISTRIBUTION SHALL BE FLOOD. LEDS SHALL BE 94 W, 13,200 LUMENS, 4000K COLOR, 10,000 HOURS. POWER SUPPLY SHALL BE 120V RATED. FIXTURE TO BE MOUNTED ON SIDE OF POLE 12' ABOVE BASE, PROVIDE WITH EXTRA HANDHOLE 90 DEGREES FROM FIXTURE. PROVIDE GFCI RECEPTACLE ON POLE WITH METAL WEATHERPROOF WHILE IN USE COVER APPROXIMATELY 48" ABOVE BASE AND EXTRA HANDHOLE 90 DEGREES FROM RECEPTACLE. PROVIDE ADDITIONAL HANDHOLE 16' FROM TOP OF POLE FOR FUTURE CCTV USE, 90 DEGREES FROM FIXTURE. UL LISTED FIXTURE AND POLE. | LED 94 WATTS | 25' SQUARE STRAIGHT STEEL POLE. HDG ANCHOR BOLTS (1" X 36" X 4"). | FIXTURE: LITHONIA TFX2-LED-40K-MVOLT-YK-DDBXD. POLE: LITHONIA SSS-25-5G-T20-EHH4A-EHH12A-EHH16A-DDBXD. EXTRA HANDHOLES FOR RECEPTACLE, FIXTURE, AND FUTURE CCTV. PROVIDE HOT DIPPED GALVANIZED (HDG) ANCHOR BOLTS AND FULL BASE COVER. POLE TOP SHALL ALLOW FOR WEATHERHEAD MOUNTING. |
| 2 | 120 | LED FIXTURE FOR PANEL MOUNTING. SURFACE MOUNTED. | LED 5 WATT 400 LUMENS | SURFACE | FIXTURE: HOFFMAN LED LIGHT #LEDA1S35, OR EQUAL |
| 3 | 120 | LED VAPOR TIGHT LUMINAIRE, 120VAC. FIBERGLASS HOUSING, UL LISTED FOR DAMP LOCATIONS. | LED 56 WATTS | SURFACE, 8" MINIMUM | FIXTURE: LITHONIA XVML-L48-5000LM-MVOLT-40K-80CRI |
| 4 | 120 | LED WALL SCENCE, 120VAC. MOTION AND AMBIENT CONTROLLED, ALUMINUM HOUSING, UL LISTED FOR WET LOCATIONS. | LED 20 WATTS | SURFACE, 6" ABOVE DOOR | FIXTURE: LITHONIA WSQ-LED-P1-30K-SR2-MVOLT-PIR-DDBXD |

CIRCUIT TYPE LEGEND



| PANELBOARD SCHEDULE | | | | | |
|----------------------------|--------|-----|-----|--------|-----------------------------|
| DESCRIPTION | BKR | CIR | CIR | BKR | DESCRIPTION |
| PCP - UPS POWER | 20A-1P | 1 | 2 | 20A-1P | GEN BATTERY CHARGER |
| PCP - LIGHTS, RECEPTACLE | 15A-1P | 3 | 4 | 20A-1P | GEN BLOCK HEATER |
| PCP - HEATER, VENTS | 15A-1P | 5 | 6 | 15A-1P | ODOR CONTROL ROOM LIGHTS |
| POWER QUALITY METER | 15A-1P | 7 | 8 | 15A-1P | IRRIGATION CONTROLLER |
| SITE LIGHT, VIA PCP SWITCH | 15A-1P | 9 | 10 | 20A-1P | ATS AND MTS PANEL HEATER |
| (F) GATE OPERATORS | 20A-1P | 11 | 12 | 20A-1P | PORTABLE GEN CABINET RECEPT |
| CANOPY, DOOR LIGHTS | 20A-1P | 13 | 14 | 20A-1P | ODOR CONTROL PANEL |
| SPARE | 15A-1P | 15 | 16 | 20A-1P | SPARE |
| SPARE | 20A-1P | 17 | 18 | 20A-1P | SPARE |
| SPARE | 20A-1P | 19 | 20 | 20A-1P | LOAD BANK CONTROLS |

| WETWELL LEVEL SETTINGS | | | |
|----------------------------|------------------|---------------------------------|--|
| MARIN VILLAGE PUMP STATION | | | |
| HMI SETPOINTS | | BACK UP FLOAT SWITCHES SETTINGS | |
| SETPOINT | DESCRIPTION | ELEV. | DESCRIPTION |
| | | | ALARM AND REDUNDANT BACK UP PUMPS START (LSHH) |
| | | 75" | |
| | | 75" | BACK UP PUMPS START (LSH) |
| 74" | HIGH LEVEL ALARM | | |
| 74" | SEWER INVERT | | |
| 72" | START LAG2 PUMP | | |
| 69" | START LAG1 PUMP | | |
| 58" | START LEAD PUMP | | |
| 26" | STOP PUMPS | | |
| 14" | LOW LEVEL ALARM | | |
| | | 10" | STOP (LSL) |
| | | 7" | ALARM AND REDUNDANT STOP (LSLL) |

NOTE:
 1. NEW CONDUIT REQUIREMENTS ARE NOT INCLUDED IN THE CIRCUIT SCHEDULE. REFER TO THE PLAN DRAWINGS FOR NEW CONDUIT REQUIREMENTS.

CONDUIT AND CABLE SCHEDULE NOTE:
 1. CONDUIT MATERIALS SHOWN ARE FOR MAJORITY LENGTHS OF CONDUIT RUNS, AND DO NOT INCLUDE METALLIC VERTICAL TRANSMONS, OR SHORT EXPOSED CONDUITS.

PREPARED BY: **NUJE** Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T.415.453.4480 WWW.NUJE.BIZ

SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
 CALIFORNIA

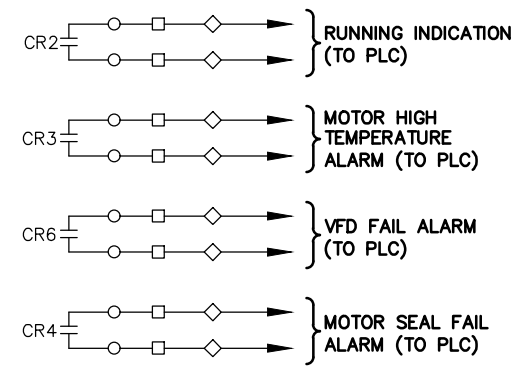
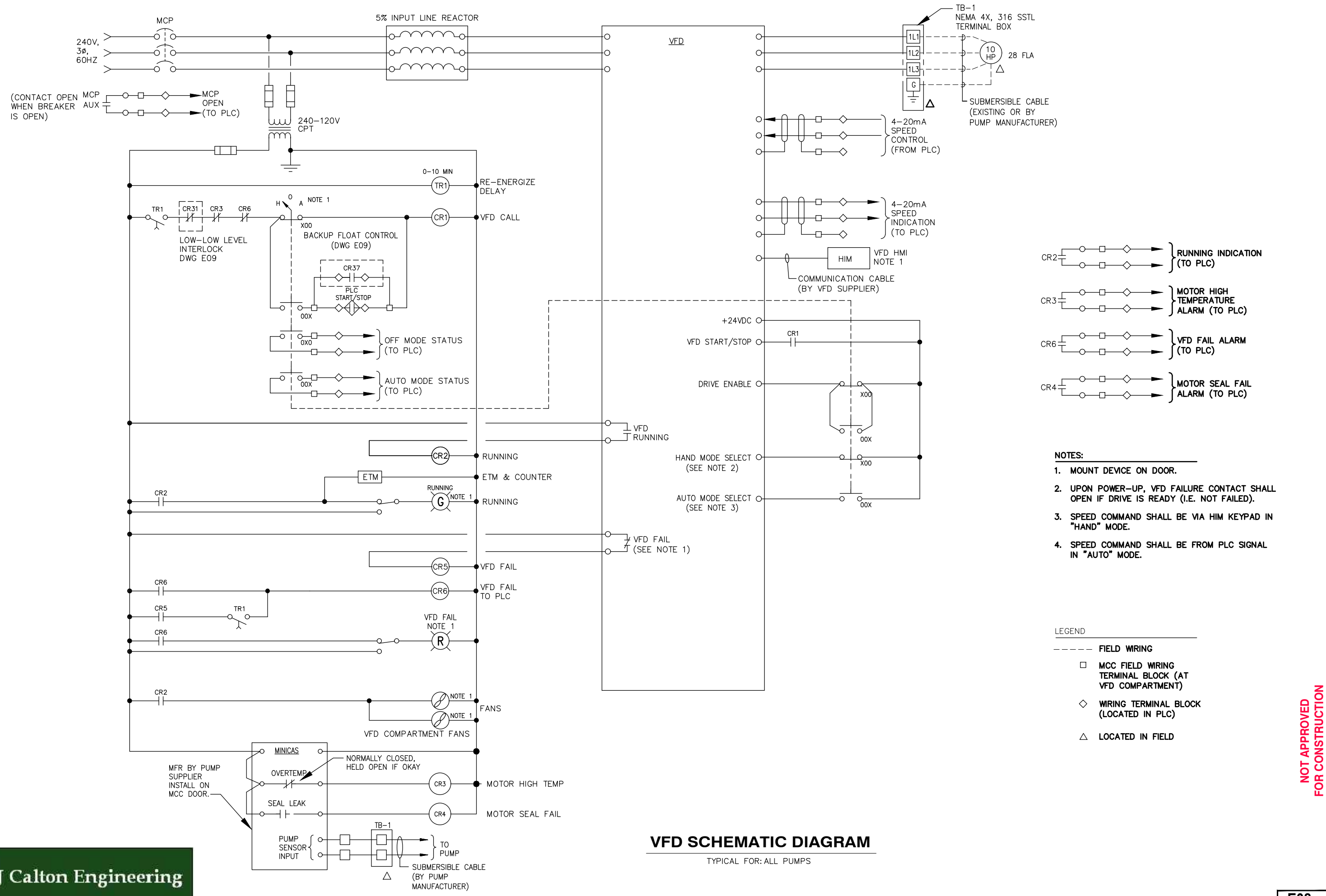
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 CONDUIT AND CABLE,
 AND PANELBOARD SCHEDULES

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 DATE: January 3, 2024
 PAGE: E07 of ##



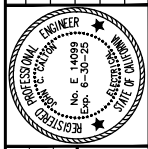
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- NOTES:**
1. MOUNT DEVICE ON DOOR.
 2. UPON POWER-UP, VFD FAILURE CONTACT SHALL OPEN IF DRIVE IS READY (I.E. NOT FAILED).
 3. SPEED COMMAND SHALL BE VIA HIM KEYPAD IN "HAND" MODE.
 4. SPEED COMMAND SHALL BE FROM PLC SIGNAL IN "AUTO" MODE.

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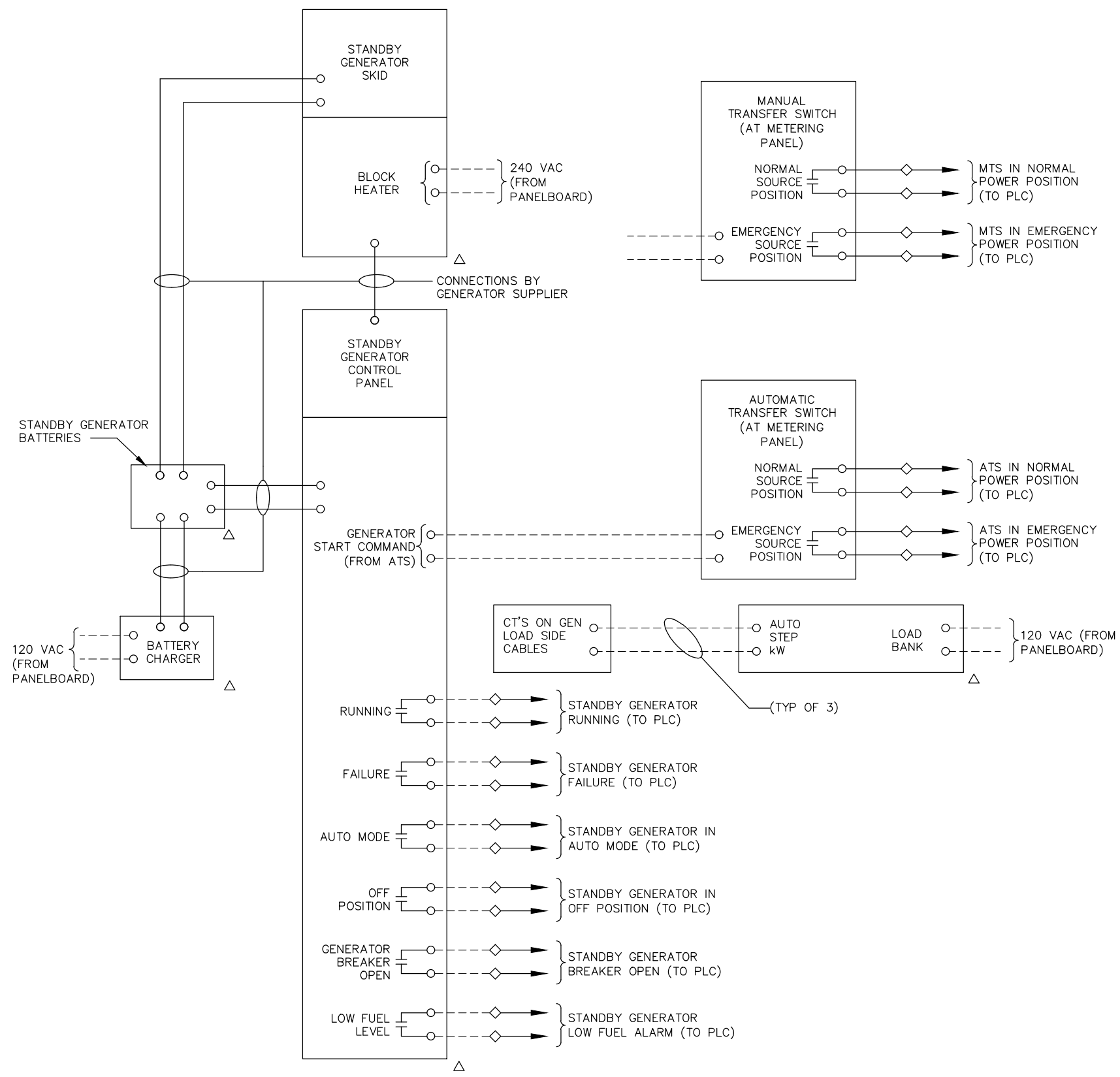
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| NO. | |
| DATE | |
| DESIGNED BY | JC |
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| CHECKED BY | |
| DATE | |
| SCALE | 1" |
| PROJECT | SANITARY DISTRICT No. 5 |
| LOCATION | COVE ROAD PUMP STATION REHABILITATION PROJECT |
| TITLE | TYPICAL PUMP CONTROL SCHEMATICS |
| JOB NUMBER | |
| DATE | January 3, 2024 |
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| E08 | |



NUJE
 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T: 415.453.4480 WWW.NUJE.BIZ

SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
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STANDBY POWER SCHEMATIC DIAGRAM

LEGEND

----- NEW FIELD WIRING

◇ WIRING TERMINAL BLOCK (LOCATED IN MCC CONTROL SECTION)

△ LOCATED IN FIELD

NOTE:
 ALL DEVICES LOCATED AT NEW MCC UNLESS NOTED OTHERWISE

| NO. | DATE | DESCRIPTION | INIT. |
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PROFESSIONAL ENGINEER
 No. E 14099
 Exp. 6-30-25
 STATE OF CALIFORNIA

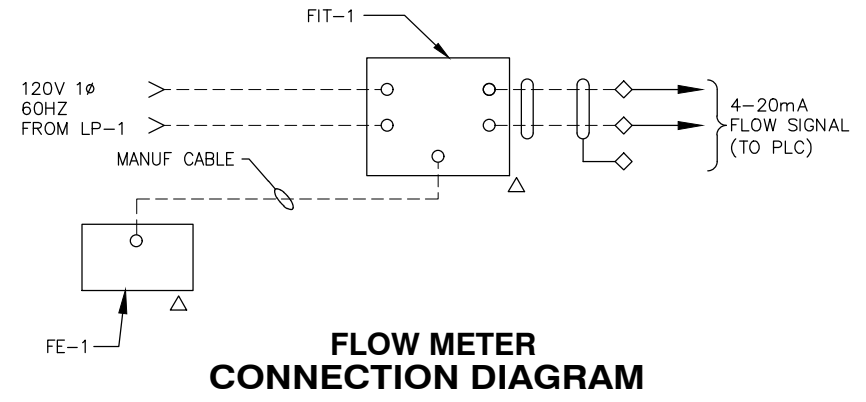
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 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUJE.BIZ

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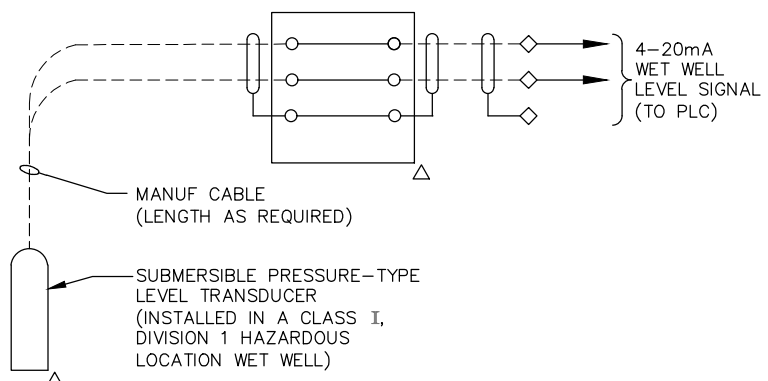
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SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
 MISCELLANEOUS
 CONTROL SCHEMATICS - 1 of 3

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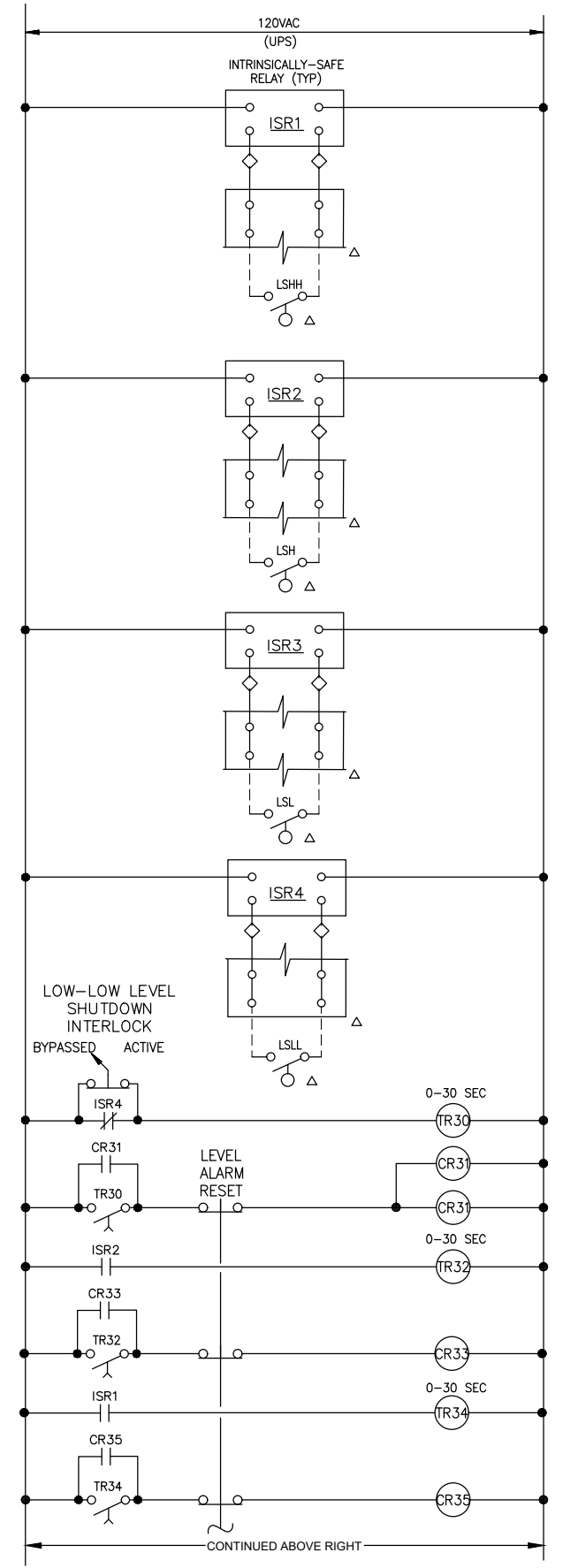


FLOW METER CONNECTION DIAGRAM

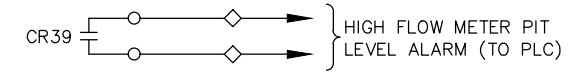
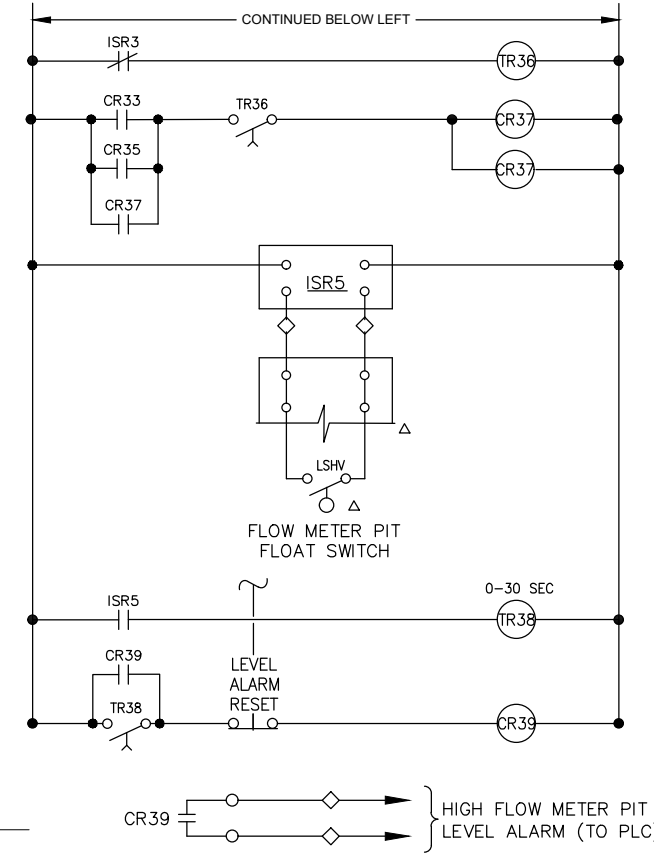
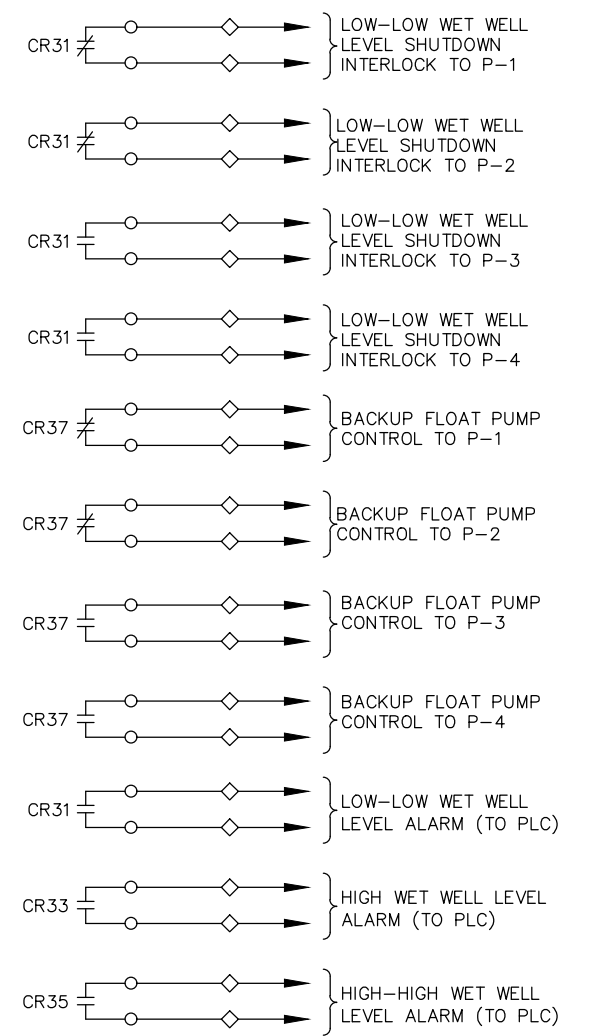


PRESSURE TRANSDUCER CONNECTION DIAGRAM

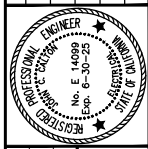
- LEGEND**
- NEW FIELD WIRING
 - NEW MCC FIELD WIRING TERMINAL BLOCK
 - ◇ WIRING TERMINAL BLOCK (LOCATED IN PLC PANEL)
 - △ LOCATED IN FIELD



BACKUP FLOATS SCHEMATIC DIAGRAM



| NO. | DESCRIPTION | DATE | INIT. |
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| Drawn: JC | Checked: PM |

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907 MISSION AVE. SAN RAFAEL, CA 94901
T: 415.453.4480 WWW.NUTE.BIZ

PREPARED FOR: **SANITARY DISTRICT No. 5**
2001 PARADISE DRIVE
TIBURON, CA 94920
PHONE: (415) 435-1501
FAX: (415) 435-0221
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COVE ROAD PUMP STATION REHABILITATION PROJECT
MISCELLANEOUS
CONTROL SCHEMATICS - 2 of 3

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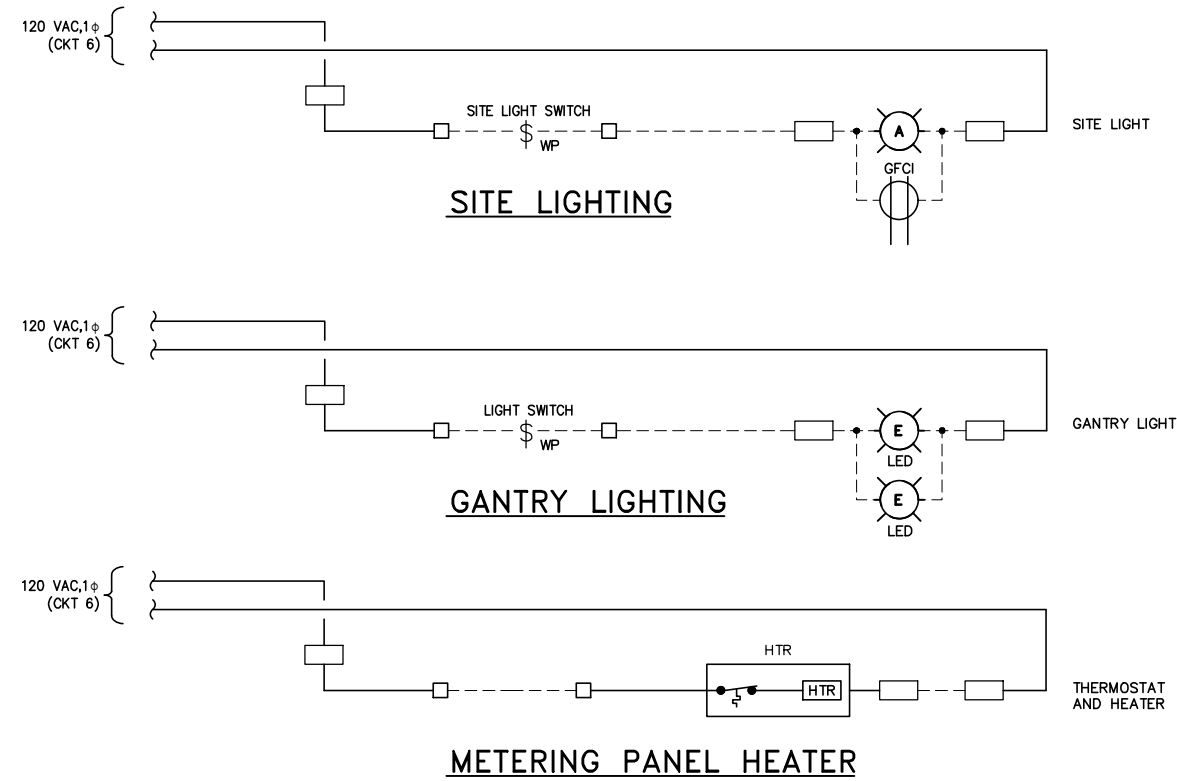
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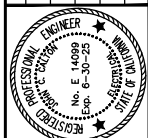
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 COVE ROAD PUMP STATION REHABILITATION PROJECT
 MISCELLANEOUS
 CONTROL SCHEMATICS - 3 of 3

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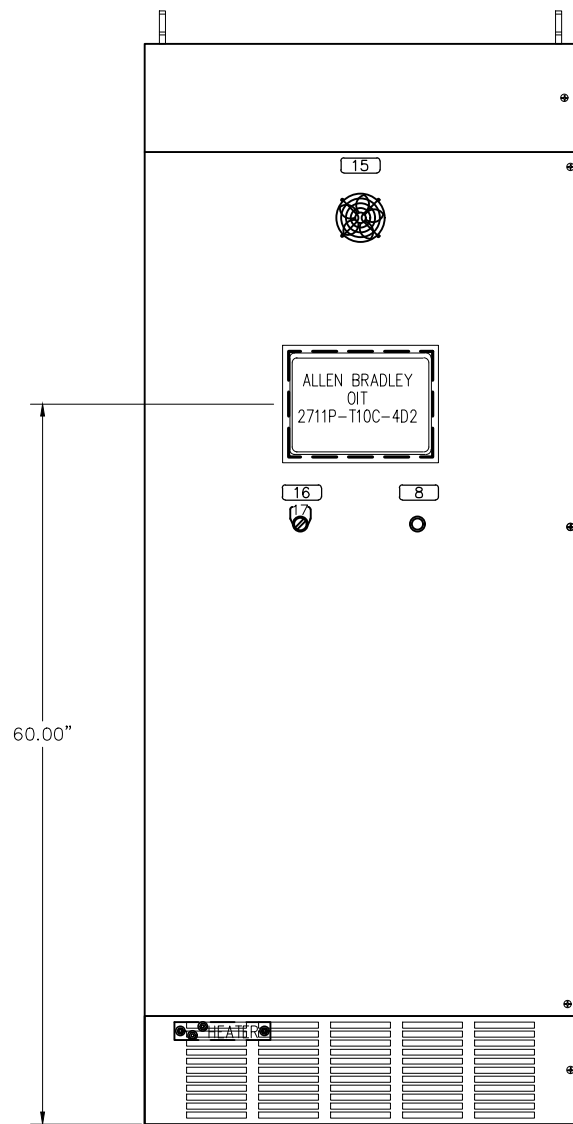
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 IF THIS DOES NOT MEASURE
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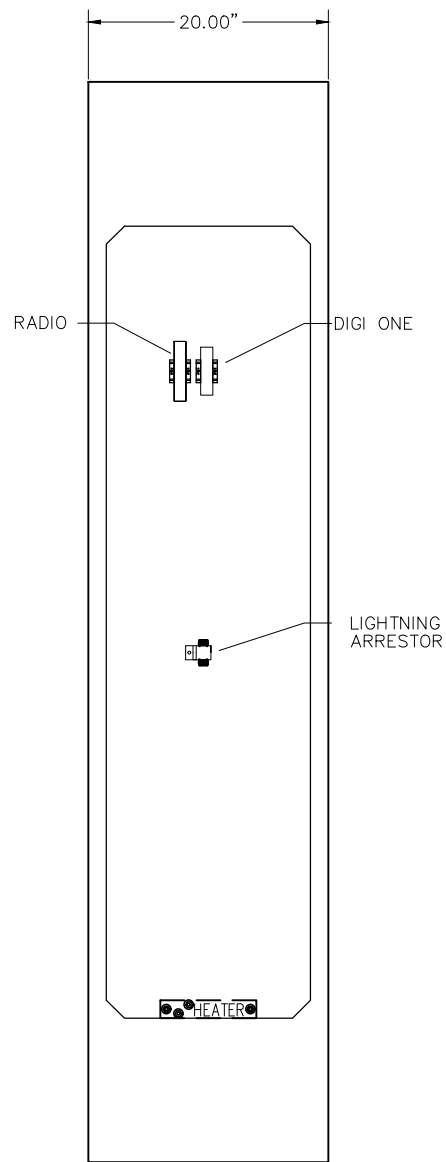


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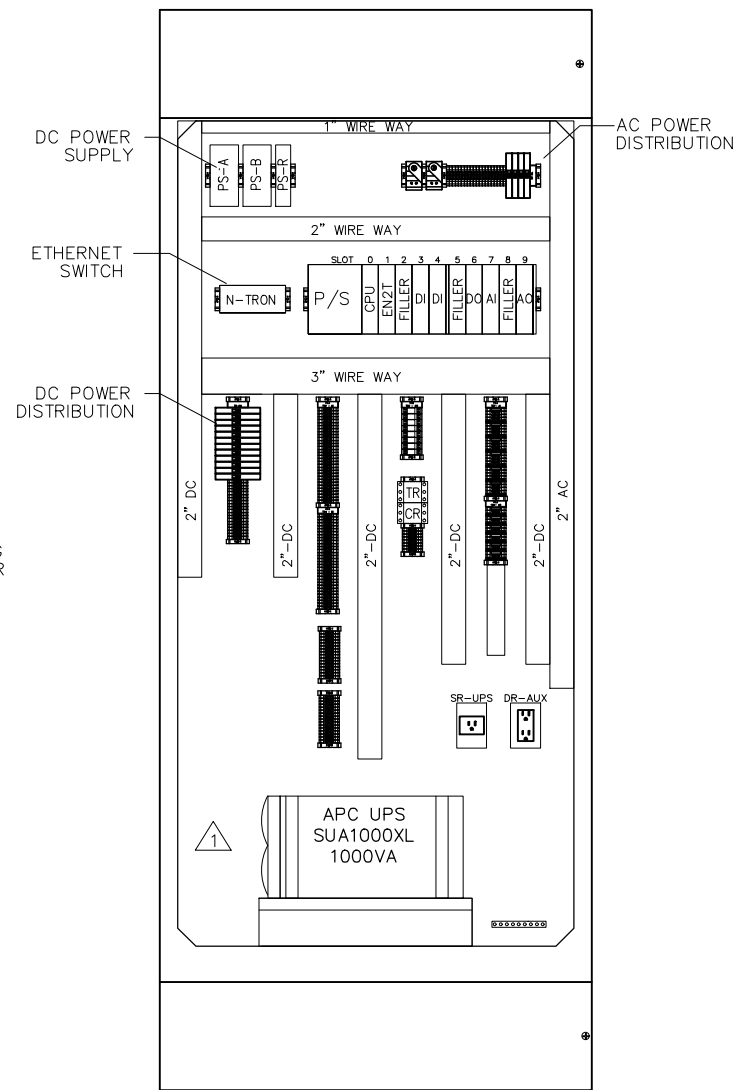
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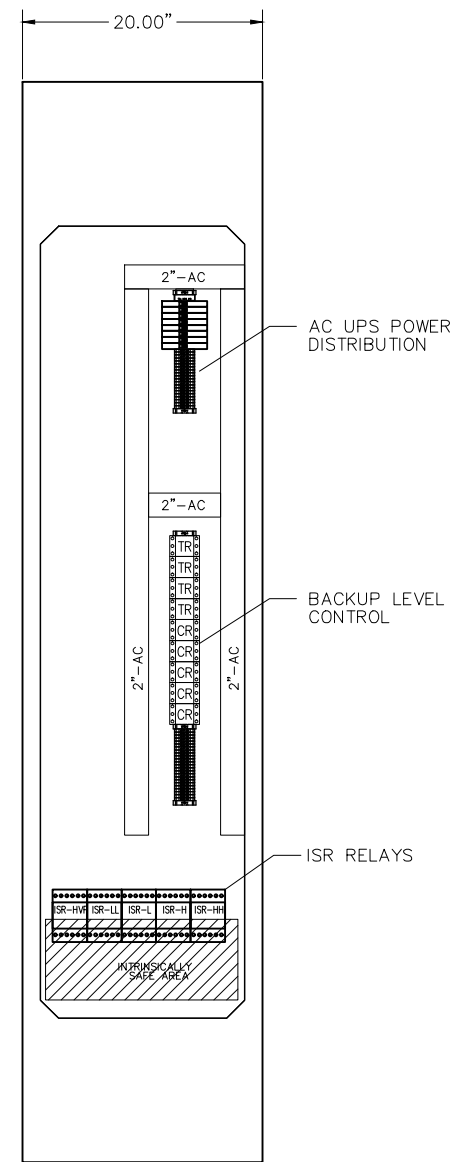
FRONT ELEVATION
 (SHOWN WITH DOOR CLOSED)



LEFT SIDE PAN



BACKPAN LAYOUT
 (SHOWN WITH OUTER DOOR REMOVED)



RIGHT SIDE PAN

| NAME PLATE SCHEDULE WHITE TEXT ON BLACK BACKGROUND | | | | |
|---|-----|-------|-----------|---|
| TAG # | QTY | TYPE | SIZE | INSCRIPTION |
| 15 | 1 | PLATE | .75" X 3" | CONTROL PANEL (PLC) |
| 16 | 1 | PLATE | .75" X 3" | LOW LOW LEVEL SHUTDOWN INTERLOCK |
| 17 | 1 | RING | NA | ACTIVE BYPASS |
| 8 | 1 | PLATE | .75" X 3" | VALVE/FLOWMETER VAULT LEVEL ALARM RESET |

| NO. | DESCRIPTION | DATE | INIT. |
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| 1 | | | |
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 IF THIS DOES NOT MEASURE CARE NOT TO SCALE

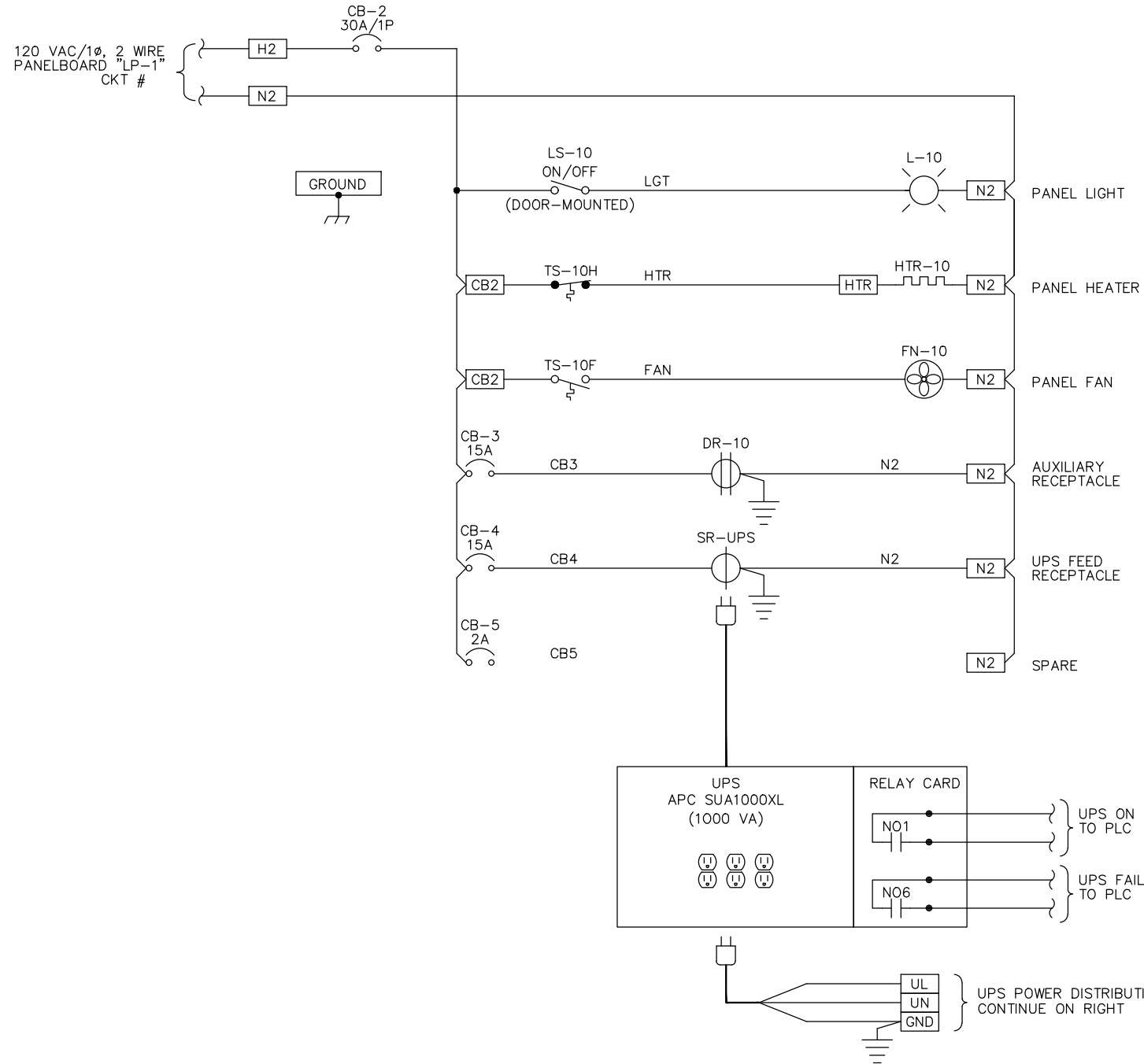
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 907 MISSION AVE, SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUJIE.BIZ

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 PHONE: (415) 435-1501
 FAX: (415) 435-0221
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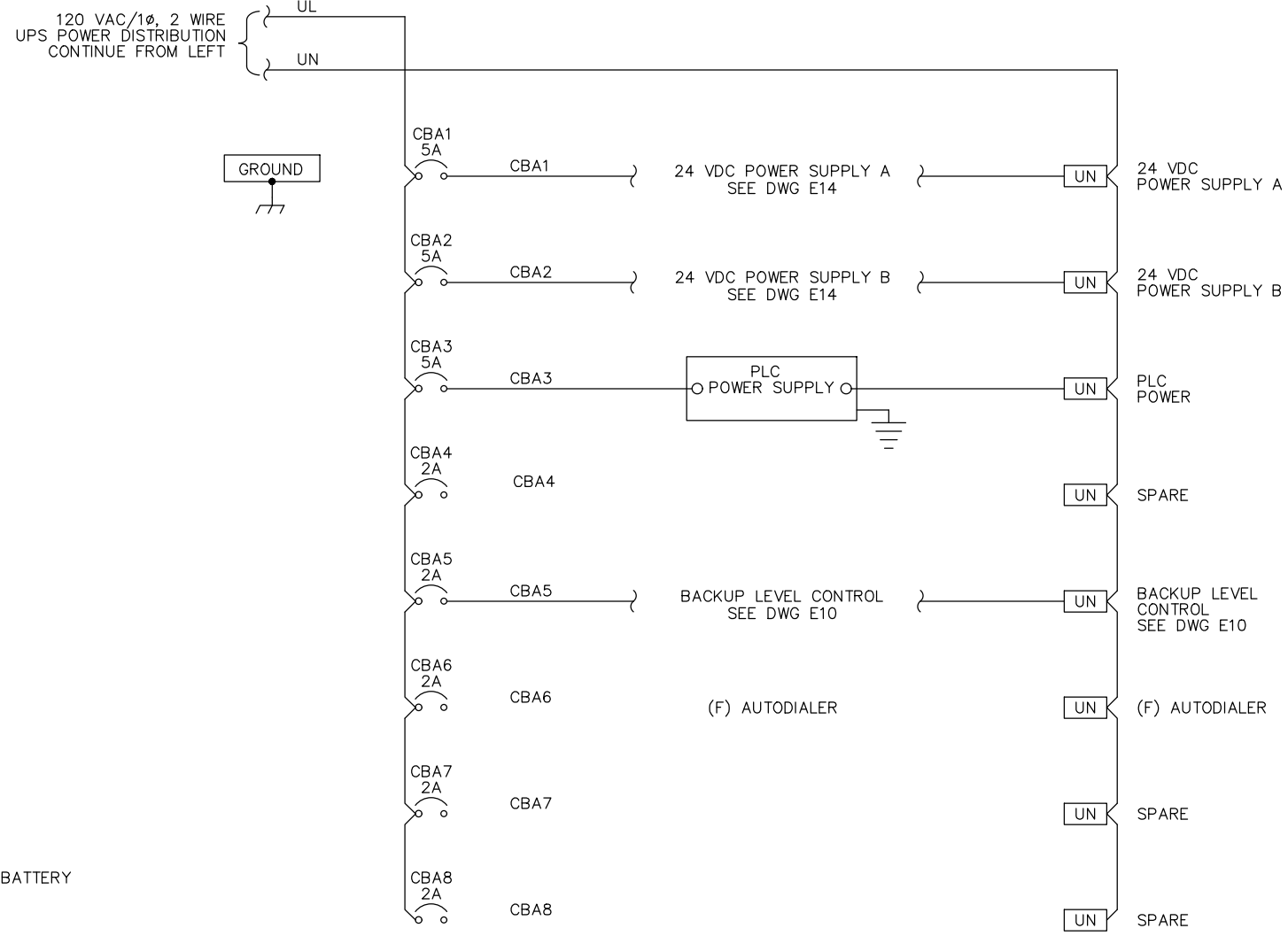
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SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
 PLC PANEL ELEVATION

JOB NUMBER:
 DATE: January 3, 2024
 PAGE: E12 of ##

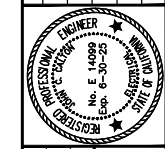


CONTROL PANEL AUXILIARY



120VAC UPS POWER DISTRIBUTION

| NO. | DESCRIPTION | DATE | INIT. |
|-----|-------------|------|-------|
| | | | |
| | | | |
| | | | |



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| Designed: | JC |
| Drawn: | PM |
| Checked: | |

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 T: 415.453.4480 WWW.NUTE.BIZ

PREPARED FOR:
SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
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SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
 PLC PANEL
 CONTROL SCHEMATICS - 1 of 2

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| JOB NUMBER: | |
| DATE: | January 3, 2024 |
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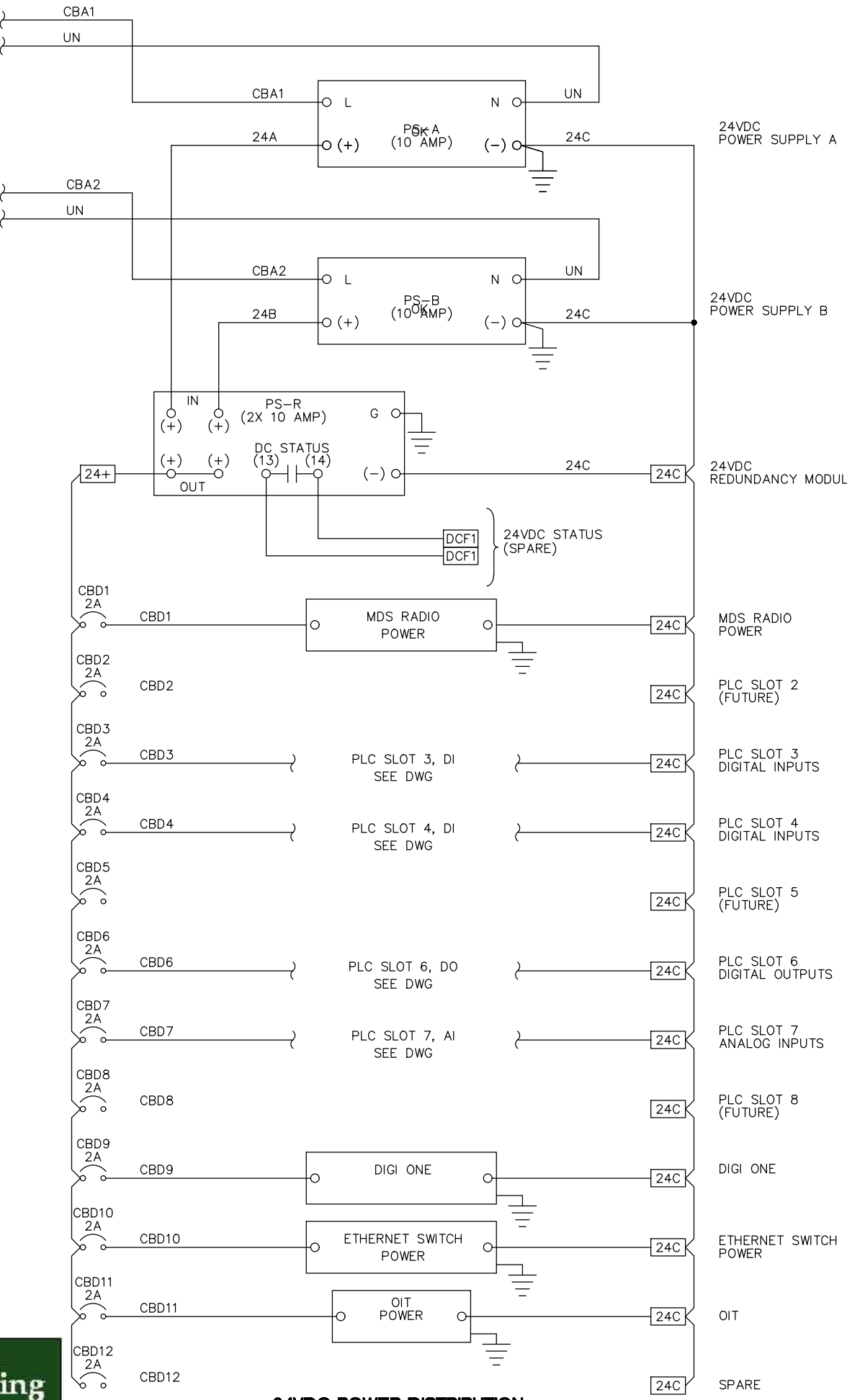
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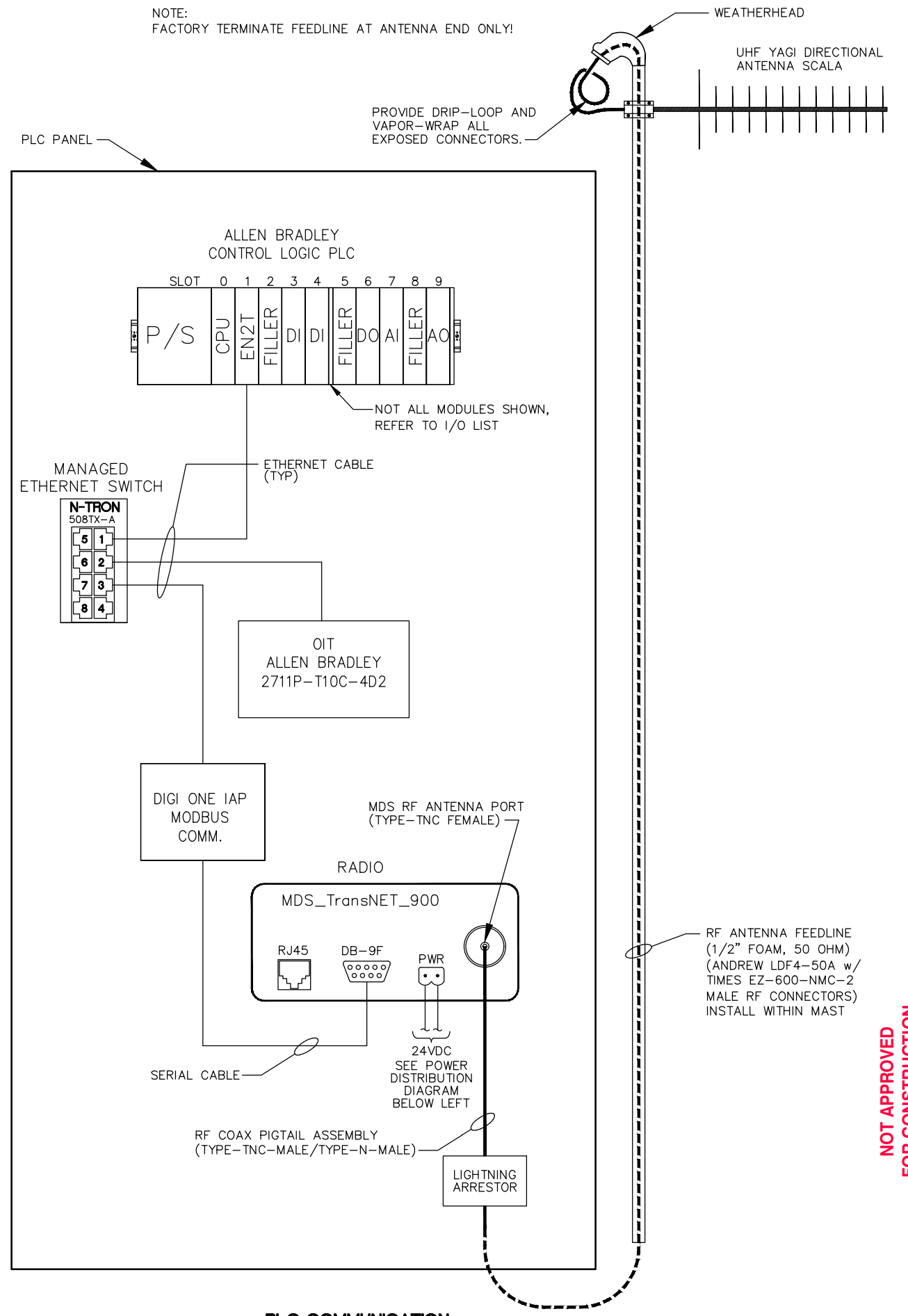


120 VAC/1Ø, 2 WIRE FROM UPS POWER DISTRIBUTION SEE DWG E13 FOR SOURCE

120 VAC/1Ø, 2 WIRE FROM 120VAC POWER DISTRIBUTION SEE DWG E13 FOR SOURCE



NOTE: FACTORY TERMINATE FEEDLINE AT ANTENNA END ONLY!



| | | | | | |
|-----|-------------|------|-------------|------|-------------|
| NO. | DESCRIPTION | DATE | DESIGNED BY | DATE | DESIGNED BY |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |

| | |
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| DESIGNED BY | JC |
| DRAWN BY | PM |
| CHECKED BY | |
| SCALE | 1" |
| IF THIS DOES NOT MEASURE CARE NOT TO SCALE | |

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PREPARED FOR: **SANITARY DISTRICT No. 5**
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
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PROJECT: **SANITARY DISTRICT No. 5**
 COVE ROAD PUMP STATION REHABILITATION PROJECT

PANEL: **PLC PANEL**

SCHEMATIC: **CONTROL SCHEMATICS - 2 of 2**

DATE: January 3, 2024

PAGE: **E14** of **##**

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| PLC I/O LIST | | | | | |
|---------------------------------------|----------|---------|---------------------------------------|----------|---------|
| DESCRIPTION | PLC TYPE | PLC NO. | DESCRIPTION | PLC TYPE | PLC NO. |
| PUMP NO. 1 CIRCUIT BREAKER OPEN ALARM | DI | 1 | PUMP NO. 4 CIRCUIT BREAKER OPEN ALARM | DI | 1 |
| PUMP NO. 1 OFF MODE STATUS | DI | 2 | PUMP NO. 4 OFF MODE STATUS | DI | 2 |
| PUMP NO. 1 AUTO MODE STATUS | DI | 3 | PUMP NO. 4 AUTO MODE STATUS | DI | 3 |
| PUMP NO. 1 RUNNING STATUS | DI | 4 | PUMP NO. 4 RUNNING STATUS | DI | 4 |
| PUMP NO. 1 MOTOR HIGH TEMP ALARM | DI | 5 | PUMP NO. 4 MOTOR HIGH TEMP ALARM | DI | 5 |
| PUMP NO. 1 MOTOR SEAL FAIL ALARM | DI | 6 | PUMP NO. 4 MOTOR SEAL FAIL ALARM | DI | 6 |
| PUMP NO. 1 VFD FAIL ALARM | DI | 7 | PUMP NO. 4 VFD FAIL ALARM | DI | 7 |
| MCC MAIN BREAKER OPEN ALARM | DI | 8 | SPARE | DI | 8 |
| STANDBY GEN RUNNING STATUS | DI | 9 | SPARE | DI | 9 |
| STANDBY GEN FAILURE ALARM | DI | 10 | SPARE | DI | 10 |
| STANDBY GEN AUTO MODE STATUS | DI | 11 | SPARE | DI | 11 |
| STANDBY GEN OFF MODE STATUS | DI | 12 | SPARE | DI | 12 |
| STANDBY GEN BREAKER OPEN ALARM | DI | 13 | SPARE | DI | 13 |
| STANDBY GEN LOW FUEL ALARM | DI | 14 | SPARE | DI | 14 |
| POWER FAIL RELAY ALARM | DI | 15 | SPARE | DI | 15 |
| SPARE | DI | 16 | SPARE | DI | 16 |
| PUMP NO. 2 CIRCUIT BREAKER OPEN ALARM | DI | 1 | | | |
| PUMP NO. 2 OFF MODE STATUS | DI | 2 | PUMP NO. 1 SPEED INDICATION (0-100%) | AI | 1 |
| PUMP NO. 2 AUTO MODE STATUS | DI | 3 | PUMP NO. 2 SPEED INDICATION (0-100%) | AI | 2 |
| PUMP NO. 2 RUNNING STATUS | DI | 4 | PUMP NO. 3 SPEED INDICATION (0-100%) | AI | 3 |
| PUMP NO. 2 MOTOR HIGH TEMP ALARM | DI | 5 | PUMP NO. 4 SPEED INDICATION (0-100%) | AI | 4 |
| PUMP NO. 2 MOTOR SEAL FAIL ALARM | DI | 6 | PUMP STATION FLOW (0-### GPM) | AI | 5 |
| PUMP NO. 2 VFD FAIL ALARM | DI | 7 | FORCE MAIN FLOW (0-### GPM) | AI | 6 |
| LOAD BANK COMMON ALARM | DI | 8 | WET WELL LEVEL (0-##.# FEET) | AI | 7 |
| ATS NORMAL STATUS | DI | 9 | CHEMICAL TANK LEVEL (0-##.# FEET) | AI | 8 |
| ATS EMERGENCY STATUS | DI | 10 | | | |
| ATS COMMON ALARM | DI | 11 | PUMP NO. 1 SPEED COMMAND (0-100%) | AO | 1 |
| WET WELL LOW LOW LEVEL ALARM | DI | 12 | PUMP NO. 2 SPEED COMMAND (0-100%) | AO | 2 |
| WET WELL HIGH LEVEL ALARM | DI | 13 | PUMP NO. 3 SPEED COMMAND (0-100%) | AO | 3 |
| WET WELL HIGH HIGH LEVEL ALARM | DI | 14 | PUMP NO. 4 SPEED COMMAND (0-100%) | AO | 4 |
| VALVE PIT HIGH LEVEL ALARM | DI | 15 | | | |
| FLOW METER PIT HIGH LEVEL ALARM | DI | 16 | PUMP NO. 1 START COMMAND | DO | 1 |
| PUMP NO. 3 CIRCUIT BREAKER OPEN ALARM | DI | 1 | PUMP NO. 2 START COMMAND | DO | 2 |
| PUMP NO. 3 OFF MODE STATUS | DI | 2 | PUMP NO. 3 START COMMAND | DO | 3 |
| PUMP NO. 3 AUTO MODE STATUS | DI | 3 | PUMP NO. 4 START COMMAND | DO | 4 |
| PUMP NO. 3 RUNNING STATUS | DI | 4 | CHEMICAL TREATMENT START COMMAND | DO | 5 |
| PUMP NO. 3 MOTOR HIGH TEMP ALARM | DI | 5 | SPARE | DO | 6 |
| PUMP NO. 3 MOTOR SEAL FAIL ALARM | DI | 6 | SPARE | DO | 7 |
| PUMP NO. 3 VFD FAIL ALARM | DI | 7 | SPARE | DO | 8 |
| PLC PANEL DC FAIL ALARM | DI | 8 | | | |
| UPS COMMON ALARM | DI | 9 | DI: 24 VDC DIGITAL INPUT MODULE | | |
| UPS ON BATTERY STATUS | DI | 10 | DO: RELAY OUTPUT MODULE, SEE NOTE 2. | | |
| CHEMICAL TREATMENT COMMON ALARM | DI | 11 | AI: 4-20MA ANALOG INPUT MODULE | | |
| CHEMICAL TANK LOW LEVEL | DI | 12 | AO: 4-20MA ANALOG OUTPUT MODULE | | |
| SPARE | DI | 13 | | | |
| SPARE | DI | 14 | | | |
| SPARE | DI | 15 | | | |
| SPARE | DI | 16 | | | |

- NOTES:
1. PROVIDE WIRED FROM PLC I/O TO FIELD TERMINAL BLOCKS FOR ALL I/O, INCLUDING SPARES.
 2. PROVIDE SPDT ISOLATION RELAYS ON ALL DIGITAL OUTPUTS, INCLUDING SPARES.
 3. CONTRACTOR TO ASSIGN TAG NUMBERS. COORDINATE WITH PLC PROGRAMMER.

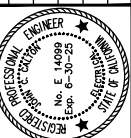
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FOR CONSTRUCTION**

SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
 PLC I/O LIST

PREPARED FOR:
SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
 CALIFORNIA

PREPARED BY:
NUIE
 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T: 415.453.4480 WWW.NUIE.BIZ

DESIGNED: JC
 DRAWN: PM
 CHECKED: [Signature]
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 TO SCALE, IT SHALL BE AS SHOWN
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| FIXTURE SCHEDULE | | | | | |
|------------------|-----|---|------------------------------------|--|--|
| TYPE | VAC | DESCRIPTION | LAMPS | MOUNTING | MANUFACTURER / MODEL NO. |
| A | 120 | LED SITE LIGHT WITH CONVENIENCE RECEPTACLE ON 10' POLE. FIXTURE TO BE DIE CAST ALUMINUM HOUSING WITH HEAT SINK FINS. FIXTURE FINISH TO BE ZINC INFUSED DURABLE THERMOSET POWDER COAT FINISH, CORROSION RESISTANT, DARK BRONZE. PRECISION MOLDED ACRYLIC LENS. 3000K COLOR TEMPERATURE. TYPE IV MEDIUM DISTRIBUTION. HIGH EFFICIENCY LEDS, 120 VAC DRIVER, 207 WATTS. PROVIDE WITH HIGH/LOW MOTION/AMBIENT SENSOR, ENABLED AT 1 FOOTCANDLE. PROVIDE HOUSE SIDE SHIELD. PROVIDE FIXTURE WITH SINGLE FUSE OPTION. UL LISTED FOR WET LOCATIONS. 5 YEAR WARRANTY. POLE TO BE 10', SQUARE STEEL POLE, 4" BASE, WITH ANCHOR BOLTS, BASE COVER, TOP CAP AND TOTAL OF THREE HANDHOLES. STANDARD HANDHOLE FOR WIRE PULLING SHALL BE AT HEIGHT 1'-6" AND ORIENTATION A. ADDITIONAL HANDHOLE FOR RECEPTACLE SHALL BE LOCATED AT HEIGHT 2'-0" AND ORIENTATION C. THIRD HANDHOLE FOR SWITCH SHALL BE LOCATED AT HEIGHT 3'-6" AND ORIENTATION C. POLE TO BE DARK BRONZE. | LED 207 WATTS 22,000 LUMENS | 10' SQUARE STRAIGHT STEEL POLE, 4" BASE. HOT DIPPED GALVANIZED ANCHOR BOLTS, WITH BASE COVER | FIXTURE: LITHONIA DSX1-LED-P8-30K-T4M-120-SPA-PIR1FC3V-HS-SF-DDBXD. POLE: LITHONIA SSS-10'-4C-DM19AS-EHH2'C-EHH3'6"C-DDBXD. CONTRACTOR TO INSTALL RECEPTACLE WITH WEATHERPROOF COVER AND WHILE IN USE COVER AT HANDHOLE. CONTRACTOR TO INSTALL SWITCH WITH WEATHERPROOF COVER AT HANDHOLE. |
| B | 120 | LED LOW PROFILE ENCLOSED AND GASKETED STRIP LIGHT, IN FIBERGLASS HOUSING, 48" LONG. PROVIDE WITH HIGH EFFICIENCY LEDS. SUITABLE FOR PENDANT MOUNTING, WITH DOUBLE BRACKETS. PROVIDE WITH FROSTED POLYCARBONATE DIFFUSER, 6000 LUMENS, MEDIUM DISTRIBUTION, MULTIVOLT, 4000K COLOR TEMPERATURE AND 80 CRI. NO CONTROLS REQUIRED AS LOCATED IN ELECTRICAL ROOM. | LED 38 WATTS 5300 LUMENS | PENDENT MOUNTED, 10' AFF TO BOTTOM OF FIXTURE. | FIXTURE: LITHONIA FEM-L48-6000LM-LPPFL-MD-MVILT-GZ10-40K-80CRI-DPMB. |
| C | 120 | LED EMERGENCY LIGHTING UNIT WITH 90 MINUTES OF ILLUMINATION. THERMOPLASTIC HOUSING WITH TEST SWITCH, LITHIUM-IRON PHOSPHATE BATTERIES, TWO LED LAMPS FOR 640 LUMENS. MULTIVOLT. 5000K COLORTEMPERATURE. PROVIDE WITH SELF DIAGNOSTICS, FAILURE INDICATION. UL LISTED. | LED TWO 6.6 WATT LAMPS, 640 LUMENS | WALL MOUNT, 8' AFF TO BOTTOM OF FIXTURE. | FIXTURE: LITHONIA ELM4L-UVOLT-LTP-SDRT |
| D | 120 | LED LOW PROFILE ENCLOSED AND GASKETED STRIP LIGHT, IN FIBERGLASS HOUSING, 24" LONG. PROVIDE WITH HIGH EFFICIENCY LEDS. SUITABLE FOR PENDANT MOUNTING, WITH DOUBLE BRACKETS. PROVIDE WITH FROSTED POLYCARBONATE DIFFUSER, 3000 LUMENS, MEDIUM DISTRIBUTION, MULTIVOLT, 40K COLOR TEMPERATURE AND 80 CRI. NO CONTROLS REQUIRED AS LOCATED IN BATHROOM. | LED 20 WATTS 2900 LUMENS | PENDENT MOUNTED, 10' AFF TO BOTTOM OF FIXTURE. | FIXTURE: LITHONIA FEM-L24-3000LM-LPPFL-MD-MVILT-GZ10-40K-80CRI-DPMB. |
| E | 120 | LED FLOOD LIGHT WITH DIE-CAST ALUMINUM BODY, LONG LIFE LEDS, WITH YOKE MOUNTING. PROVIDE WITH HIGH EFFICIENCY LEDS, 13,200 LUMENS, 4000K COLOR TEMPERATURE, WIDE FLOOD DISTRIBUTION. FIXTURE TO BE DARK BRONZE. | LED 94 WATTS 13,200 LUMENS | GANTRY MOUNTED WITH YOKE SUPPORTED TO GANTRY, CORD TO BOX | FIXTURE: LITHONIA TFX2-LED-40K-MVOLT-YK-DDBXD CONTRACTOR TO PROVIDE BOX TO SPLICE FIXTURE CORD TO BRANCH CIRCUIT, AND SWITCH ON GANTRY COLUMN. |

| HANDHOLE SCHEDULE | | | | | | | | |
|-------------------|--------------------------|--------|-------|-------------|--------------|------------|--|--|
| IDENTIFIER NUMBER | MIN. INTERIOR DIMENSIONS | | | BOTTOM SLAB | LOADING H-20 | COVER | | REMARKS |
| | WIDTH | LENGTH | DEPTH | | | STEEL | | |
| HH-E1 | 17" | 30" | 36" | X | X | GALVANIZED | | COVER INSCRIBED "ELECTRICAL HH-E1" WITH PENTA 316 SS BOLTS |
| HH-S1 | 10" | 17" | 36" | X | X | GALVANIZED | | COVER INSCRIBED "SIGNAL HH-S1", WITH PENTA 316 SS BOLTS |

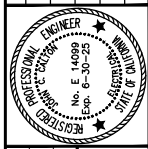
**NOT APPROVED
FOR CONSTRUCTION**

SANITARY DISTRICT No. 5
 COVE ROAD PUMP STATION REHABILITATION PROJECT
FIXTURE SCHEDULE
HANDHOLE SCHEDULE

PREPARED FOR:

SANITARY DISTRICT No. 5
 2001 PARADISE DRIVE
 TIBURON, CA 94920
 PHONE: (415) 435-1501
 FAX: (415) 435-0221
 CALIFORNIA
 MARIN COUNTY

PREPARED BY:
NUTE
 Civil and Sanitary Consultants
 907 MISSION AVE. SAN RAFAEL, CA 94901
 T. 415.453.4480 WWW.NUTE.BIZ



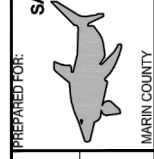
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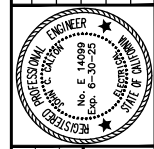
SANITARY DISTRICT No. 5
COVE ROAD PUMP STATION REHABILITATION PROJECT



SANITARY DISTRICT No. 5
2001 PARADISE DRIVE
TIBURON, CA 94920
PHONE: (415) 435-1501
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DESIGNED BY: JC
DRAWN BY: PM
CHECKED BY:



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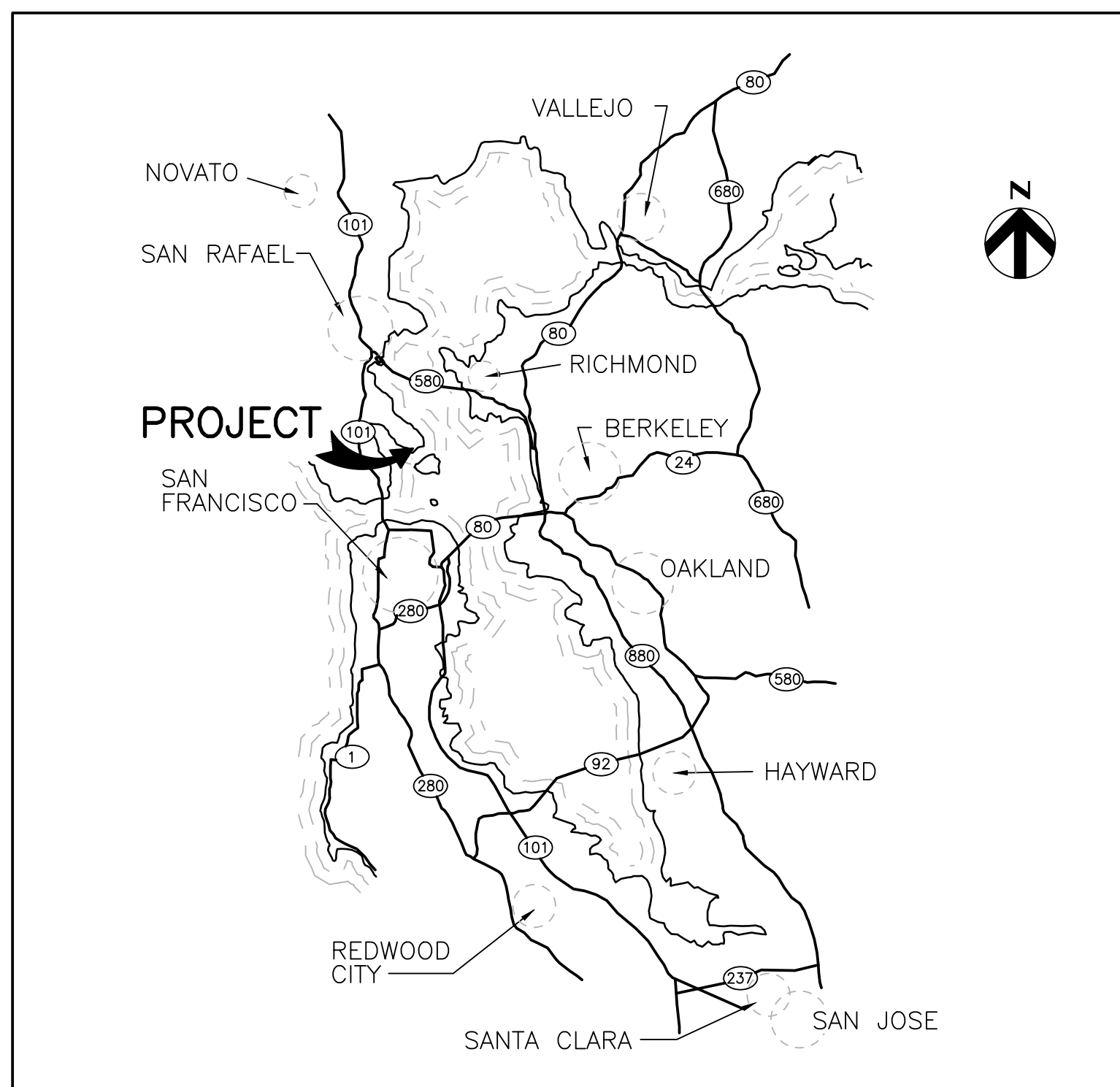
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SANITARY DISTRICT NO. 5 OF MARIN COUNTY

DIGESTER CLEANING AND REHABILITATION



LOCATION MAP

SANITARY DISTRICT of MARIN COUNTY



100% DRAWINGS
JANUARY 2024

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- 2 G002 Symbols and Abbreviations
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- 4 G102 Staging Plan
- 5 G601 Process Flow Diagram
- 6 G602 Valve Numbering
- 7 G901 Sequencing Phase 1 – Secondary Digester Offline
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- 10 X102 Digester Demolition Plan – Phase 2
- 11 X103 Sludge Pump Room Demolition Plan and Section
- 12 X104 Dewatering Building Demolition Plan and Details
- 13 X105 Screw Press Room Demolition Plan and Photos
- 14 X901 Demolition Photos I – Phase 1
- 15 X902 Demolition Photos II – Phase 2

PROCESS

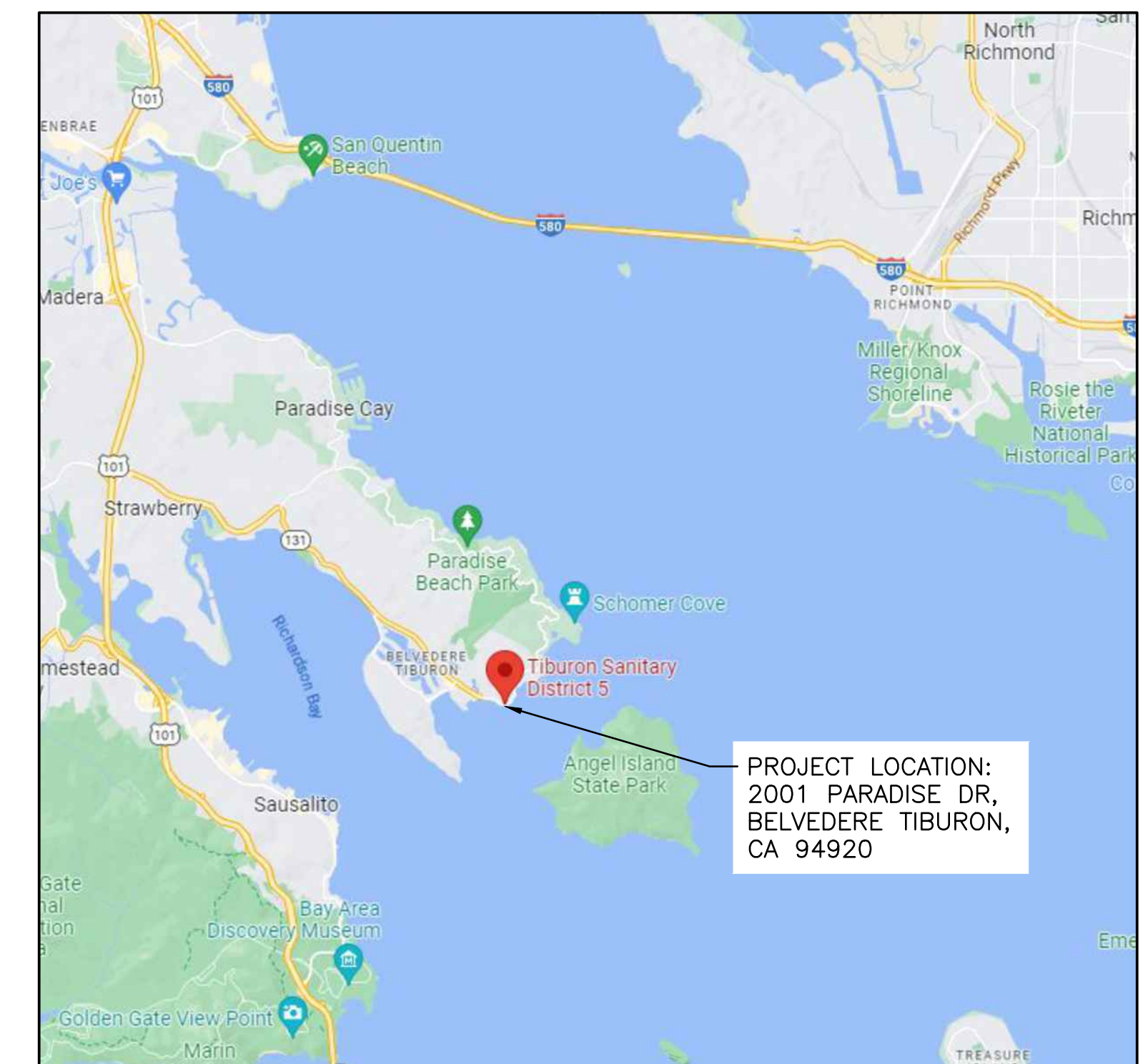
- 16 D001 Pipe Support Details
- 17 D101 Digester Process Plan – Phase 1
- 18 D102 Digester Process Plan – Phase 2
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- 20 D104 Dewatering Building Process Plan
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- 41 E105 MCC Room Plan
- 42 E106 Sludge Pump Room Power and Control Plan



VICINITY MAP



SITE PLAN SYMBOLOGY

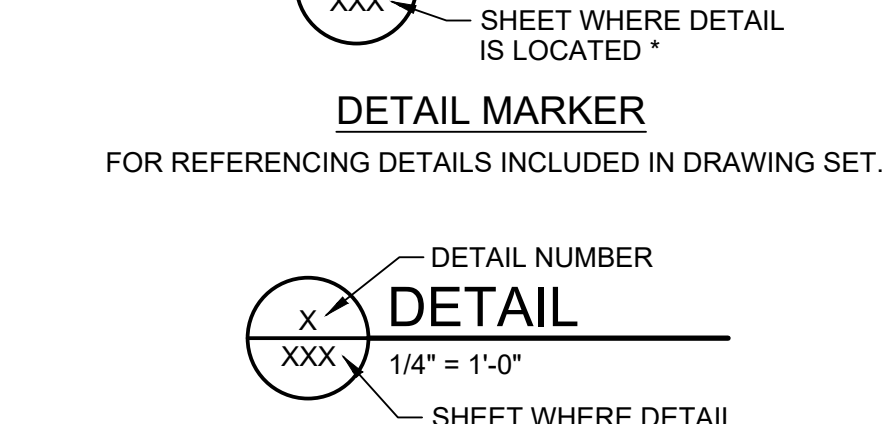
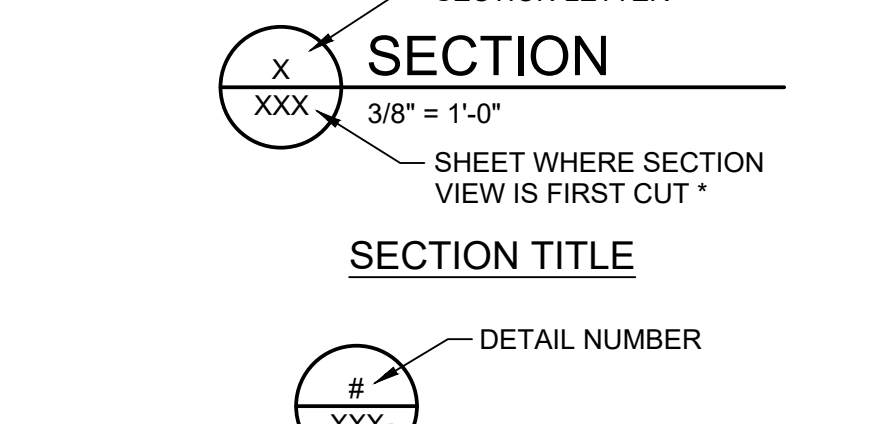
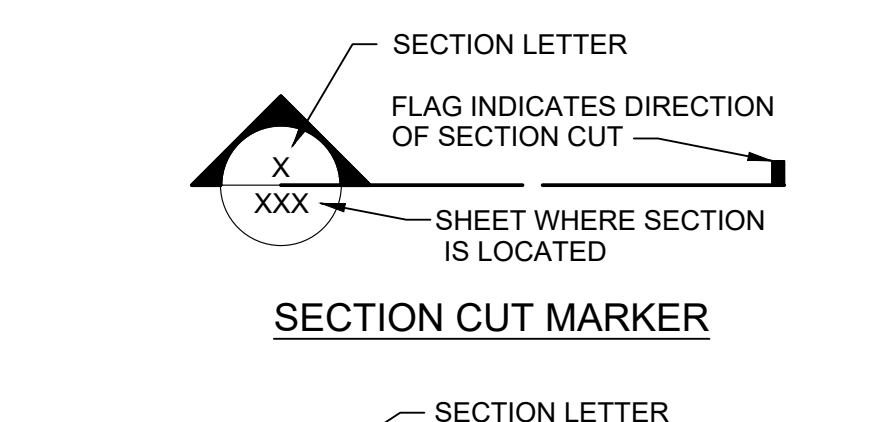
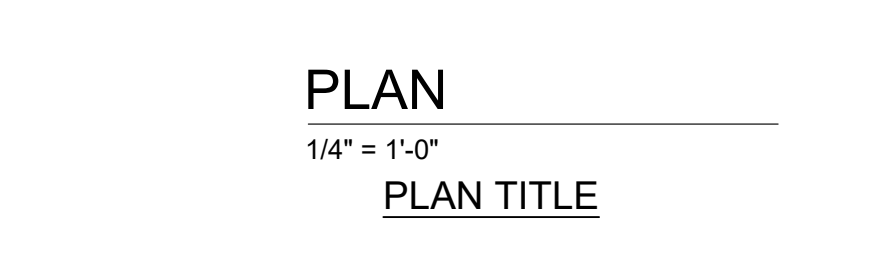
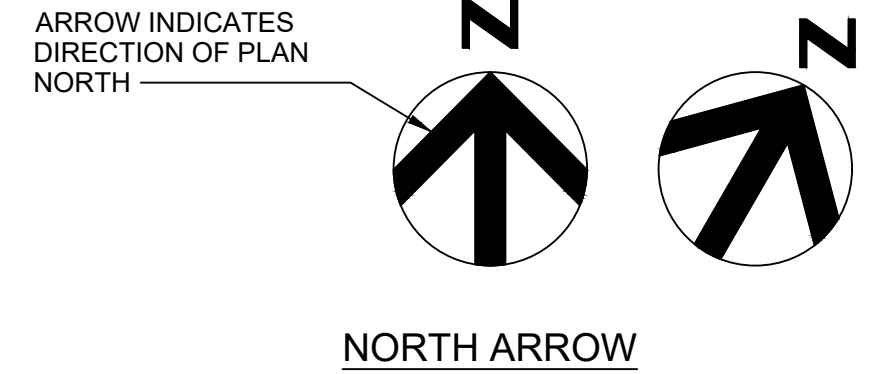
GENERAL SYMBOLOGY

ABBREVIATIONS

Table of site plan symbols including embankment slope, contours, vegetation, cleanouts, manholes, monitoring wells, piezometers, storm drain catch basins, utility vaults, power poles, telephone poles, fire hydrants, yard hydrants, existing and finished spot elevations, horizontal control points, benchmarks, soil test holes, downguy, exterior and pole-mounted transformers, and electrical handholes.

NOTES: 1. UTILITIES THAT ARE SUSPENDED ABOVE GRADE ARE DESIGNATED BY THE PREFIX "OH" (OVERHEAD).

Table of utility lines including telephone lines, electric lines, communication lines, handrails and guardrails, pipelines, large pipelines, utility structures, railroads, drainage flows, natural waterways, chain link fences, field fences, property lines, centerlines, rock berms, silt fences, easements, limits of construction, ROW, and wetlands boundaries.



MATERIALS IN PLAN/SECTION

Table of material patterns and descriptions: CHECKERED PLATE (PLAN), CONCRETE (PLAN AND/OR SECTION), CONCRETE MASONRY (PLAN AND/OR SECTION), DEMOLITION (PLAN AND/OR SECTION), EARTH (SECTION).

VALVE SYMBOLOGY

Table of valve symbols and descriptions: GATE VALVE, PLUG VALVE, BUTTERFLY VALVE, CHECK VALVE, BALL VALVE.

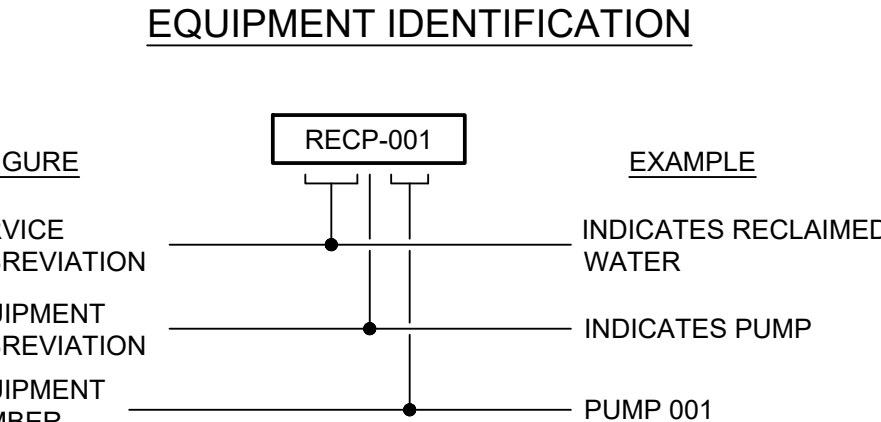
Table of abbreviations for materials and construction terms, including AB, ABC, AC, AD, ADDL, ADH, ADJ, AFF, AFG, AGGR, AI, AIT, ALG, ALT, ALUM, ANC, APRX, ARV, ASSY, AUTO, AVE, AVG, AWG, B TO B, BAL, B/C, BD, BE, BF, BFV, BITUM, BLDG, BM, BOP, BOT, BP, BS, BTW, BTWLD, BU, BW, BYP, C TO C, CAP, CDP, CE, CF, CHFR, CIP, CJ, CLJ, CLR, CMP, CON, CONC, CONN, CONST, COOR, CP, CPLG, CSC, CTR, CTRL, CVT, CY, DBL, DEG, DEMO, DEP, DET, DF, DI, DIA, DIM, DISCH, DM, DMJ, DN, DP, DR, DS, DUP, DWG, E, EA, ECC, EF, EFFL, EG, EL, ELEC, EMBD, EMER, ENCL, ENGR, ENTR, EOP, EQ, EQUIP, EQUIV, ES, EST, EW, EWFB, EWTF, EXC, EXP, EXST, EXT, D, DEEP, DOUBLE, DEGREE, DEMOLITION, DEPRESSED, DETAIL, DIGESTER FEED, DROP INLET, DUCTILE IRON, DIAMETER, DIMENSION, DISCHARGE, DISTANCE, DISTRIBUTION, DIGESTER MIXING, DOUBLE MECHANICAL JOINT, DOWN, DEPTH, DIGESTER RECIRCULATION, DIGESTER SLUDGE, DUPLICATE, DRAWING, EAST, EACH, ECCENTRIC, EACH FACE, EFFLUENT, EXISTING GRADE, ELBOW, ELEVATION, ELECTRICAL, EMBEDDED, EMERGENCY, ENCLOSURE, ENGINEER, ENTRANCE, EDGE OF PAVEMENT, EQUAL, EQUIPMENT, EQUIVALENT, EACH SIDE, ESTIMATE, EACH WAY, EACH WAY, EACH FACE, EACH WAY, TOP AND BOTTOM, EXCAVATION, EXPANSION, EXPOSED, EXISTING, EXTERIOR, EXTERNAL, EXTENSION.

Table of abbreviations for construction and materials terms, including F TO F, FAB, FB, FC, FCA, FD, FOUND, FDN, FE, FES, FF, FG, FIN, FIT, FL, FLEX, FLG, FLR, FOC, FPT, FS, FSC, FT, FTG, FUT, FW, FWD, FWE, FXTR, GA, GAL, GALV, GB, GD, GEN, GJ, GND, GP, GR, GRTG, GVL, GW, H, HD, HDPE, HDR, HDW, HEX, HFCA, HM, HORIZ, HP, HPC, HPT, HR, HSS, HT, HV, HVAC, HWL, HYD, HZ, ID, IE, IF, IN, INC, INFL, INT, INTR, INV, IPS, IPT, IR, IRR, ISO, JCT, JT, K, KO, L, LATL, LB, LDR, LE, LFP, LG, LIN, LNG, LOC, LP, LR, LT, LTG, LTL, LWC, LWL, MAINT, MATL, MAX, MC, MED, MFR, MH, MIN, MISC, MJ, MON, MSL, MT, MW.

Table of abbreviations for site and utility terms, including N, NA, NC, NF, NIC, NO, NOM, NPS, NS, NTS, NWL, OC, OD, OF, OH, OPNG, OPP, OR, ORIG, OVFL, PAR, PC, PCC, PCF, PCT, PE, PED, PEN, PERP, PG, PI, PIT, PL, PLF, PP, PRC, PREFAB, PRELM, PREP, PRES, PRI, PROT, PS, PSF, PSI, PSIA, PSIG, PT, PVC, PVMT, R&R, R&S, R, RB, RED, REF, REINF, REM, REQU, RET, REV, RFG, RGH, RND, RO, ROW, RSP, RT, RY, SA, SAN, SC, SCH, SEC, SECT, SEP, SF, SHT, SIM, SL, SLTD, SLV, SOG, SPEC, SQ, SR, SST, STA, STD, STIR, STL, STOR, STR, SUSP, SY, SYM, SYMM, T&B, TAN, TBM, TCE, TEMP, THD, THK, TOB, TOC, TOF, TOG, TOP, TOS.

Table of abbreviations for topography and utility terms, including TOW, TRANS, TYP, UG, UNO, UTIL, V, VAC, VC, VEL, VENT, VERT, VIF, VOL, VPI, VPT, VTR, W/, W/O, W, WL, WM, WS, WT, WWF, XP, XS, XSECT, XXS, YH.

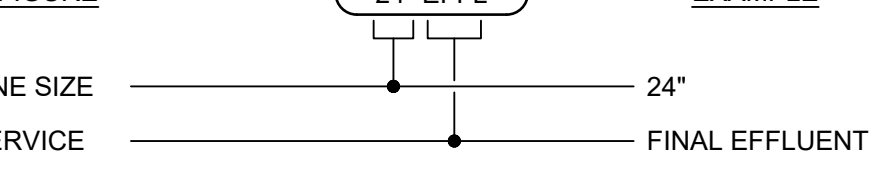
IDENTIFICATION SYMBOLOGY



EQUIPMENT ABBREVIATIONS

Table of equipment abbreviations: RDT - ROTATING DRUM THICKENER, RECP - RECLAIMED WATER BOOSTER PUMP.

PIPING IDENTIFICATION



PIPING ABBREVIATIONS

Table of piping abbreviations: SERVICE DESIGNATOR vs SERVICE. Includes 1W, 2W, 3W, DAFR, DS, F, FC, FD, P, PSC, PSL, PW, RAS, RD, REC, SB, SSC, SU, TD, TO, TWAS, WAS, V.

NOTES: 1. THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS. 2. LISTING OF ABBREVIATIONS DOES NOT IMPLY THAT ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS. 3. ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF A WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION. "INC" MAY MEAN INCLUDED OR INCLUDING AND "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.

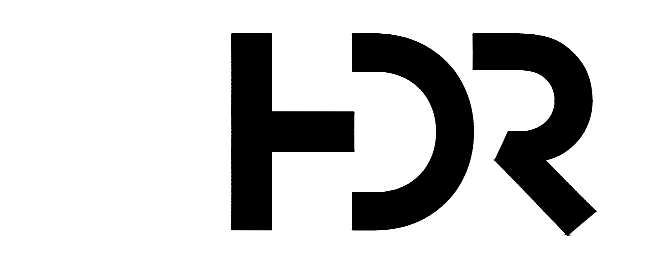
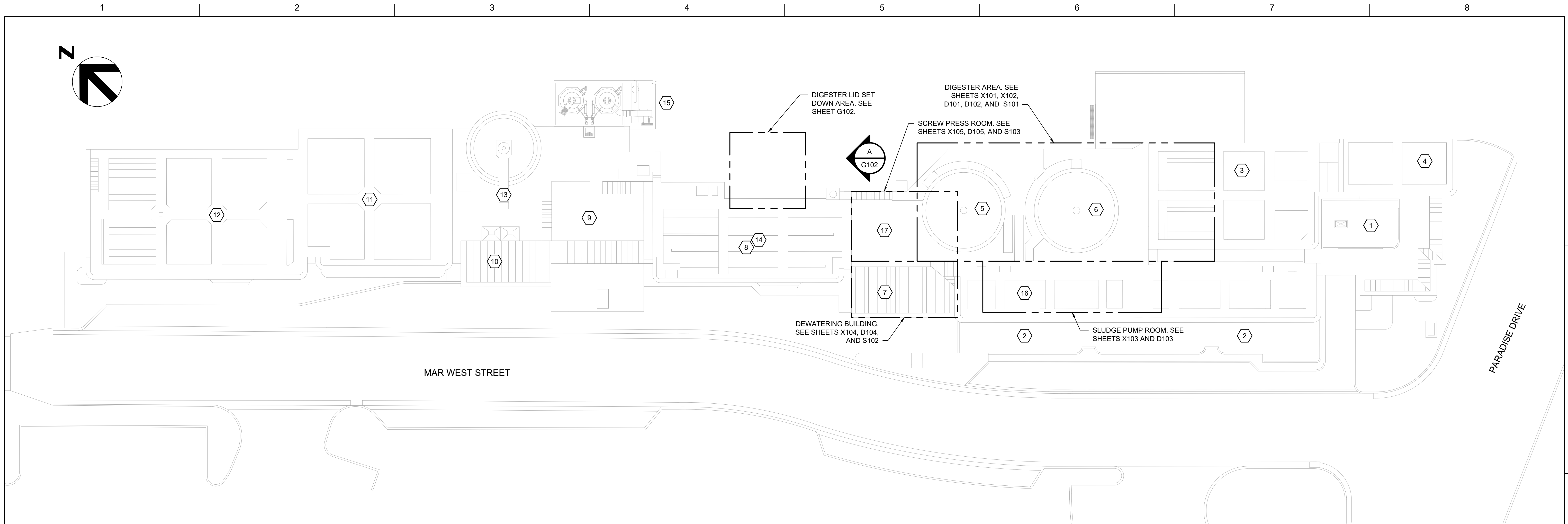


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Table with columns: PROJECT MANAGER, DESIGNER 1, DESIGNER 2, CHECKED, DRAWN, DATE, PROJECT NUMBER.



DIGESTER CLEANING AND REHABILITATION SYMBOLS AND ABBREVIATIONS



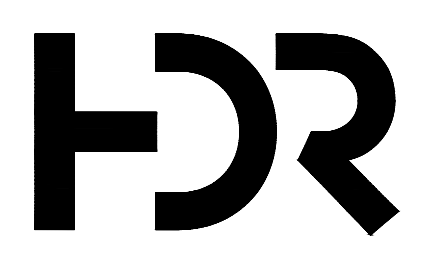
SITE PLAN
SCALE: 1/16" = 1'-0"

GENERAL DEMOLITION NOTES:

- THE FOLLOWING NOTES DEFINE THE BASIC REQUIREMENTS FOR, AND APPLY TO, ALL DEMOLITION WORK PROVIDED UNDER THIS CONTRACT.
- ALL DEMOLITION MATERIAL TO BE DISPOSED OF OFF SITE AT CONTRACTOR'S EXPENSE WITH COSTS INCLUDED IN BID.
 - SEE X SHEETS FOR LIMITS OF WORK. NOT ALL DEMOLITION WORK REQUIRED ON THIS PROJECT IS SHOWN ON THE DEMOLITION DRAWINGS. SEE OTHER CONTRACT DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION WORK REQUIRED.
 - CONTRACTOR TO VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO DEMOLITION AND CONSTRUCTION.
 - CONTRACTOR TO FIELD VERIFY EXACT LENGTHS OF PIPING TO BE REMOVED PRIOR TO BEGINNING OF DEMOLITION.
 - CONTRACTOR SHALL PROVIDE TEMPORARY REMOVAL/REROUTING OF UTILITIES AND/OR IMPROVEMENTS DESIGNATED TO REMAIN AND/OR REMAIN IN SERVICE DURING CONSTRUCTION. CONTRACTOR SHALL REPLACE IN KIND, OR BETTER, ITEMS DAMAGED DURING DEMOLITION MEANT TO BE PROTECTED IN PLACE.
 - THE DRAWINGS ARE PRODUCED FROM THE 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS AND SITE PHOTOS. THE CONTRACTOR SHOULD NOT CONSIDER ALL EXISTING EQUIPMENT LOCATIONS SHOWN AS EXACT AND IS TO VERIFY LOCATION OF ALL EQUIPMENT AND DIMENSIONS ON SITE.
 - NOT ALL EXISTING PIPING OR DUCT IS SHOWN, AND PIPING SHALL REMAIN UNLESS OTHERWISE NOTED.
 - ALL DEMOLITION WORK SHALL BE COORDINATED WITH DETAILED STAGING CHANGE OVER PLANS. THE CONTRACTOR MAY ELECT TO DEMOLISH MORE THAN IS SHOWN FOR EASE OF CONSTRUCTABILITY, BUT BEFORE DOING SO, THE DEMO NEEDS TO BE APPROVED BY THE OWNER, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO RESTORE EVERYTHING TO PRE-DEMO CONDITIONS. IF THE CONTRACTOR DAMAGES OR LOSES ANYTHING DURING THIS TIME, IT IS THE CONTRACTOR'S RESPONSIBILITY TO REPLACE IT AT NO COST TO THE OWNER.
 - DURING THE COURSE OF THE DEMOLITION WORK, PROVIDE ADEQUATE PROTECTION TO SYSTEMS THAT ARE TO BE RETAINED FOR THE DURATION OF THE DEMOLITION WORK AND ALL ITEMS THAT ARE TO BE RE-USED DURING THE SUBSEQUENT STAGES OF THE PROJECT OR ON COMPLETION OF THE WORK. PROVISIONS SHALL BE MADE FOR THE STORAGE OF ANY REUSABLE STRIPPED OUT ITEMS OF EQUIPMENT, WHICH IS INTENDED TO BE REUSED ELSEWHERE.
 - CONTRACTOR SHALL PATCH ALL OPENINGS AS A RESULT OF ALL DEMOLITION AND NEW CONSTRUCTION AND OPENINGS THAT WILL NOT BE RE-USED FOR NEW CONSTRUCTION. CONTRACTOR SHALL CAP ALL UTILITIES AS NECESSARY TO COMPLETE THE SYSTEM IF THE UTILITY IS NOT RE-USED AS A CONTINUATION FOR THE NEW SYSTEM.
 - DIFFERENT SYSTEM SHUTDOWNS ARE REQUIRED THROUGHOUT CONSTRUCTION. SEE SPEC 01 11 00 FOR SEQUENCING. COORDINATE WITH DISTRICT. DISTRICT RESERVES THE RIGHT TO ALTER OR REJECT ANY SHUTDOWN REQUESTS.

AREA LEGEND

- 1 HEADWORKS
- 2 DRY WEATHER PRIMARY SED BASINS
- 3 WET WEATHER PRIMARY SED BASINS
- 4 SURGE TANK
- 5 PRIMARY DIGESTER
- 6 SECONDARY DIGESTER
- 7 DEWATERING BUILDING
- 8 BOTTOM LEVEL: WORKSHOP BUILDING
- 9 CHEMICAL/BLOWER BUILDING
- 10 RAS/THICKENER BUILDING
- 11 AERATION BASINS
- 12 SECONDARY SED BASINS
- 13 TOP LEVEL: ROTARY DRUM THICKENER
BOTTOM LEVEL: DISSOLVED AIR FLOTATION THICKENER
- 14 CHLORINE CONTACT BASIN
- 15 FOUL AIR SCRUBBER
- 16 SLUDGE PUMP/GRINDER ROOM
- 17 TOP LEVEL: SCREW PRESS ROOM

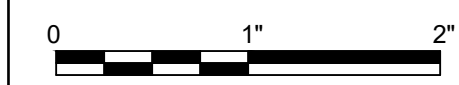


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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

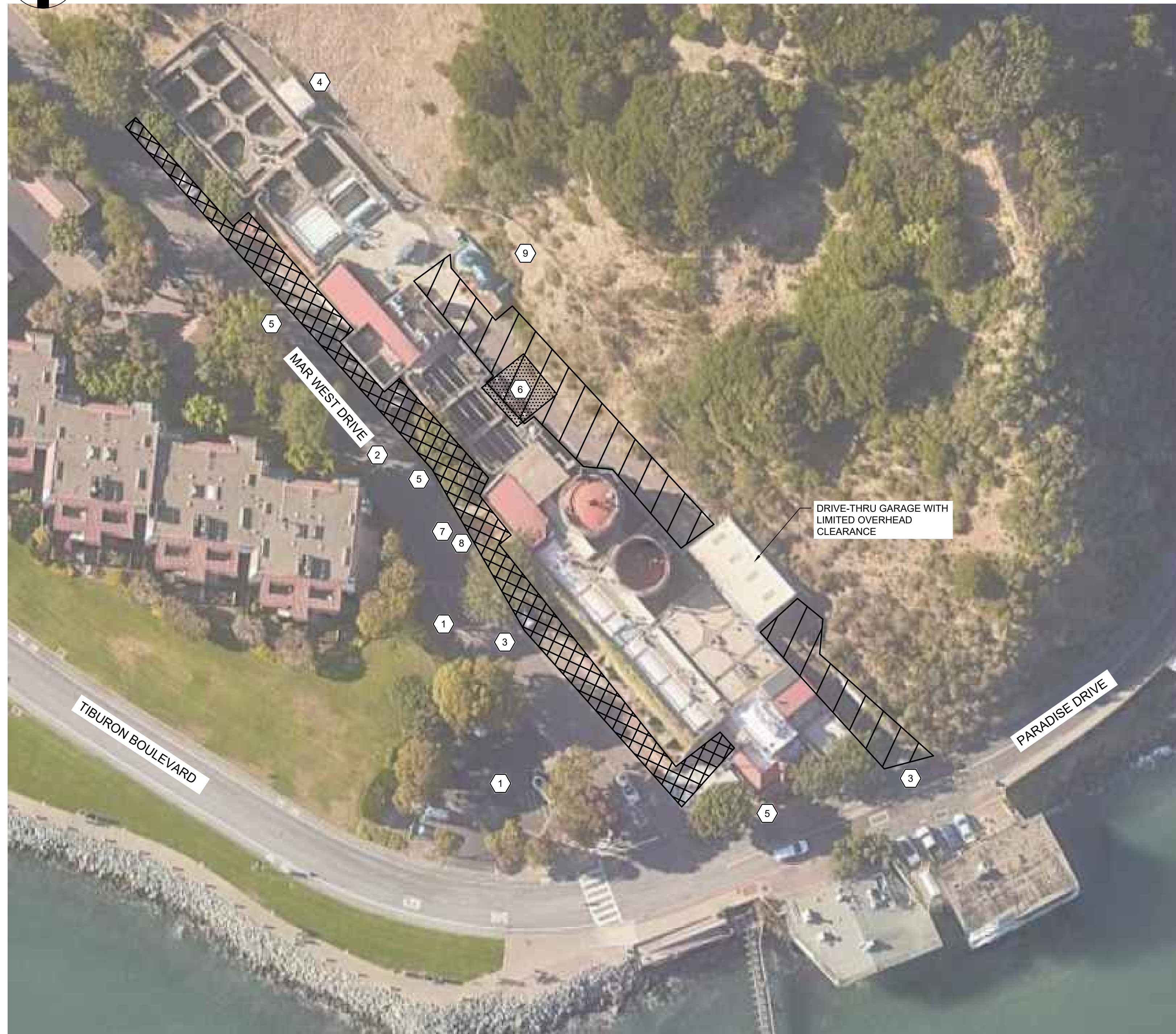
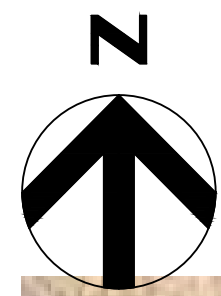


DIGESTER CLEANING AND REHABILITATION OVERVIEW SITE PLAN



FILENAME | G101.dwg
SCALE | 1/16" = 1' 0"

SHEET
G101



STAGING PLAN
SCALE: NTS

SHEET KEYNOTES:

- 1 CONTRACTOR PARKING AND STAGING IS NOT ALLOWED IN THESE PARKING AREAS.
- 2 MINIMIZE TIME MAR WEST DRIVE IS FULLY OR PARTIALLY CLOSED. COORDINATE ALL TRAFFIC CONTROL MEASURES WITH THE TOWN OF TIBURON POLICE DEPARTMENT, TIBURON FIRE AND EMERGENCY SERVICES DISTRICT AND DEPARTMENT OF PUBLIC WORKS.
- 3 PROVIDE ADEQUATE NUMBER OF FLAGGERS AND APPROPRIATE SIGNAGE REQUIRED TO ENSURE THE SAFE PASSAGE OF VEHICLES, CYCLISTS AND PEDESTRIANS. EMPLOY FLAGMEN FOR ALL DELIVERIES TO PLANT.
- 4 PROVIDE ACCESS TO CELLULAR PHONE FACILITIES LEASED TO NEXTEL WHEN REQUESTED BY THE OWNER.
- 5 PROTECT EXISTING VEGETATION/LANDSCAPING.
- 6 DIGESTER COVER TEMPORARY STAGING AREA FOR COVER INSPECTION AND COATING. OUTLINE DIGESTER COVER LAYDOWN AREA PRIOR TO REMOVING LID. CONFIRM AREA WITH DISTRICT.
- 7 PROVIDE ACCESS FOR CHEMICAL DELIVERY. COORDINATE WITH DISTRICT.
- 8 PROVIDE ACCESS FOR SLUDGE BIN PICKUP AND DELIVERY. COORDINATE WITH DISTRICT.
- 9 VERIFY LOCATION AND EXTENT OF EXISTING FENCE. REPLACE IN KIND ANY PORTION OF FENCE DAMAGED BY CONTRACTOR.
- 10 RELOCATE SPARE PIPING AND EQUIPMENT. REPLACE IN KIND ANY SPARE PARTS DAMAGED BY CONTRACTOR. REQUESTS TO USE SPARE PIPING AND EQUIPMENT WILL BE CONSIDERED IF IT HELPS EXPEDITE THE PROJECT. SUBMIT REQUESTS TO OWNER AND ENGINEER FOR APPROVAL.
- 11 DO NOT COVER OR INTERFERE WITH EXHAUST VENT.

LEGEND:

- CONTRACTOR STAGING AREA
- DISTRICT PARKING/ACCESS. KEEP CLEAR AND FREE OF CONTRACTOR VEHICLES.
- DIGESTER COVER TEMPORARY STAGING AREA

GENERAL NOTES:

- 1. UPON COMPLETION OF CONSTRUCTION, RESTORE ALL STAGING AREAS USED DURING CONSTRUCTION TO PRE-CONSTRUCTION CONDITION.
- 2. COORDINATE ACCESS, STAGING AND WORK WITH SECTION 01 11 00.
- 3. ACCESS AND DELIVERY SHALL BE ON TIBURON BOULEVARD/STATE ROUTE 131 FROM US101. MEET ALL TRAFFIC AND VEHICLE REQUIREMENTS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS) AND THE CITY OF TIBURON FOR VEHICLES USED ON THIS ROUTE.
- 4. CARPOOL CONTRACTOR EMPLOYEES TO THE SITE DUE TO LIMITED PARKING.
- 5. ALL DELIVERIES/ARRIVALS AND OPERATION OF HEAVY EQUIPMENT OUTSIDE OF THE PLANT SHALL BE LIMITED TO BETWEEN 9:30 AM AND 4:00 PM, MONDAY THROUGH FRIDAY PER TOWN OF TIBURON CHAPTER 13 MUNICIPAL CODE.
- 6. PROVIDE THE NEIGHBORHOOD WITH A 5-DAY AND A 24-HOUR ADVANCE NOTICE, INCLUDING THE DAY AND TIME, OF ANY STREET CLOSURE NEAR PROJECT SITE.
- 7. PROVIDE CONSTRUCTION WARNING SIGNS ON ALL PUBLICLY ACCESSIBLE STREETS, DRIVEWAYS AND WALKWAYS ADJACENT TO THE PROJECT SITE.



DIGESTER LID STAGING AREA
SCALE: NTS



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION STAGING PLAN

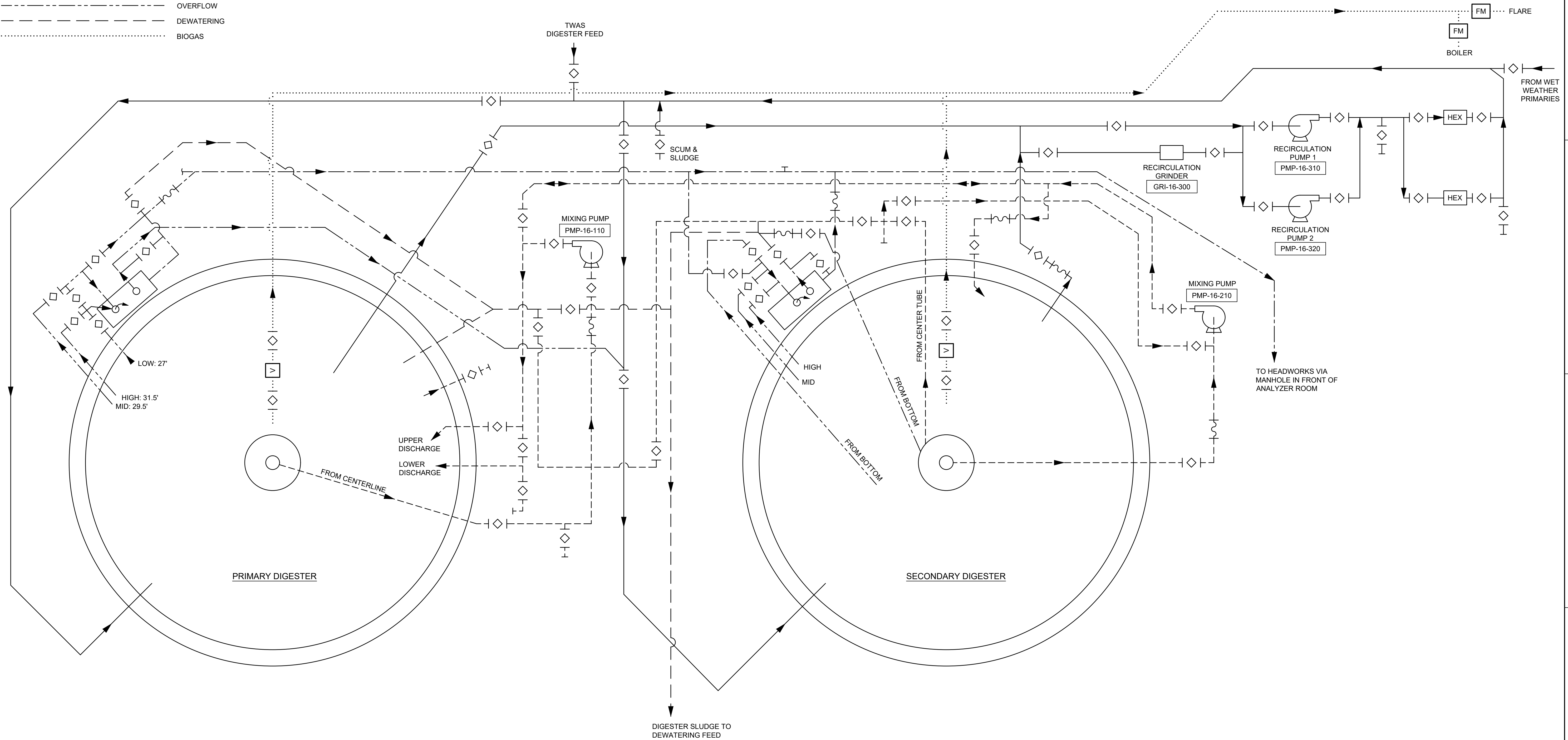


FILENAME | G102.dwg
SCALE | NTS

SHEET
G102

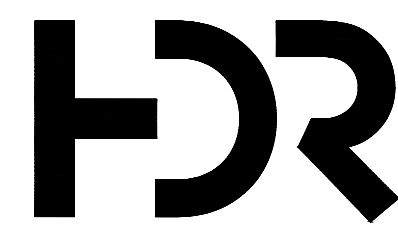
PIPE AND VALVE LEGEND

| | | | |
|-------|--------------------|---|--------------------------|
| — | RECIRCULATION | ◇ | OPEN VALVE |
| - - - | MIXING | ◆ | CLOSED VALVE |
| - - - | DRAIN TO HEADWORKS | ⋈ | FLEXIBLE EXPANSION JOINT |
| - - - | OVERFLOW | | |
| - - - | DEWATERING | | |
| ⋯ | BIOGAS | | |



GENERAL NOTES:

1. DRAINS, SECONDARY SYSTEMS, CHEMICAL SYSTEMS, AND WATER SYSTEMS HAVE BEEN OMITTED FOR CLARITY.



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| PROJECT MANAGER | | MIKE FALK |
| DESIGNER 1 | S. JOSLYN | |
| DESIGNER 2 | T. GULLIVER | |
| CHECKED | D. REARDON | |
| DRAWN | P. HERMANSON | |
| DATE | JANUARY 2024 | |
| PROJECT NUMBER | 10347063 | |



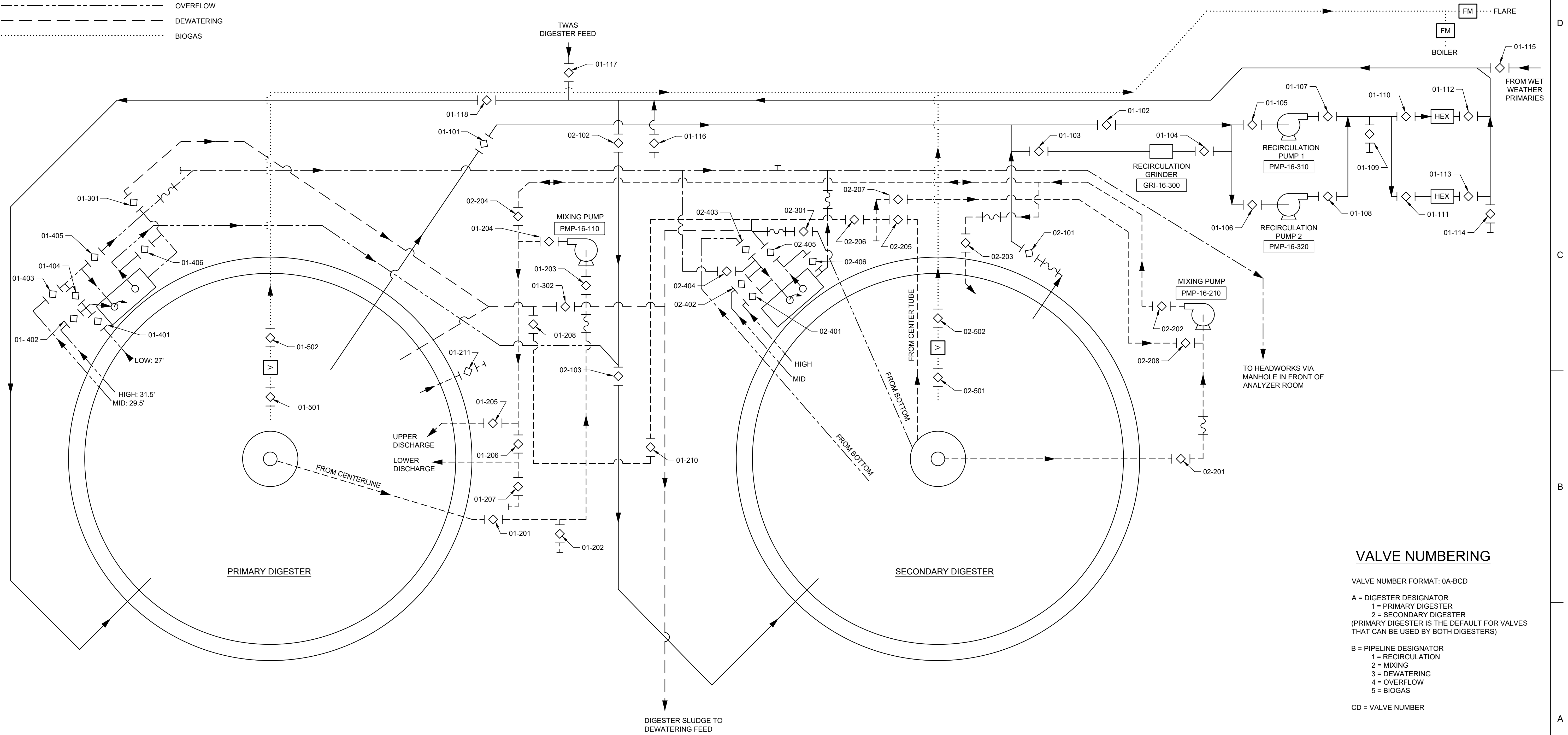
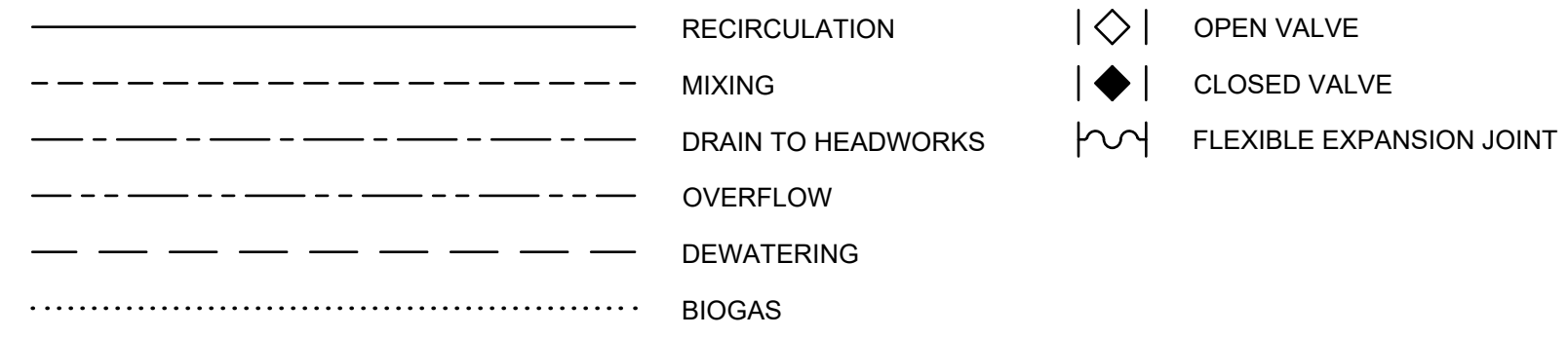
**DIGESTER CLEANING AND REHABILITATION
PROCESS FLOW DIAGRAM
PRE-CONSTRUCTION**



FILENAME | G601.dwg
SCALE | NTS

SHEET
G601

PIPE AND VALVE LEGEND



VALVE NUMBERING

VALVE NUMBER FORMAT: 0A-BCD

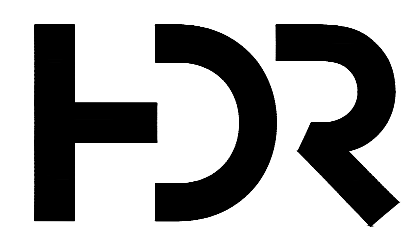
A = DIGESTER DESIGNATOR
 1 = PRIMARY DIGESTER
 2 = SECONDARY DIGESTER
 (PRIMARY DIGESTER IS THE DEFAULT FOR VALVES THAT CAN BE USED BY BOTH DIGESTERS)

B = PIPELINE DESIGNATOR
 1 = RECIRCULATION
 2 = MIXING
 3 = DEWATERING
 4 = OVERFLOW
 5 = BIOGAS

CD = VALVE NUMBER

GENERAL NOTES:

- DRAINS, SECONDARY SYSTEMS, CHEMICAL SYSTEMS, AND WATER SYSTEMS HAVE BEEN OMITTED FOR CLARITY.
- PROVIDE IDENTIFICATION DEVICES FOR ALL VALVES, PIPE, FLOW DIRECTION PER SECTION 10 14 00.



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | T. GULLIVER |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



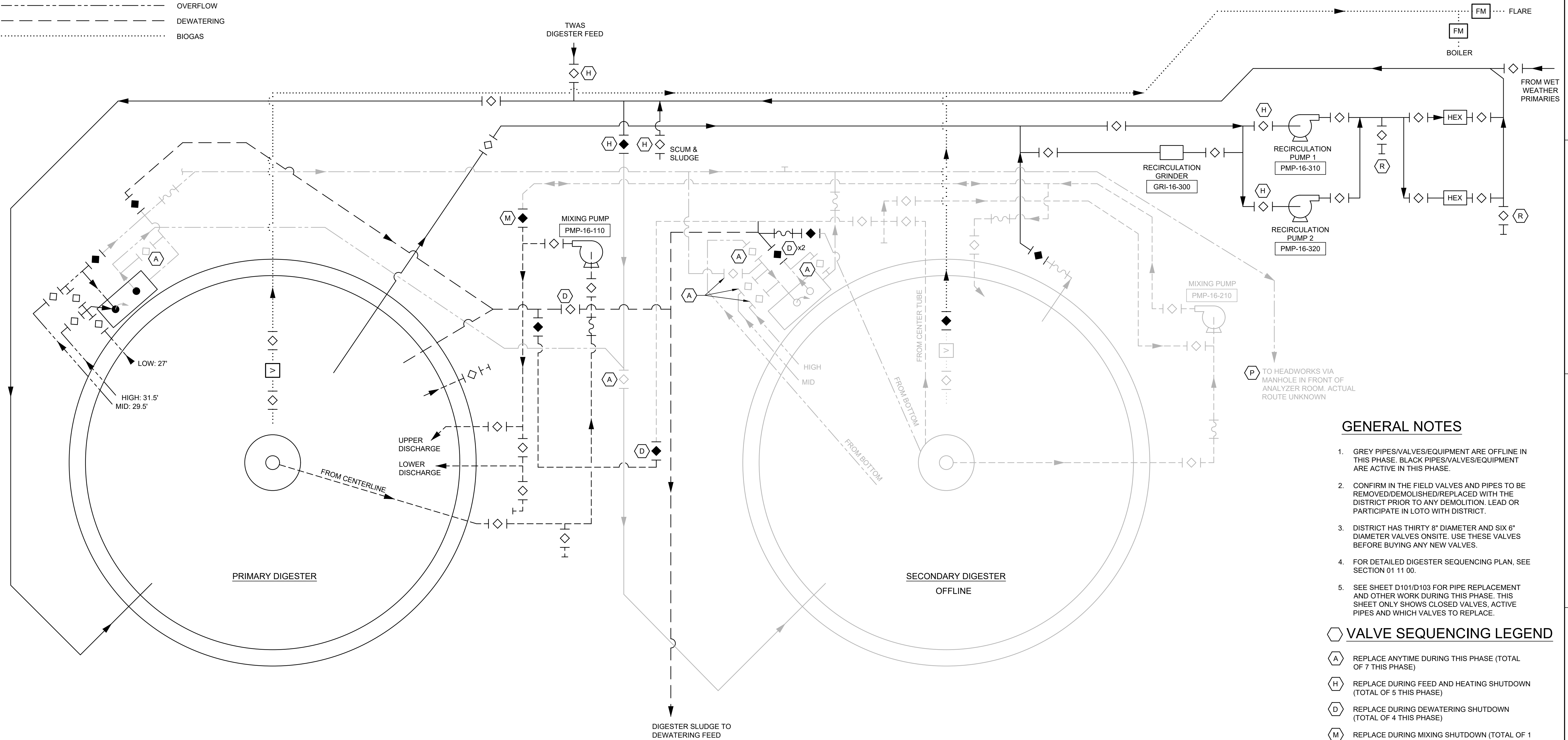
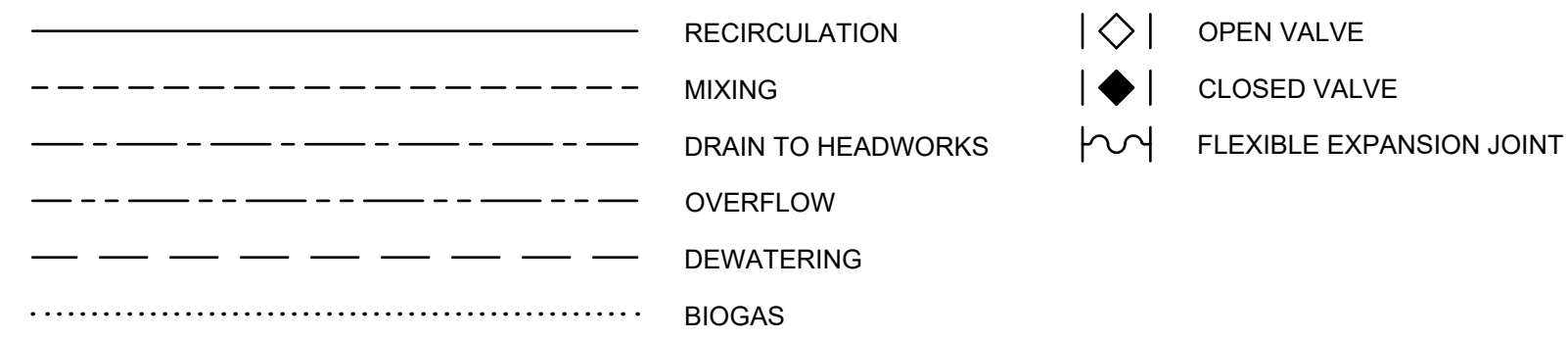
DIGESTER CLEANING AND REHABILITATION VALVE NUMBERING



FILENAME | G602.dwg
 SCALE | NTS

SHEET
G602

PIPE AND VALVE LEGEND

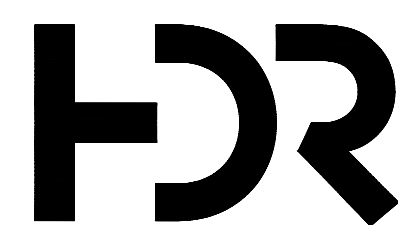


GENERAL NOTES

- GREY PIPES/VALVES/EQUIPMENT ARE OFFLINE IN THIS PHASE. BLACK PIPES/VALVES/EQUIPMENT ARE ACTIVE IN THIS PHASE.
- CONFIRM IN THE FIELD VALVES AND PIPES TO BE REMOVED/DEMOLISHED/REPLACED WITH THE DISTRICT PRIOR TO ANY DEMOLITION. LEAD OR PARTICIPATE IN LOTO WITH DISTRICT.
- DISTRICT HAS THIRTY 8" DIAMETER AND SIX 6" DIAMETER VALVES ONSITE. USE THESE VALVES BEFORE BUYING ANY NEW VALVES.
- FOR DETAILED DIGESTER SEQUENCING PLAN, SEE SECTION 01 11 00.
- SEE SHEET D101/D103 FOR PIPE REPLACEMENT AND OTHER WORK DURING THIS PHASE. THIS SHEET ONLY SHOWS CLOSED VALVES, ACTIVE PIPES AND WHICH VALVES TO REPLACE.

VALVE SEQUENCING LEGEND

- REPLACE ANYTIME DURING THIS PHASE (TOTAL OF 7 THIS PHASE)
- REPLACE DURING FEED AND HEATING SHUTDOWN (TOTAL OF 5 THIS PHASE)
- REPLACE DURING DEWATERING SHUTDOWN (TOTAL OF 4 THIS PHASE)
- REPLACE DURING MIXING SHUTDOWN (TOTAL OF 1 THIS PHASE)
- PLUGGED PIPE. CLEAN, INSPECT, AND REPLACE PLUGGED PORTION ANY TIME EITHER PHASE. VIDEO DOCUMENT INSIDE OF CLEANED PIPE AND SUBMIT TO ENGINEER (TOTAL OF 1 THIS PHASE)
- REMOVE/DEMOLISH VALVE DURING FEED AND HEATING SHUTDOWN. SEE SHEET X101 FOR MORE INFO. (TOTAL OF 2 THIS PHASE)

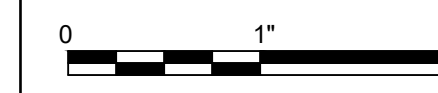


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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | T. GULLIVER |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



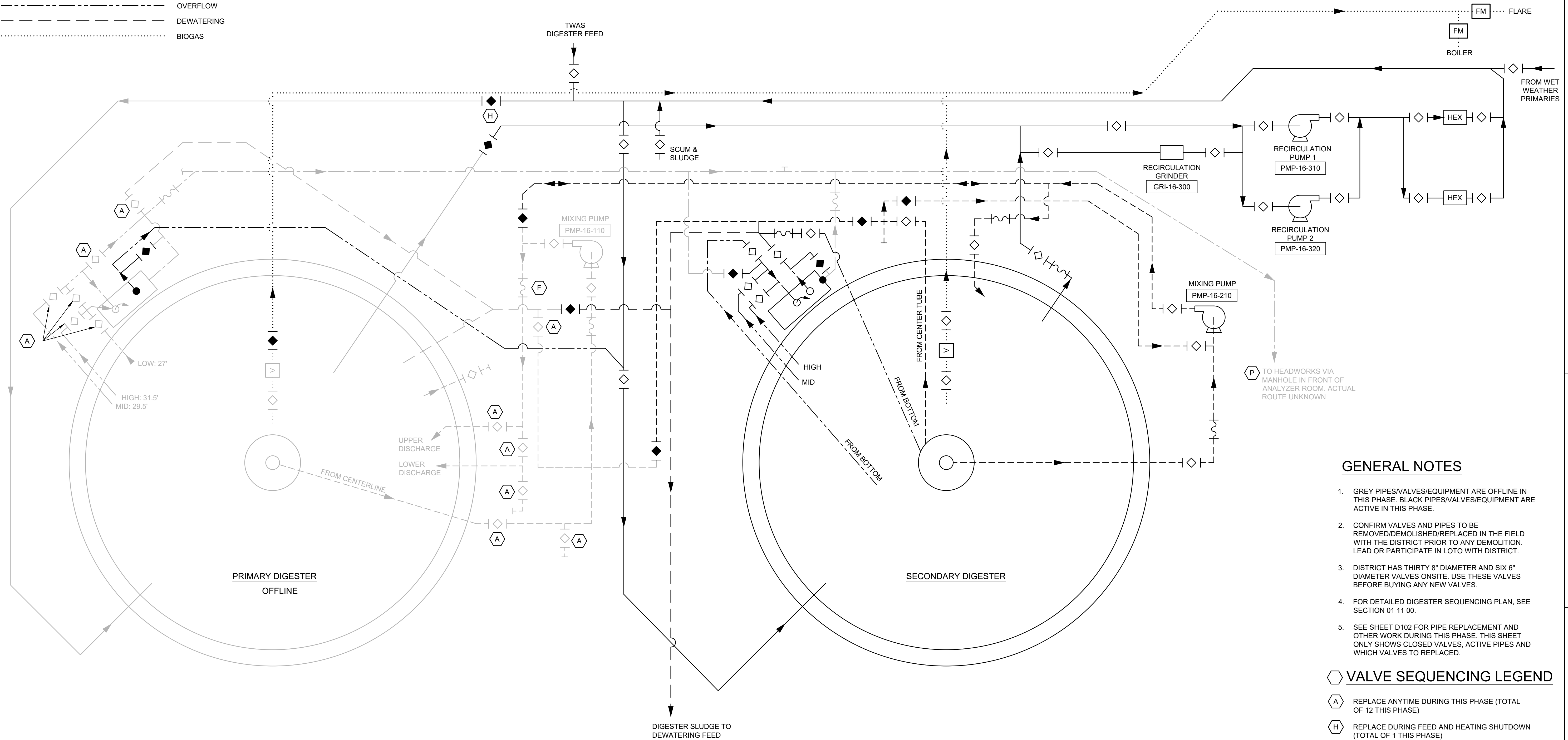
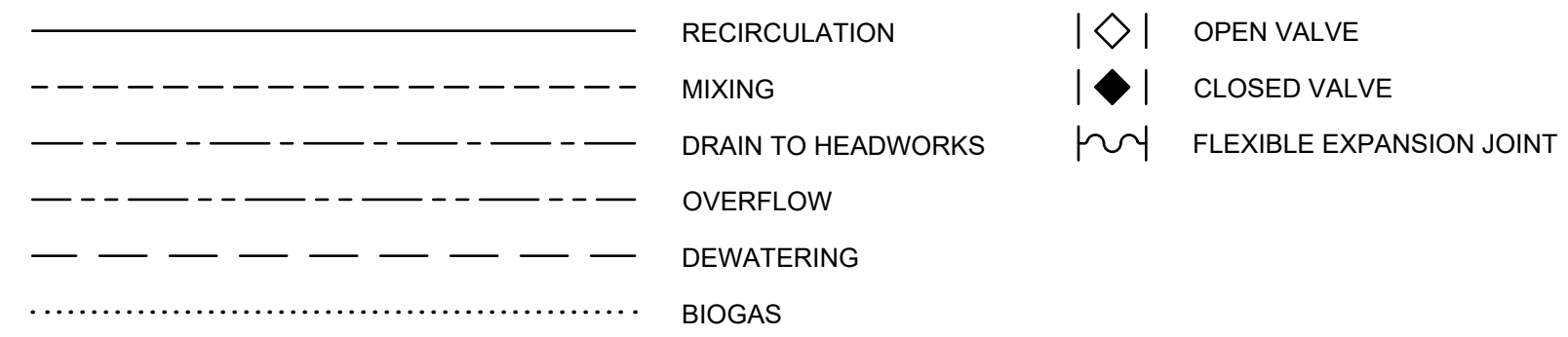
DIGESTER CLEANING AND REHABILITATION SEQUENCING PHASE 1 SECONDARY DIGESTER OFFLINE



FILENAME | G901.dwg
SCALE | NTS

SHEET
G901

PIPE AND VALVE LEGEND



GENERAL NOTES

- GREY PIPES/VALVES/EQUIPMENT ARE OFFLINE IN THIS PHASE. BLACK PIPES/VALVES/EQUIPMENT ARE ACTIVE IN THIS PHASE.
- CONFIRM VALVES AND PIPES TO BE REMOVED/DEMOLISHED/REPLACED IN THE FIELD WITH THE DISTRICT PRIOR TO ANY DEMOLITION. LEAD OR PARTICIPATE IN LOTO WITH DISTRICT.
- DISTRICT HAS THIRTY 8" DIAMETER AND SIX 6" DIAMETER VALVES ONSITE. USE THESE VALVES BEFORE BUYING ANY NEW VALVES.
- FOR DETAILED DIGESTER SEQUENCING PLAN, SEE SECTION 01 11 00.
- SEE SHEET D102 FOR PIPE REPLACEMENT AND OTHER WORK DURING THIS PHASE. THIS SHEET ONLY SHOWS CLOSED VALVES, ACTIVE PIPES AND WHICH VALVES TO BE REPLACED.

VALVE SEQUENCING LEGEND

- REPLACE ANYTIME DURING THIS PHASE (TOTAL OF 12 THIS PHASE)
- REPLACE DURING FEED AND HEATING SHUTDOWN (TOTAL OF 1 THIS PHASE)
- PLUGGED PIPE. CLEAN, INSPECT, AND REPLACE PLUGGED PORTION ANY TIME EITHER PHASE. VIDEO DOCUMENT INSIDE OF CLEANED PIPE AND SUBMIT TO ENGINEER (TOTAL OF 1 THIS PHASE)
- INSTALL FLEXIBLE EXPANSION JOINT (TOTAL OF 1 THIS PHASE)

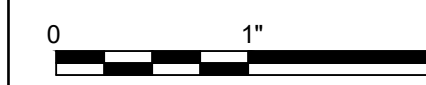


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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | T. GULLIVER |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

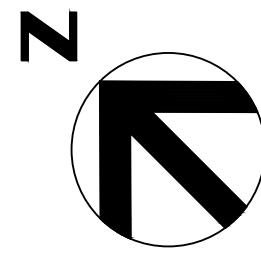


DIGESTER CLEANING AND REHABILITATION SEQUENCING PHASE 2 PRIMARY DIGESTER OFFLINE



FILENAME | G902.dwg
SCALE | NTS

SHEET
G902

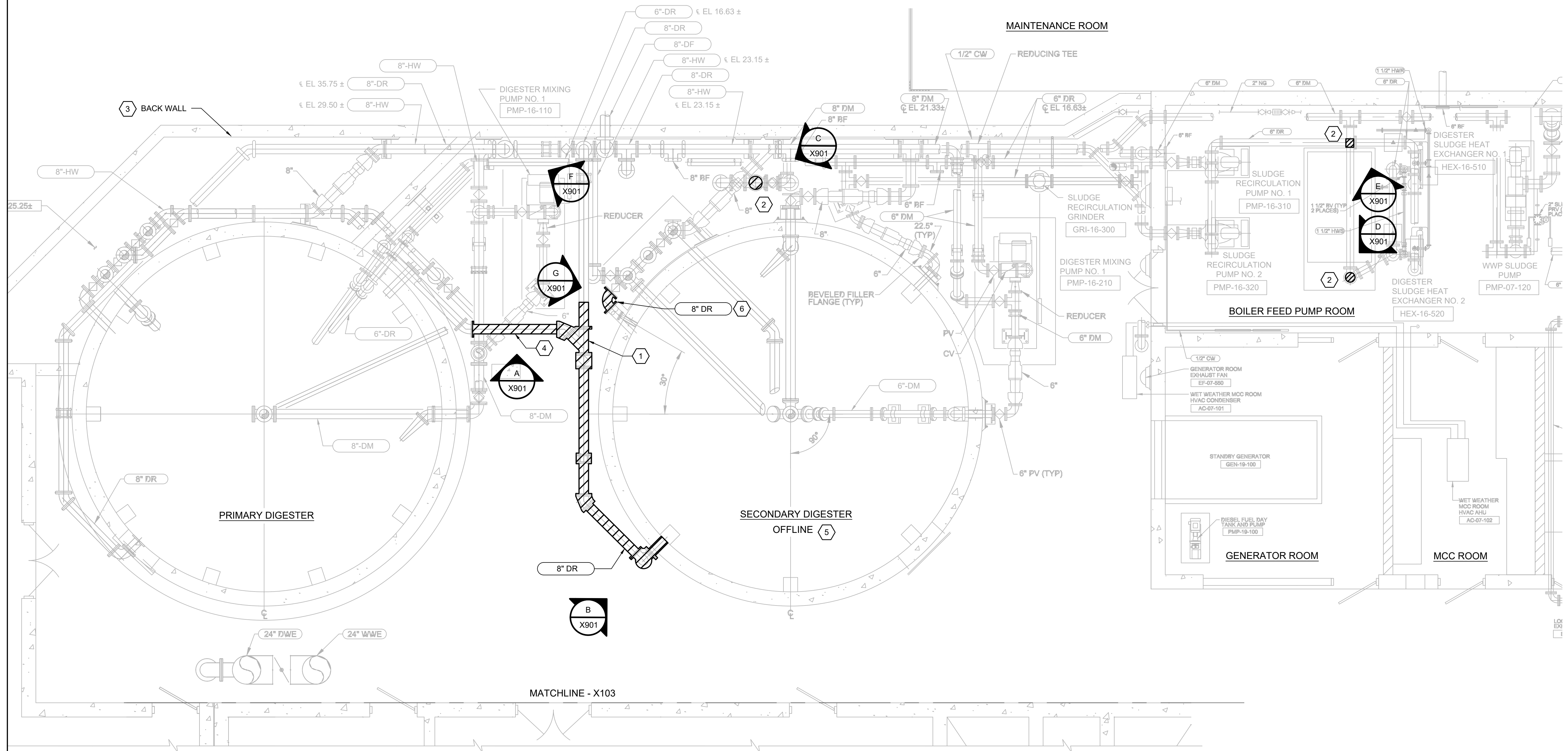


GENERAL NOTES:

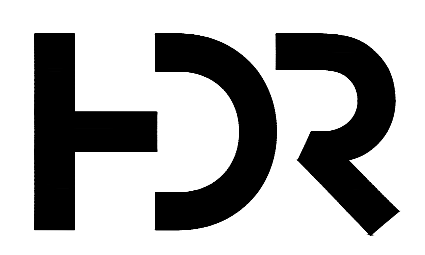
1. NOT ALL PIPING SHOWN FOR CLARITY. INSULATION NOT SHOWN FOR DM OR DR PIPING.
2. DEMOLITION HATCHING AND PIPE LOCATIONS ARE APPROXIMATE. SEE SHEETS X901 AND X902 FOR LIMITS OF DEMOLITION.
3. DEMOLITION HATCHING OF VALVES REPLACED THIS PHASE IS NOT SHOWN FOR CLARITY. SEE SHEET G101 FOR VALVES TO REPLACE DURING THIS PHASE.
4. BACKGROUND OF DRAWING BASED ON SHEET 16M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

1. DEMOLISH PIPE FROM SECONDARY DIGESTER TO TEE. DEMOLISH PIPE PASSED TEE AS FAR AS NEEDED TO REMOVE ALL PLUGGED PIPE.
2. DEMOLISH VALVE/PIPE AND INSTALL BLIND FLANGE. SEE X901 FOR MORE DETAILS.
3. DEMOLISH EXISTING UNISTRUT PIPE SUPPORTS ALONG BACK WALL (APPROX 6) AFTER INSTALLING NEW PIPE SUPPORTS. SEE D101 FOR MORE DETAILS.
4. DEMOLISH PIPE AND PIPE SUPPORT. SEE X901 FOR MORE DETAILS.
5. REMOVE LID. SET DOWN IN DESIGNATED AREA SHOWN ON G101. SEE D101 FOR MORE DETAILS.
6. DEMOLISH ELBOW AND REPLACE WITH NEW. MATCH EXISTING SIZE AND MATERIAL. SEE D101 FOR MORE DETAILS.



DIGESTER AREA BOTTOM PLAN - PHASE 1
SCALE: 1/4" = 1'-0"

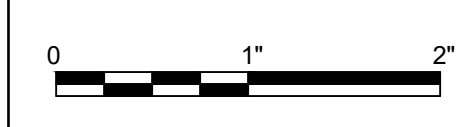


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

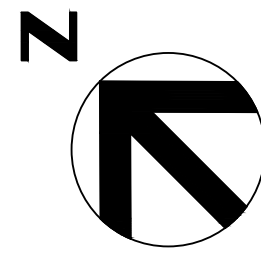


**DIGESTER CLEANING AND REHABILITATION
DIGESTER DEMOLITION PLAN
PHASE 1**



FILENAME | X101.dwg
SCALE | 1/4" = 1'-0"

SHEET
X101

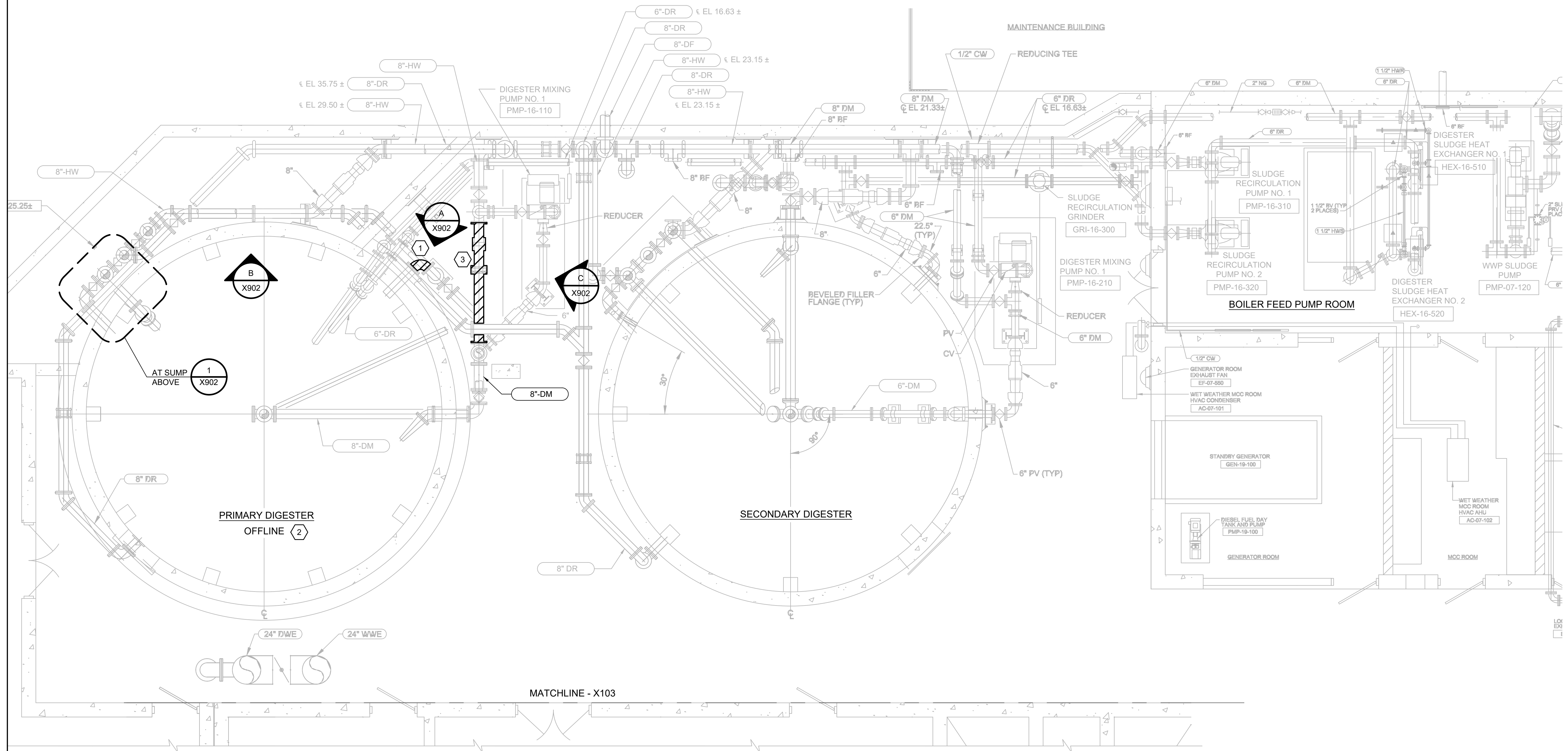


GENERAL NOTES:

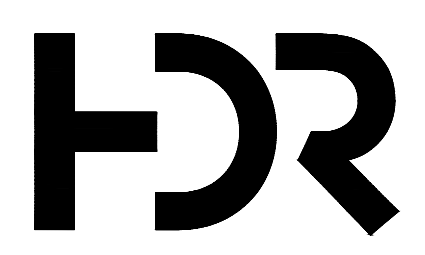
1. NOT ALL PIPING SHOWN FOR CLARITY. INSULATION NOT SHOWN FOR DM OR DR PIPING.
2. DEMOLITION HATCHING AND PIPE LOCATIONS ARE APPROXIMATE. SEE SHEETS X901 AND X902 FOR LIMITS OF DEMOLITION.
3. DEMOLITION HATCHING OF VALVES REPLACED THIS PHASE IS NOT SHOWN FOR CLARITY. SEE SHEET G101 FOR VALVES TO REPLACE DURING THIS PHASE.
4. BACKGROUND OF DRAWING BASED ON SHEET 16M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

- 1 DEMOLISH ELBOW AND CAP CONNECTIONS.
- 2 REMOVE LID. SET DOWN IN DESIGNATED AREA SHOWN ON G101. SEE D102 FOR MORE DETAILS.
- 3 DEMOLISH PIPE AND INSTALL FLEXIBLE CONNECTION. FLEXIBLE CONNECTION HAS BEEN PRE-PURCHASED BY DISTRICT AND IS ON SITE. REPLACE EXISTING PIPE SUPPORT WITH NEW. SEE D102 FOR MORE DETAILS.



DIGESTER AREA BOTTOM PLAN - PHASE 2
SCALE: 1/4" = 1'-0"

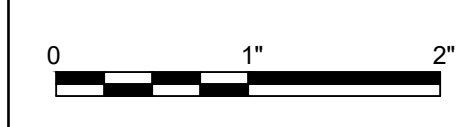


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
DIGESTER DEMOLITION PLAN
PHASE 2**



FILENAME X102.dwg
SCALE 1/4" = 1'-0"

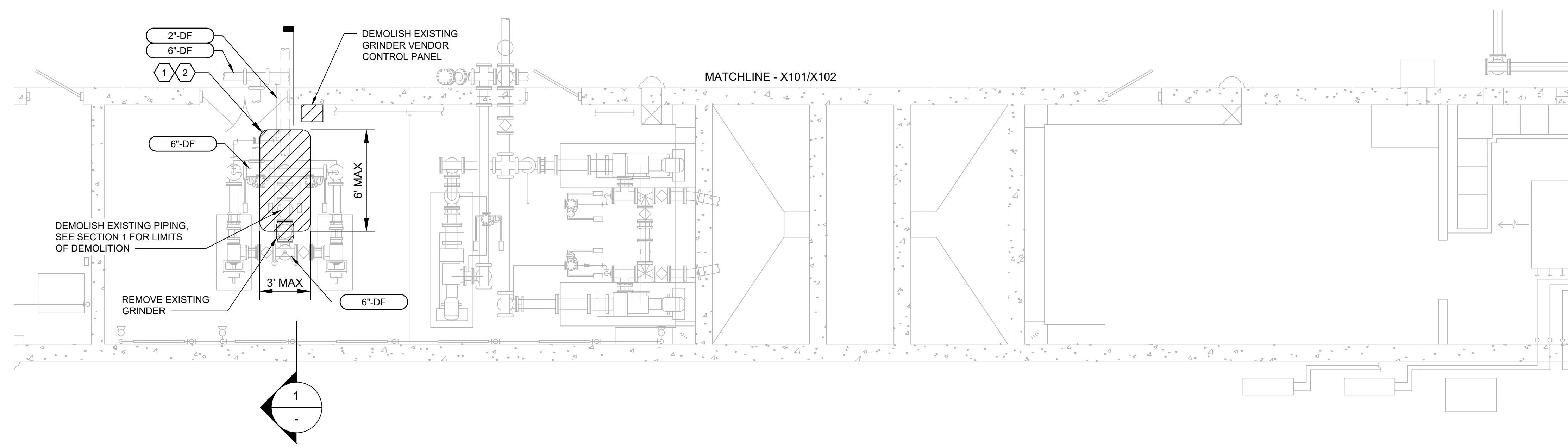
SHEET
X102

GENERAL NOTES:

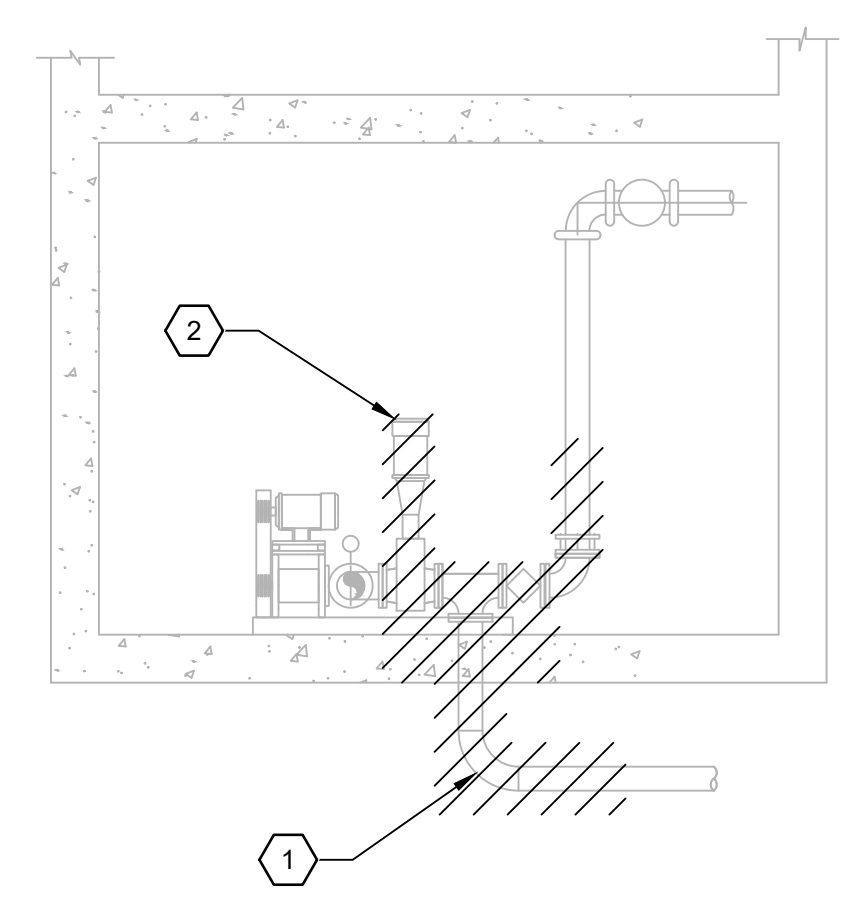
1. NOT ALL PIPING SHOWN FOR CLARITY.
2. BACKGROUND OF DRAWING BASED ON SHEET 6M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

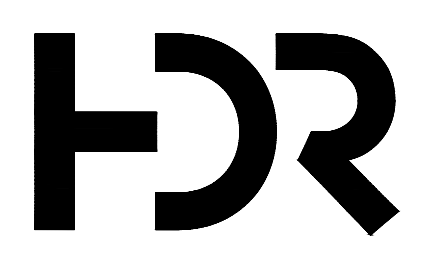
- 1 DEMOLISH PIPE AND CONCRETE ENCASUREMENT TO THE EXTENT NECESSARY FOR INSTALLING THE NEW PIPING. SAWCUT EXISTING SLAB PER MAXIMUM LIMITS SHOWN.
- 2 DEMOLISH GRINDER, ELECTRICAL POWER TO BE REUSED FOR NEW GRINDER.



PLAN VIEW - SLUDGE PUMPS/GRINDER AREA EL. 97.0'
SCALE: 1/4" = 1'0"



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



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | D. GREENFIELD |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | D. GREENFIELD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

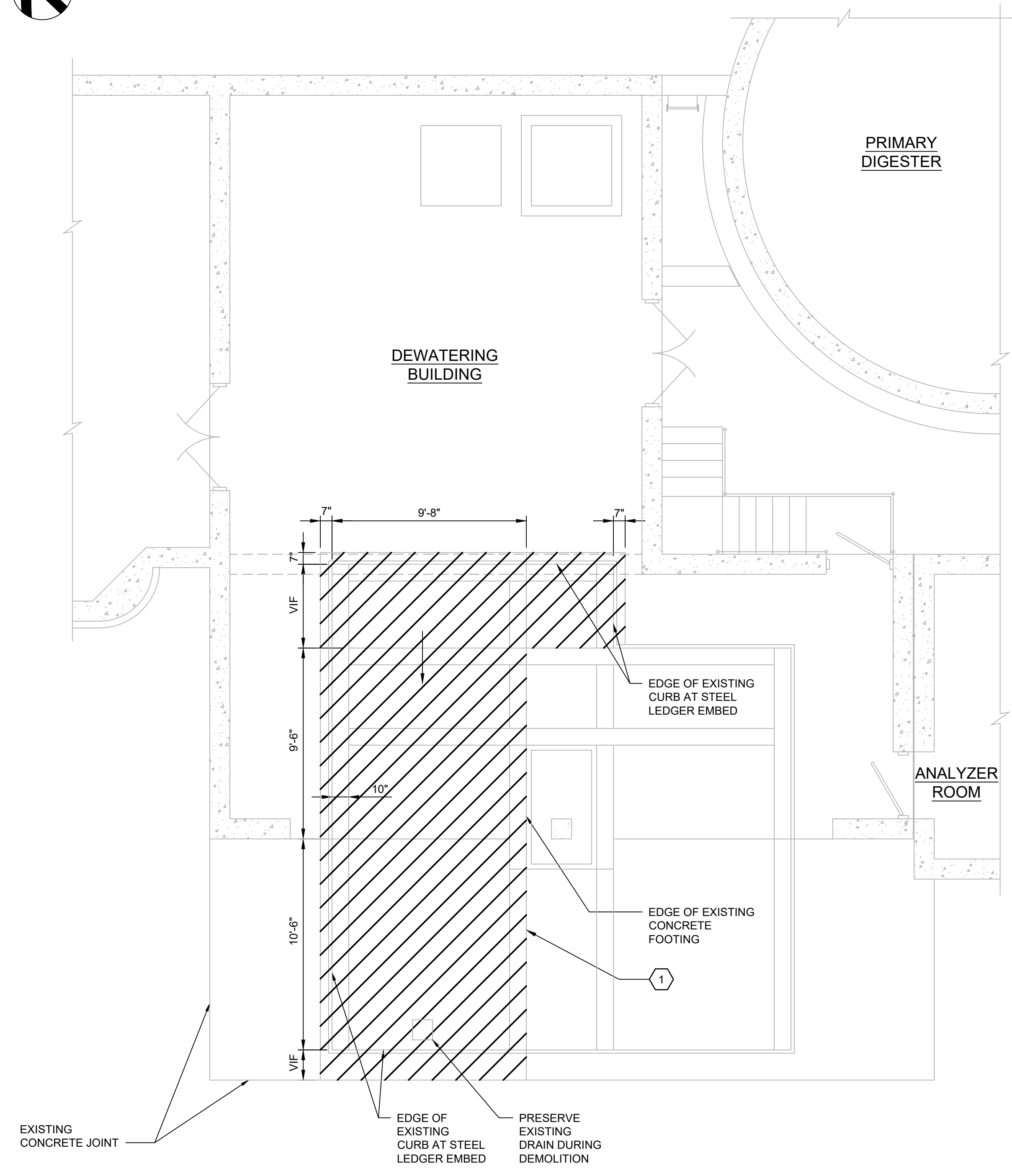
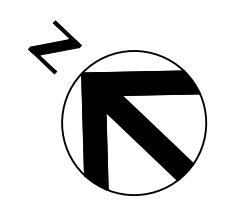


**DIGESTER CLEANING AND REHABILITATION
SLUDGE PUMP ROOM
DEMOLITION PLAN AND SECTION**



FILENAME | X103.dwg
SCALE | VARIES

SHEET
X103



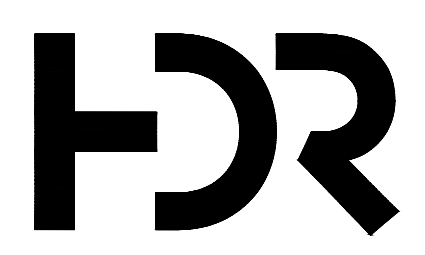
PLAN AT EL 14.50
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17D1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

- 1 SAWCUT AND REMOVE EXISTING CONCRETE AND STEEL EMBEDS TO EXTENT SHOWN.

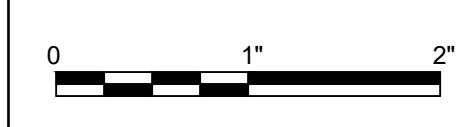


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

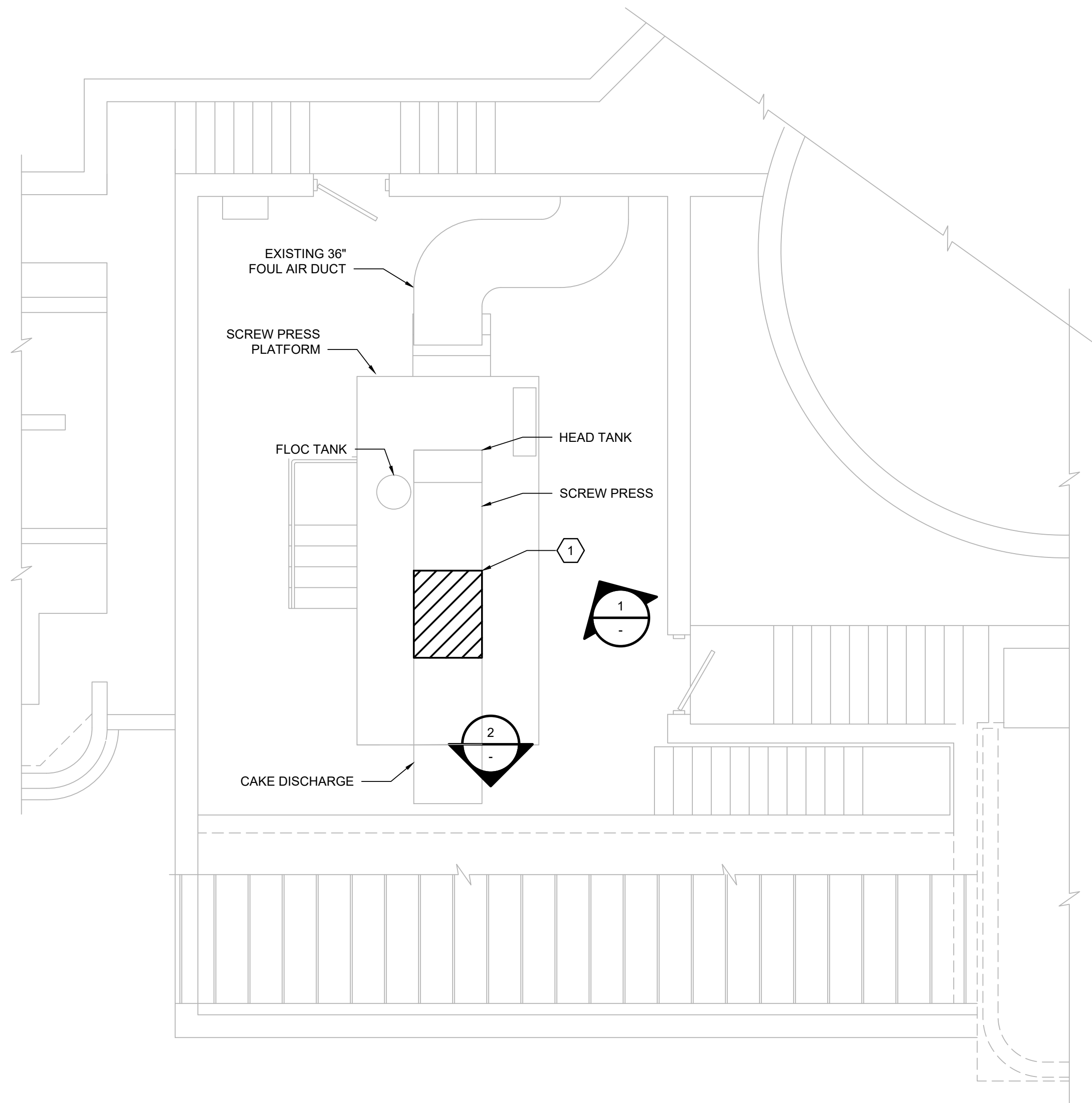
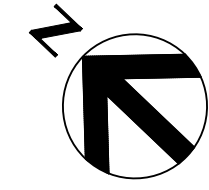


**DIGESTER CLEANING AND REHABILITATION
DEWATERING BUILDING
DEMOLITION PLAN AND SECTION**



FILENAME | X104.dwg
SCALE | NTS

SHEET
X104



SCREW PRESS ROOM DEMOLITION PLAN
SCALE: 1/4" = 1'-0"



1 PHOTOGRAPH 1
SCALE: NTS



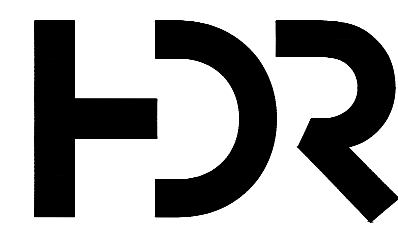
2 PHOTOGRAPH 2
SCALE: NTS

GENERAL NOTES

1. EQUIPMENT LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY ALL DIMENSIONS AND LOCATIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17E1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

- 1 CONTACT FKC TO REPLACE PANEL 2 WITH NEW PANEL WITH A 12"x12"x12" BOX AND 6" FLANGE. SEE SHEET D105 FOR MORE DETAILS.



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

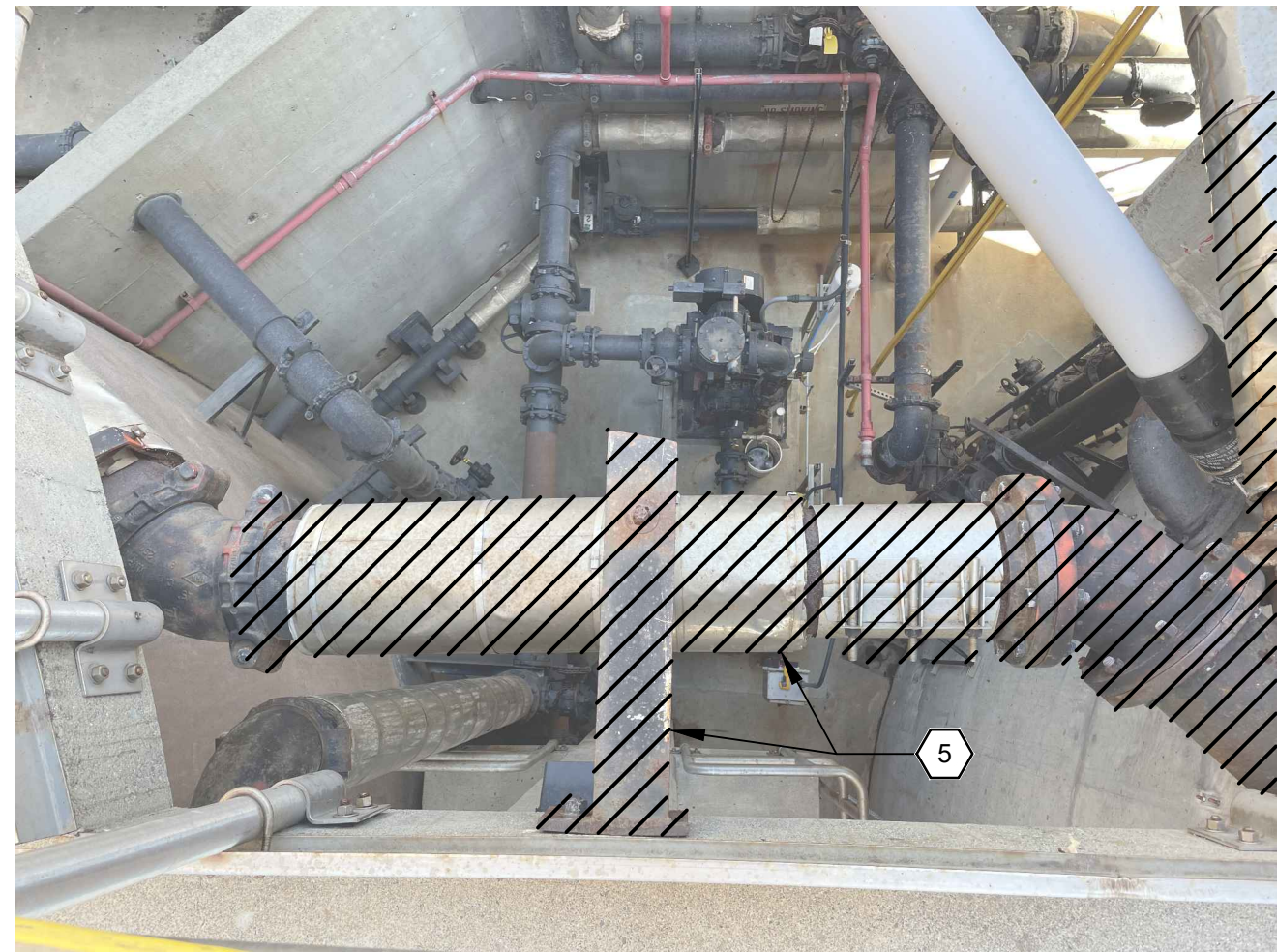


**DIGESTER CLEANING AND REHABILITATION
SCREW PRESS ROOM
DEMO PLAN AND PHOTOS**

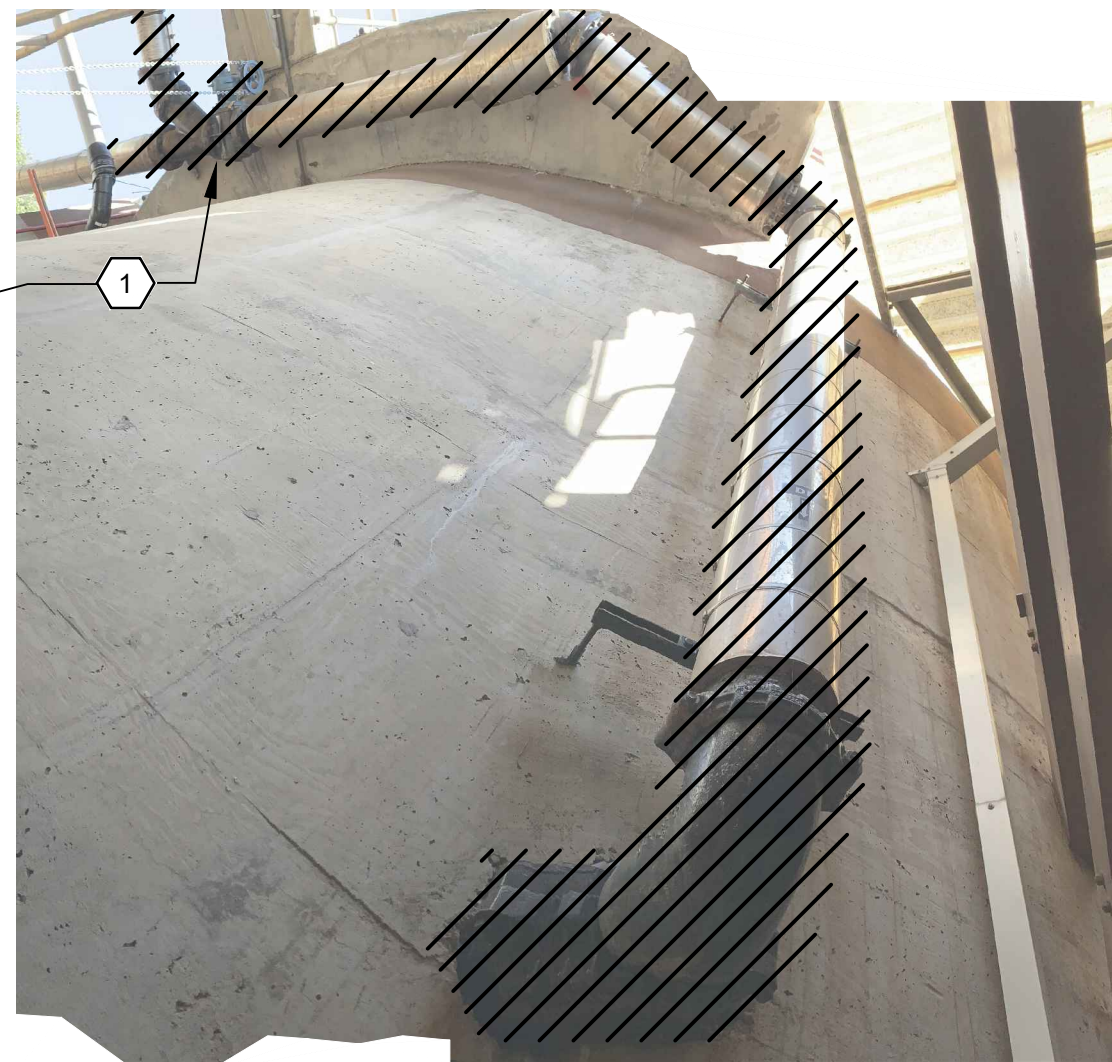


FILENAME | X105.dwg
SCALE | NTS

SHEET
X105



A
X101 NTS
DEMOLITION PHOTOGRAPH



B
X101 NTS
DEMOLITION PHOTOGRAPH



C
X101 NTS
DEMOLITION PHOTOGRAPH

GENERAL NOTES:

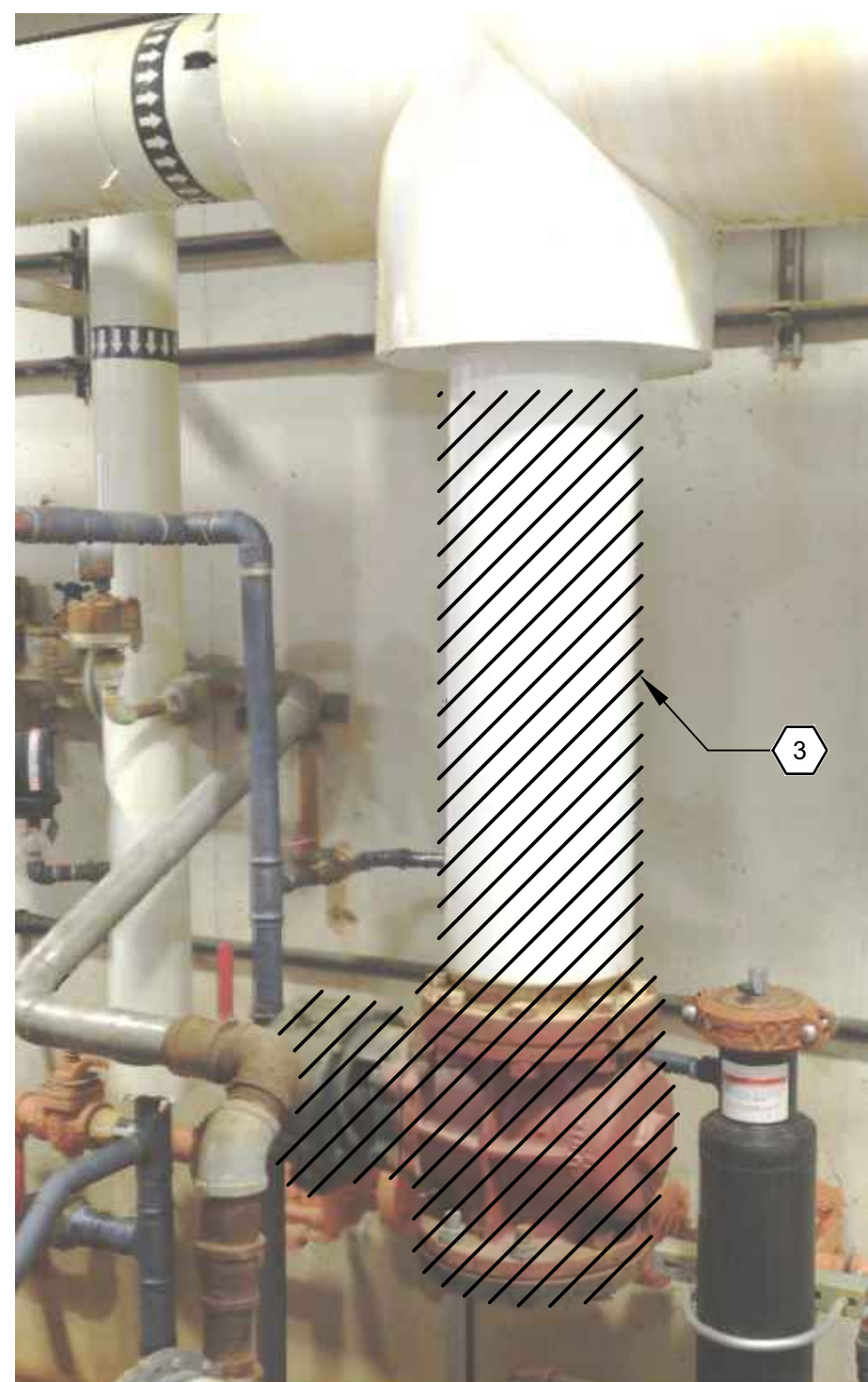
- COORDINATE WITH DISTRICT FOR ALL NECESSARY SHUTDOWNS. DISTRICT RESERVES THE RIGHT TO ALTER SHUTDOWN REQUESTS TO ACCOMMODATE PLANT OPERATIONS.

SHEET KEYNOTES

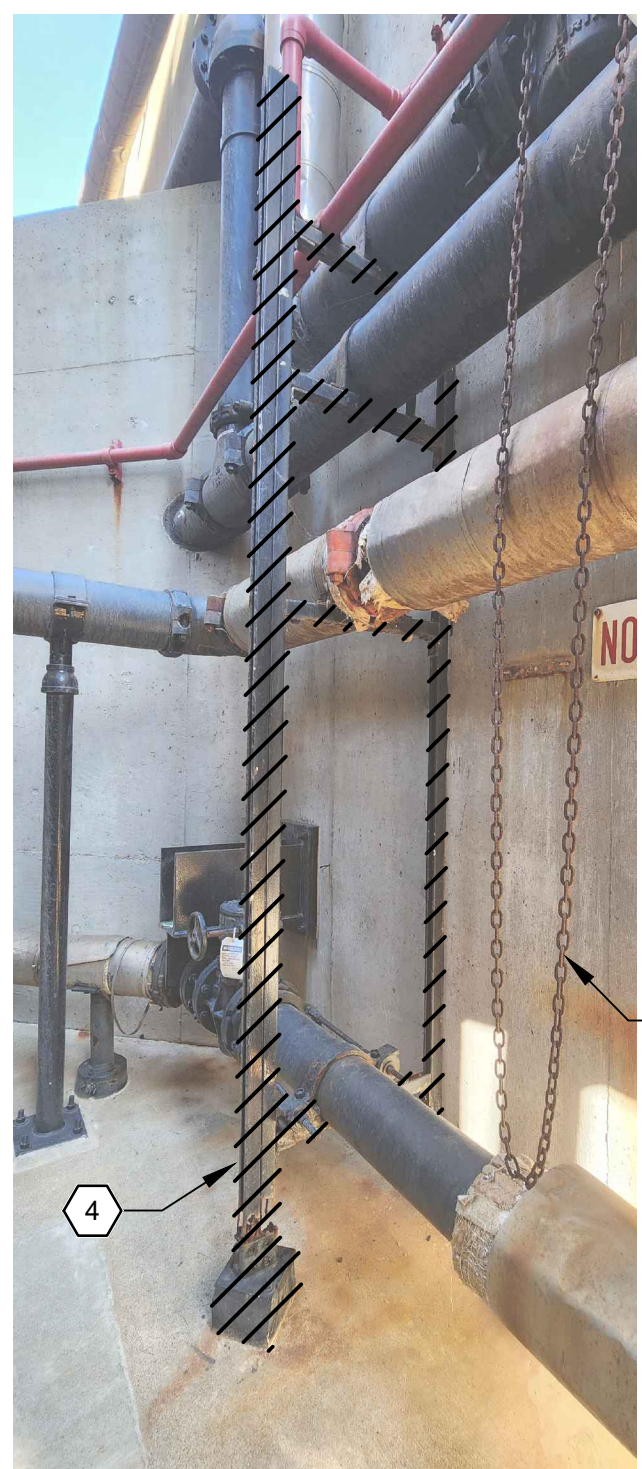
- DEMOLISH PIPE FROM SECONDARY DIGESTER TO TEE. DEMOLISH PIPE PASSED TEE AS FAR AS NEEDED TO REMOVE ALL PLUGGED PIPE.
- DEMOLISH PIPE ABOVE GRADE AND ABANDON PIPE BELOW GRADE IN PLACE. CLEAN OUT AND FILL ABANDONED PIPE WITH CONCRETE. INSTALL BLIND FLANGE ON CROSS.
- DEMOLISH VALVE AND PIPE UP TO TEE. INSTALL BLIND FLANGE ON CONNECTION.
- DEMOLISH EXISTING UNISTRUT PIPE SUPPORTS ALONG BACK WALL (APPROX 6) AFTER INSTALLING NEW PIPE SUPPORTS. SEE D101 FOR MORE DETAILS.
- DEMOLISH PIPE AND PIPE SUPPORT. SEE D101 FOR MORE DETAILS.
- REINSTALL CHAIN WHEEL OPERATOR AND INSTALL NEW 316 SST CHAIN FOR ALL VALVE HANDLES 6 FEET ABOVE OPERATING DECK.



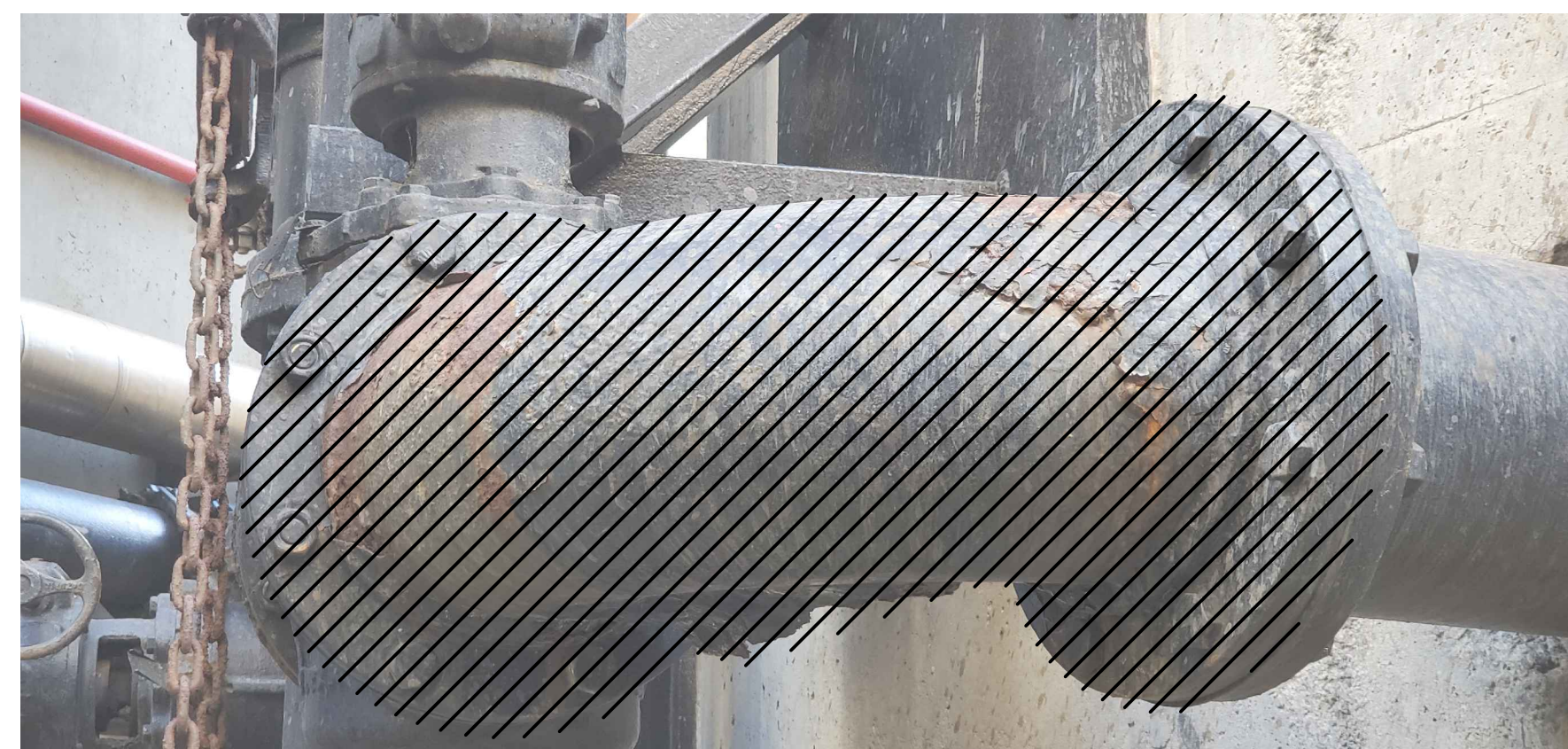
D
X101 NTS
DEMOLITION PHOTOGRAPH



E
X101 NTS
DEMOLITION PHOTOGRAPH



F
X101 NTS
DEMOLITION PHOTOGRAPH



G
X101 NTS
DEMOLITION PHOTOGRAPH

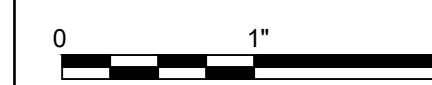


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

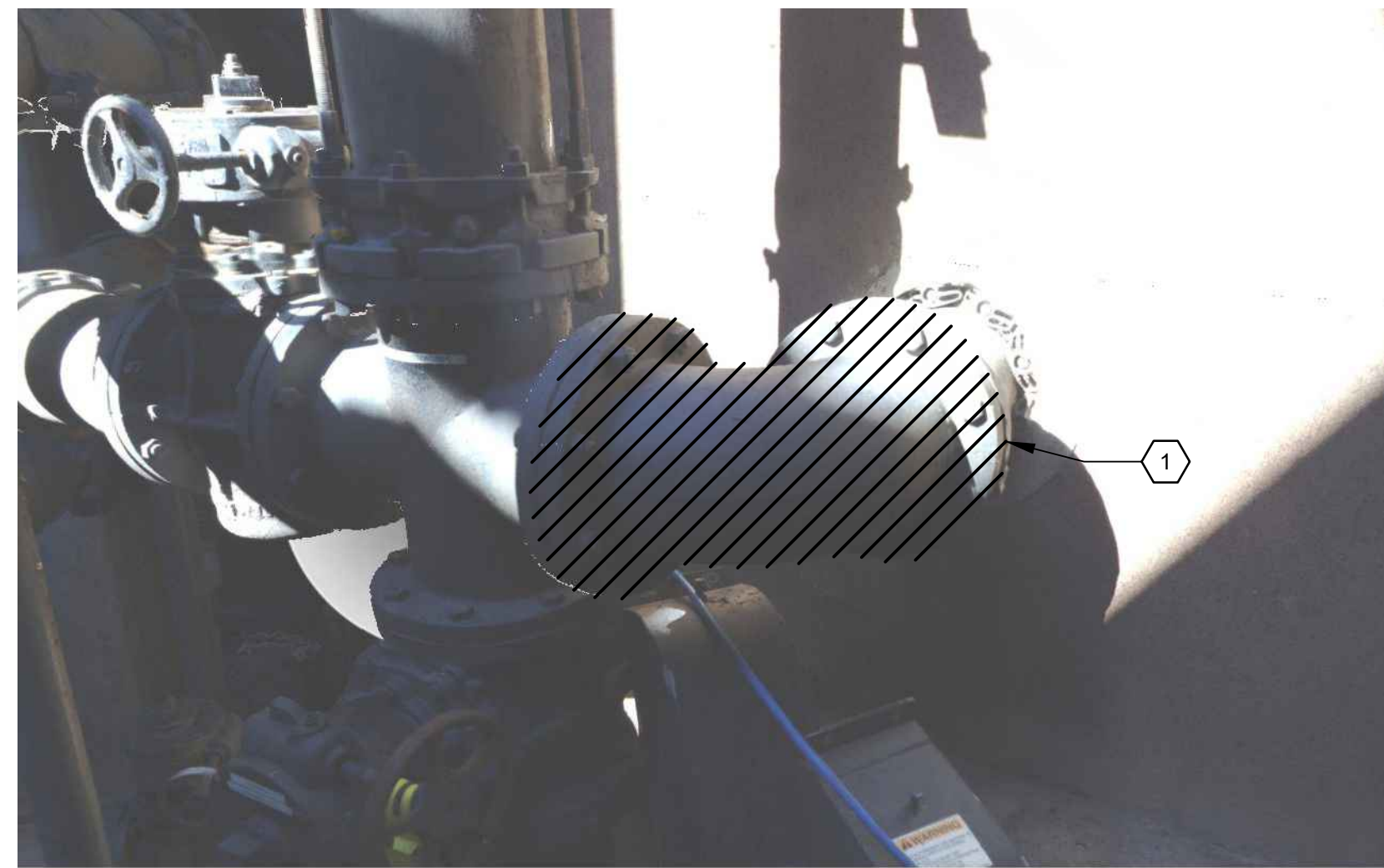


**DIGESTER CLEANING AND REHABILITATION
DEMOLITION PHOTOS I
PHASE 1**

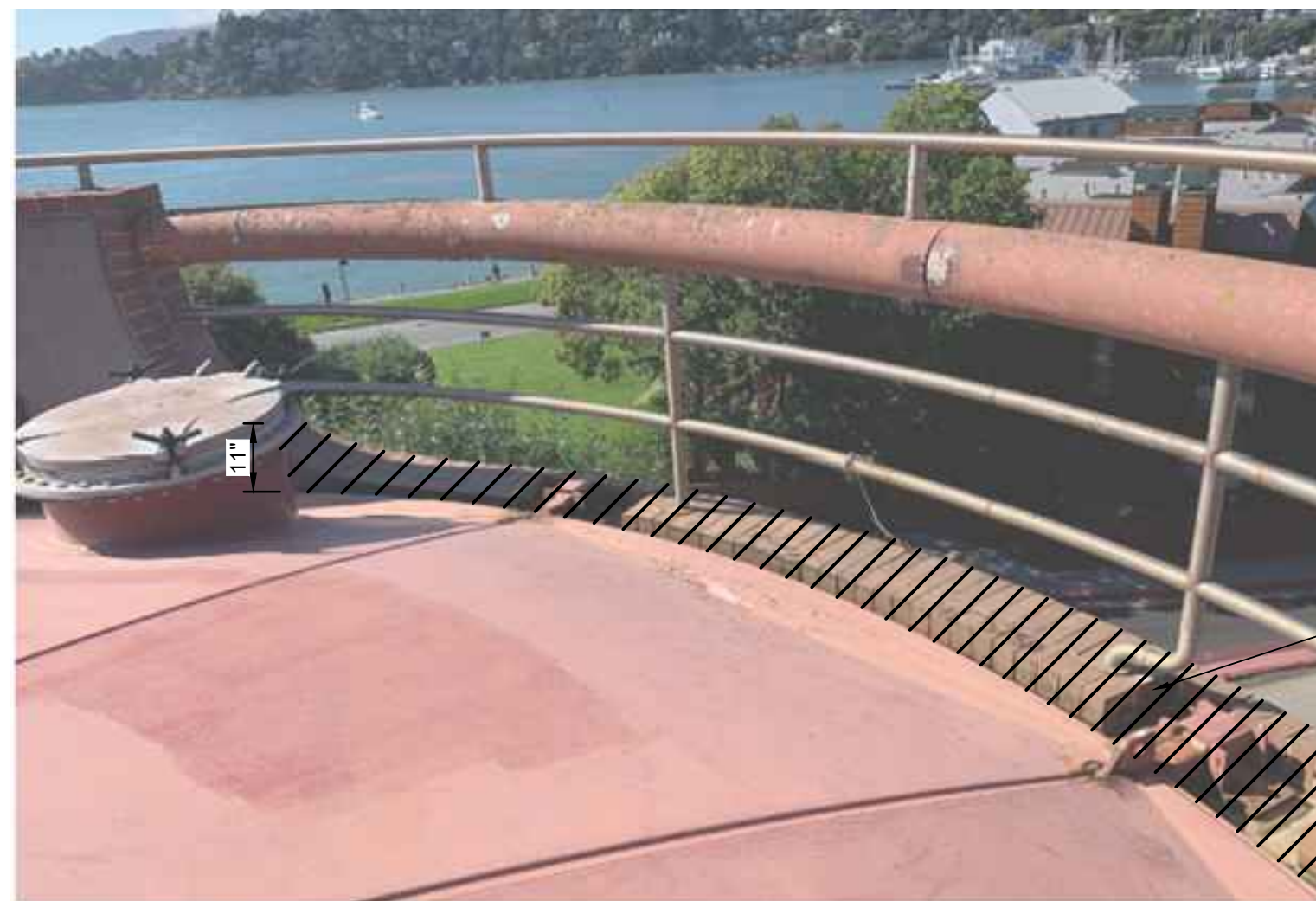


FILENAME | X901.dwg
SCALE | NTS

SHEET
X901



A DEMOLITION PHOTOGRAPH
X102 NTS



B DEMOLITION PHOTOGRAPH
X102 NTS

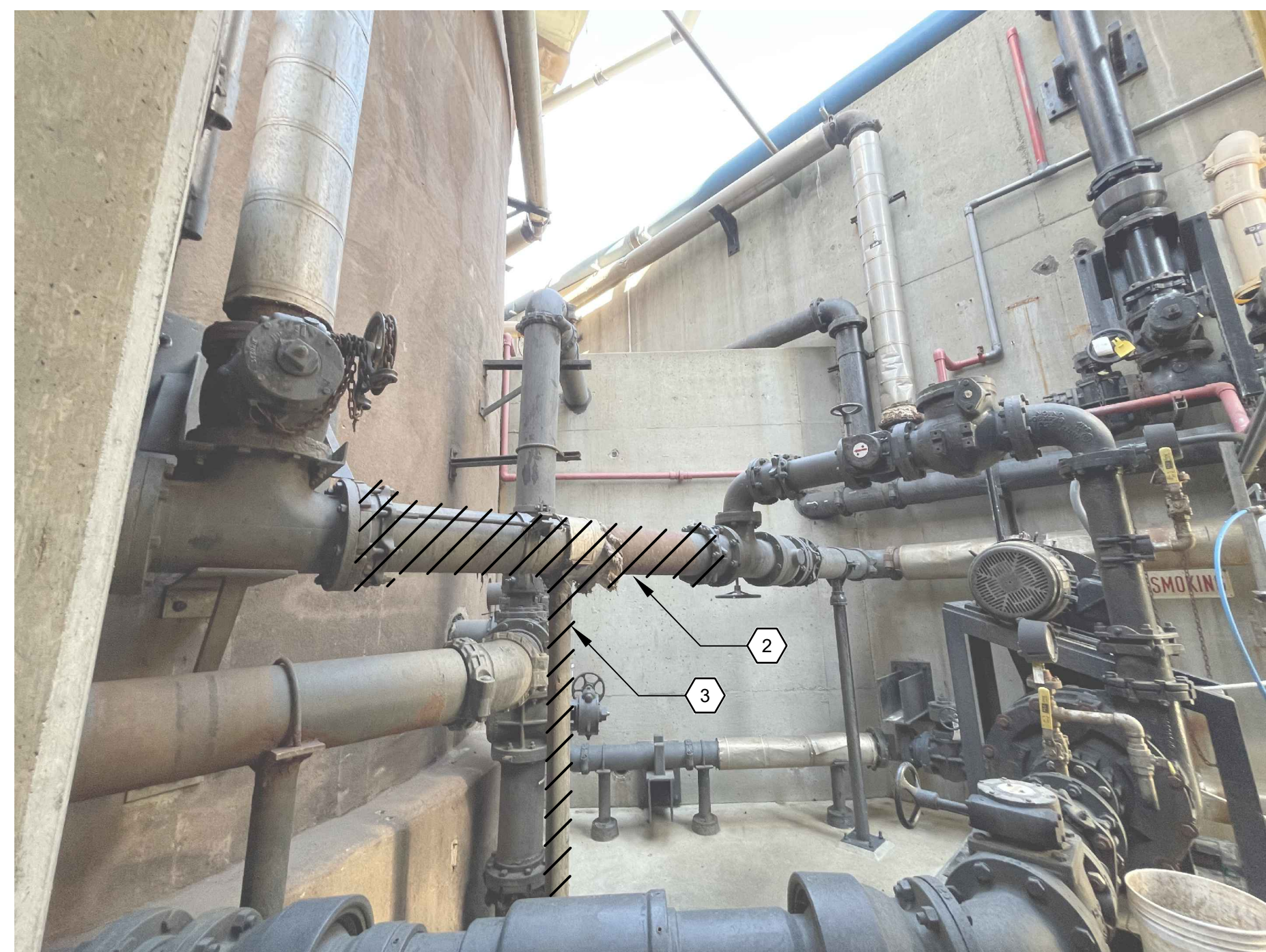
REMOVE INSIDE LAYER OF BRICK (TYP AT ALL OPENINGS)

GENERAL NOTES:

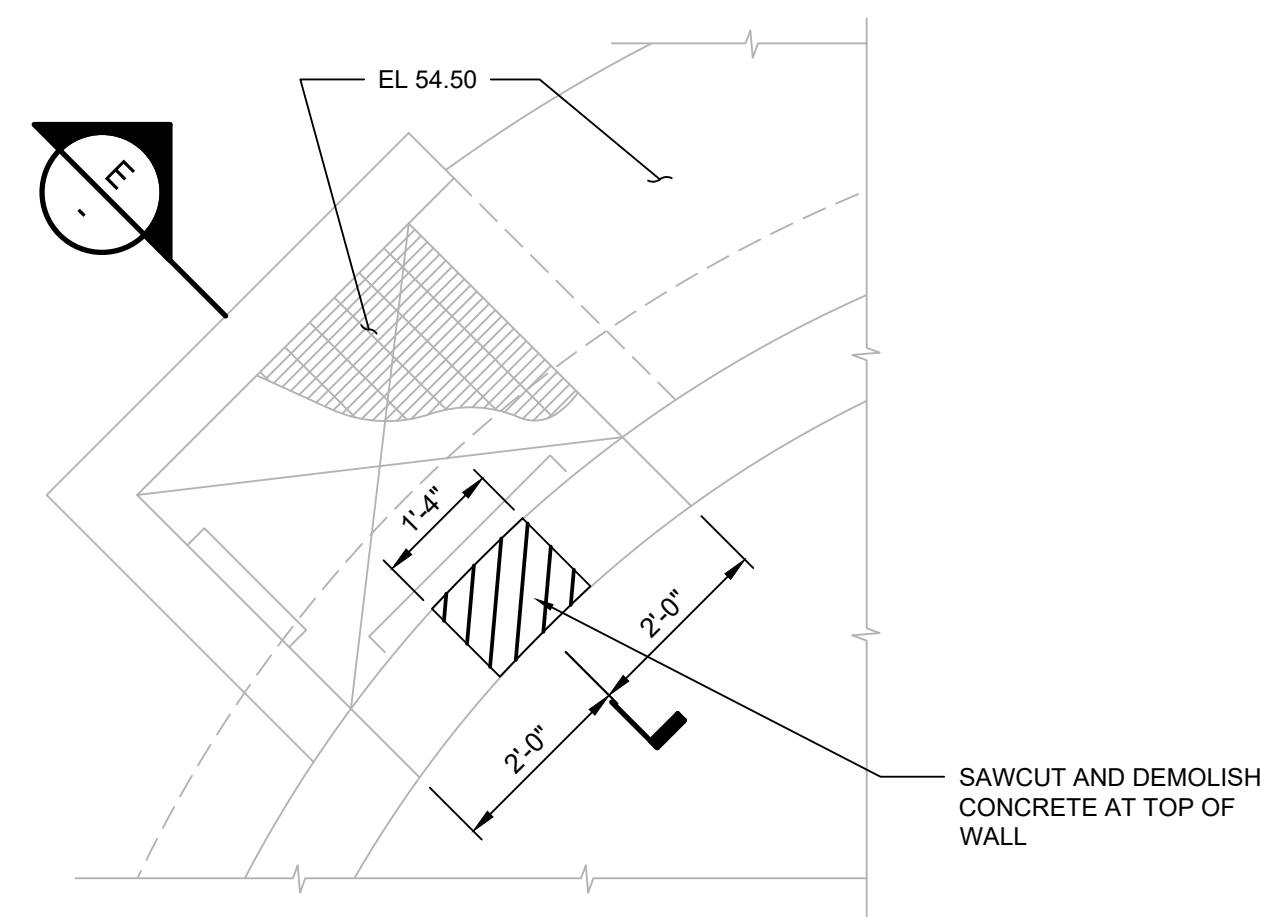
- COORDINATE WITH DISTRICT FOR ALL NECESSARY SHUTDOWNS. DISTRICT RESERVES THE RIGHT TO ALTER SHUTDOWN REQUESTS TO ACCOMMODATE PLANT OPERATIONS.

SHEET KEYNOTES

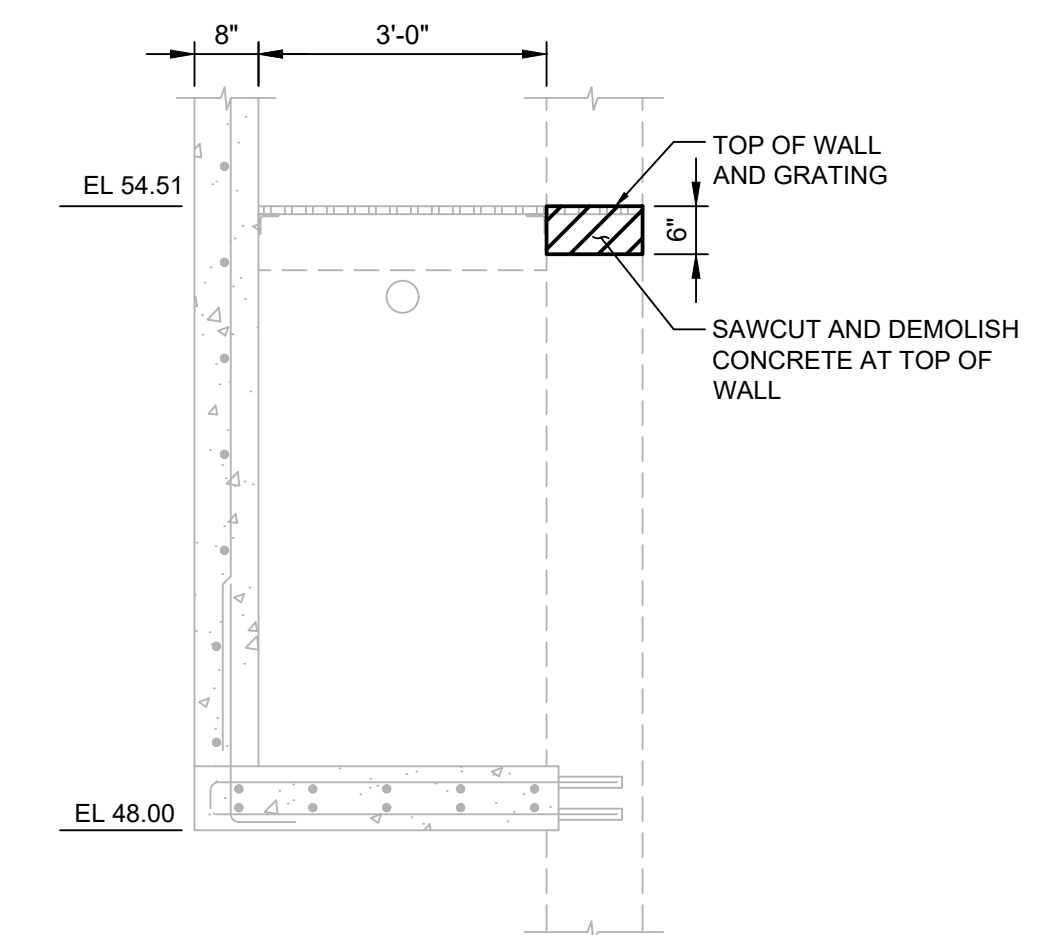
- DEMOLISH ELBOW AND CAP CONNECTIONS.
- DEMOLISH PIPE AND INSTALL FLEXIBLE CONNECTION. FLEXIBLE CONNECTION HAS BEEN PRE-PURCHASED BY DISTRICT AND IS ON SITE.
- REPLACE EXISTING PIPE SUPPORT WITH NEW.



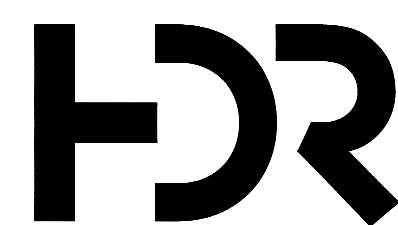
C DEMOLITION PHOTOGRAPH
X102 NTS



1 DETAIL
X102 NTS



E SECTION
1/2" = 1'-0"



| ISSUE | DATE | DESCRIPTION |
|-------|------|-------------|
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|-----------------|--------------|
| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

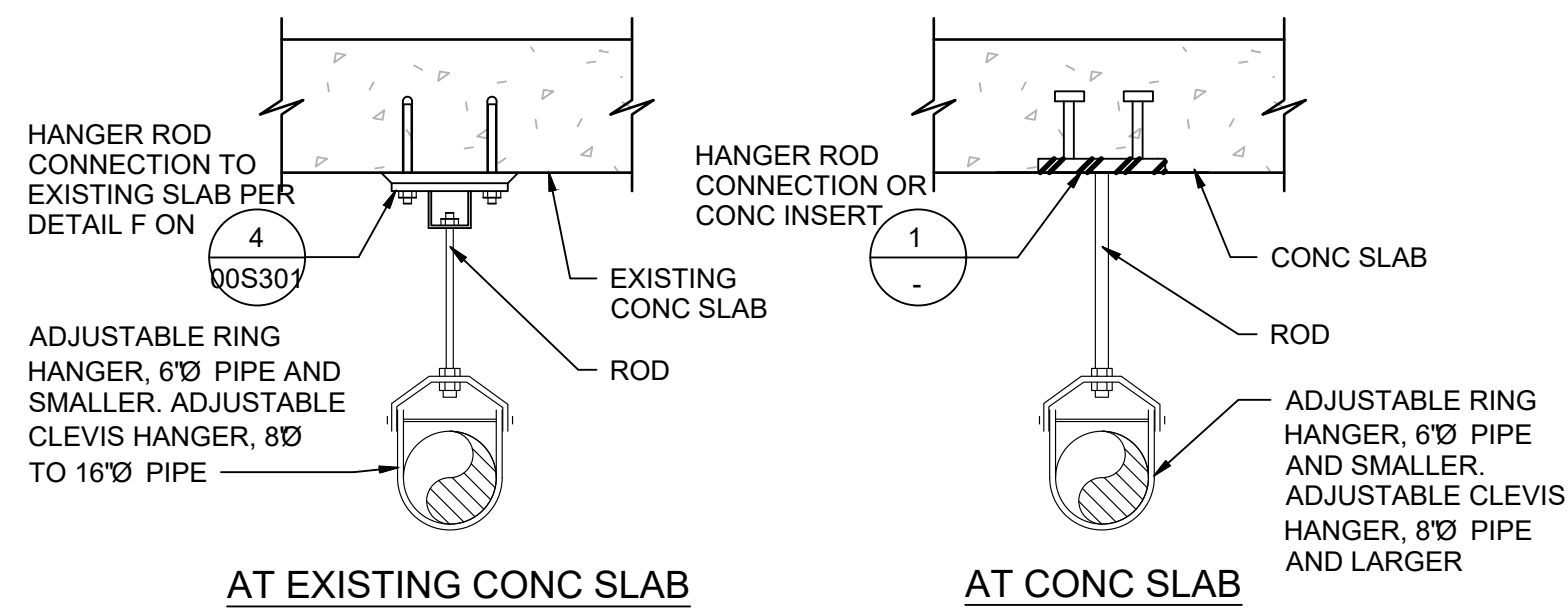


**DIGESTER CLEANING AND REHABILITATION
DEMOLITION PHOTOS AND DETAILS II
PHASE 2**



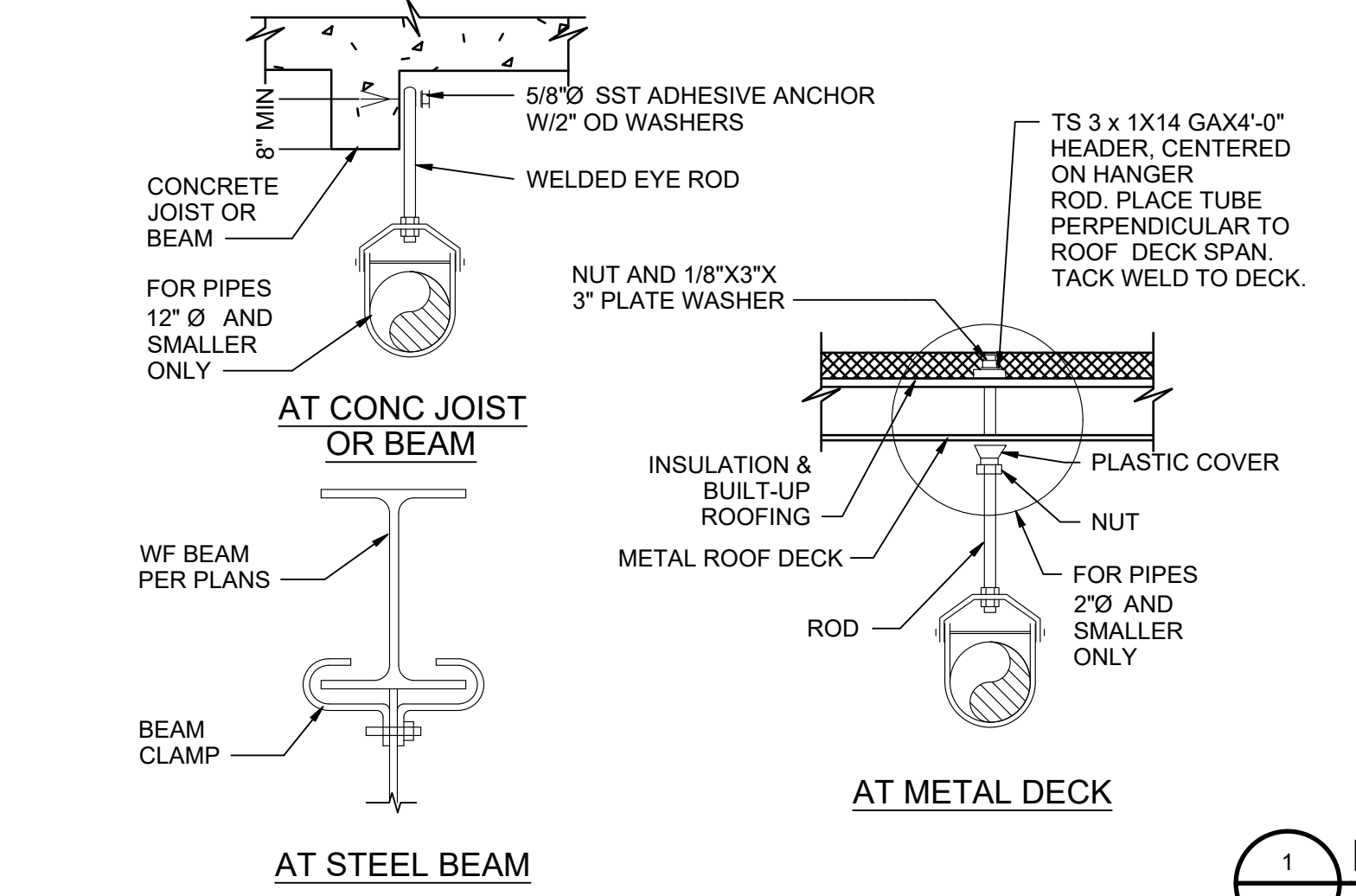
FILENAME | X902.dwg
SCALE | NTS

SHEET
X902

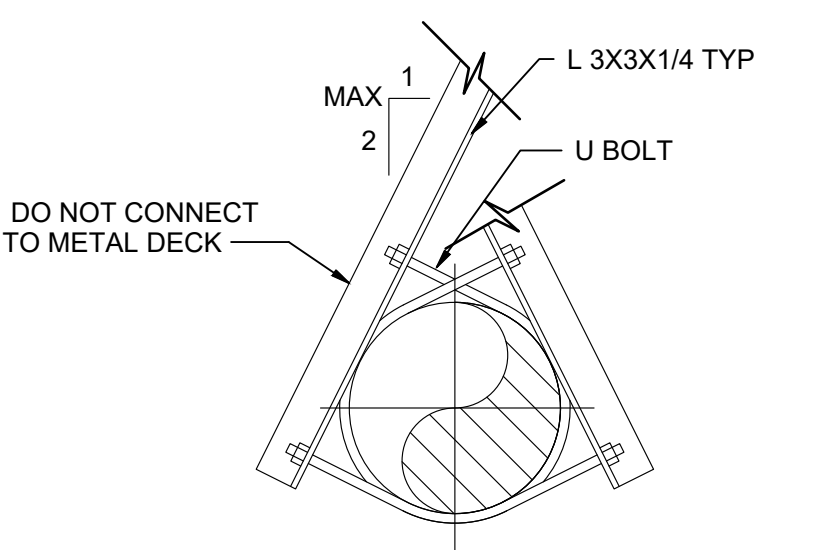


| PIPE HANGER RODS AND SUPPORT SPACING | | |
|--------------------------------------|------------------|---------------------|
| PIPE DIA (INCHES) | ROD DIA (INCHES) | MAX SUPPORT SPACING |
| 2 AND LESS | 3/8 | 5 FEET |
| 2 1/2 TO 3 1/2 | 1/2 | 10 FEET |
| 4 TO 5 | 5/8 | 10 FEET |
| 6 | 3/4 | 10 FEET |
| 8 | 7/8 | 10 FEET |
| 10 | 7/8 | 10 FEET |
| 12 | 7/8 | 10 FEET |
| 14 TO 18 | 1 | 10 FEET |
| 20 TO 24 | 1 1/4 | 10 FEET |
| 30 TO 36 (NOTE 7) | 1 1/4 | 10 FEET |

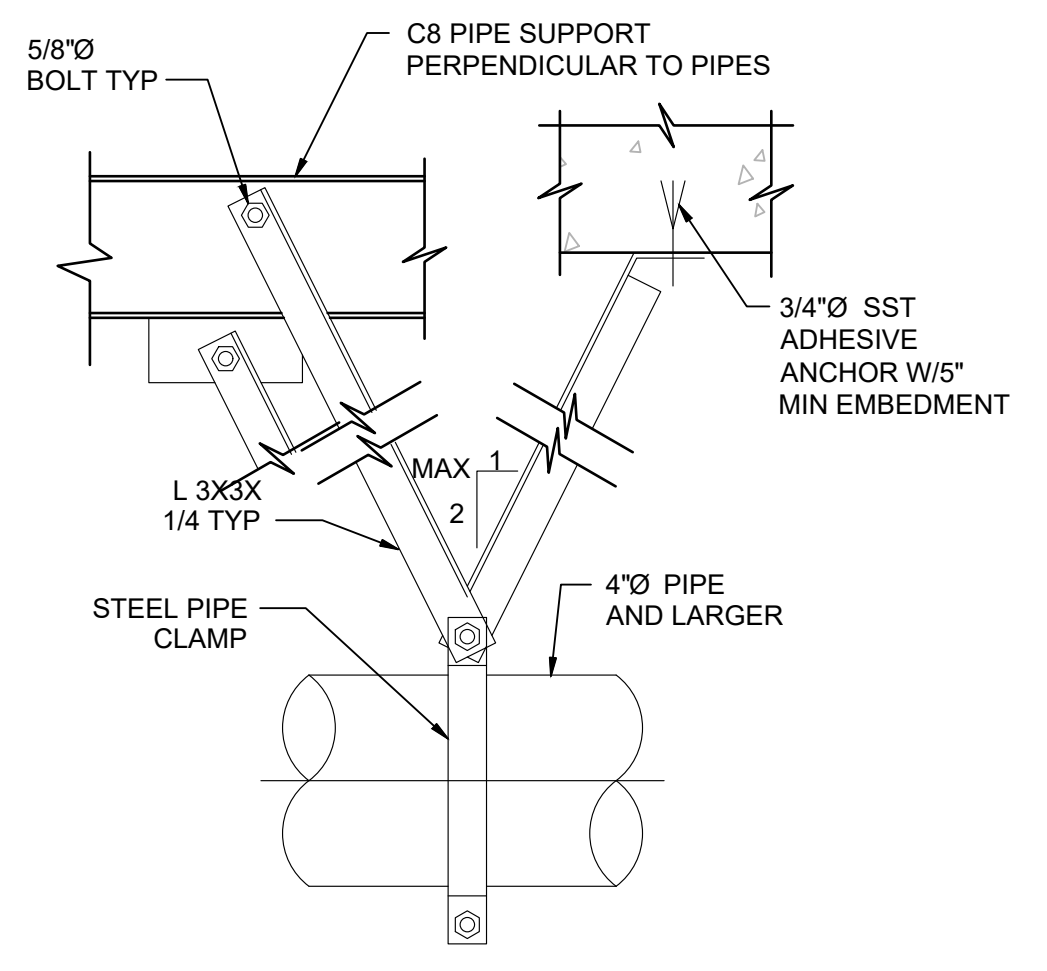
- NOTES:
1. MAXIMUM LONGITUDINAL BRACE SPACING = 20'-0", MINIMUM OF ONE PER PIPE.
 2. MAXIMUM TRANSVERSE BRACE SPACING = 20'-0", MINIMUM OF ONE PER PIPE.
 3. DO NOT CONNECT BRACE TO BOTTOM OF ROOF BEAM OR C8 PIPE SUPPORT.
 4. USE LONGITUDINAL AND TRANSVERSE BRACES FOR PIPES 4" AND LARGER.
 5. ISOLATE ALL COPPER PIPE FROM SUPPORT WITH PVC TAPE.
 6. PROVIDE ADDITIONAL HANGER AT EACH SIDE OF ALL VALVES 4 INCHES AND LARGER.
 7. AIR PIPING ONLY.



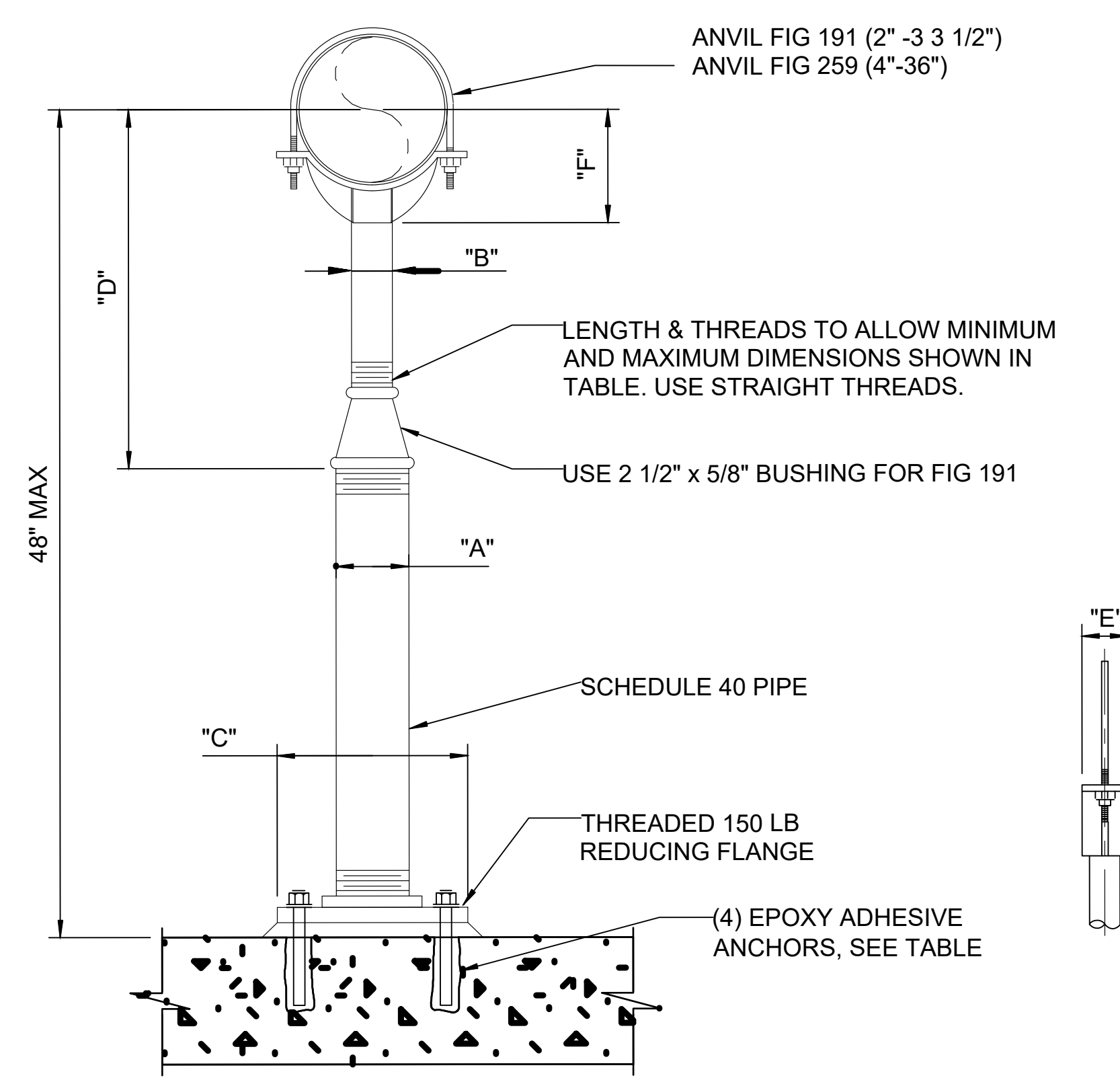
1 PIPE HANGER
- NTS



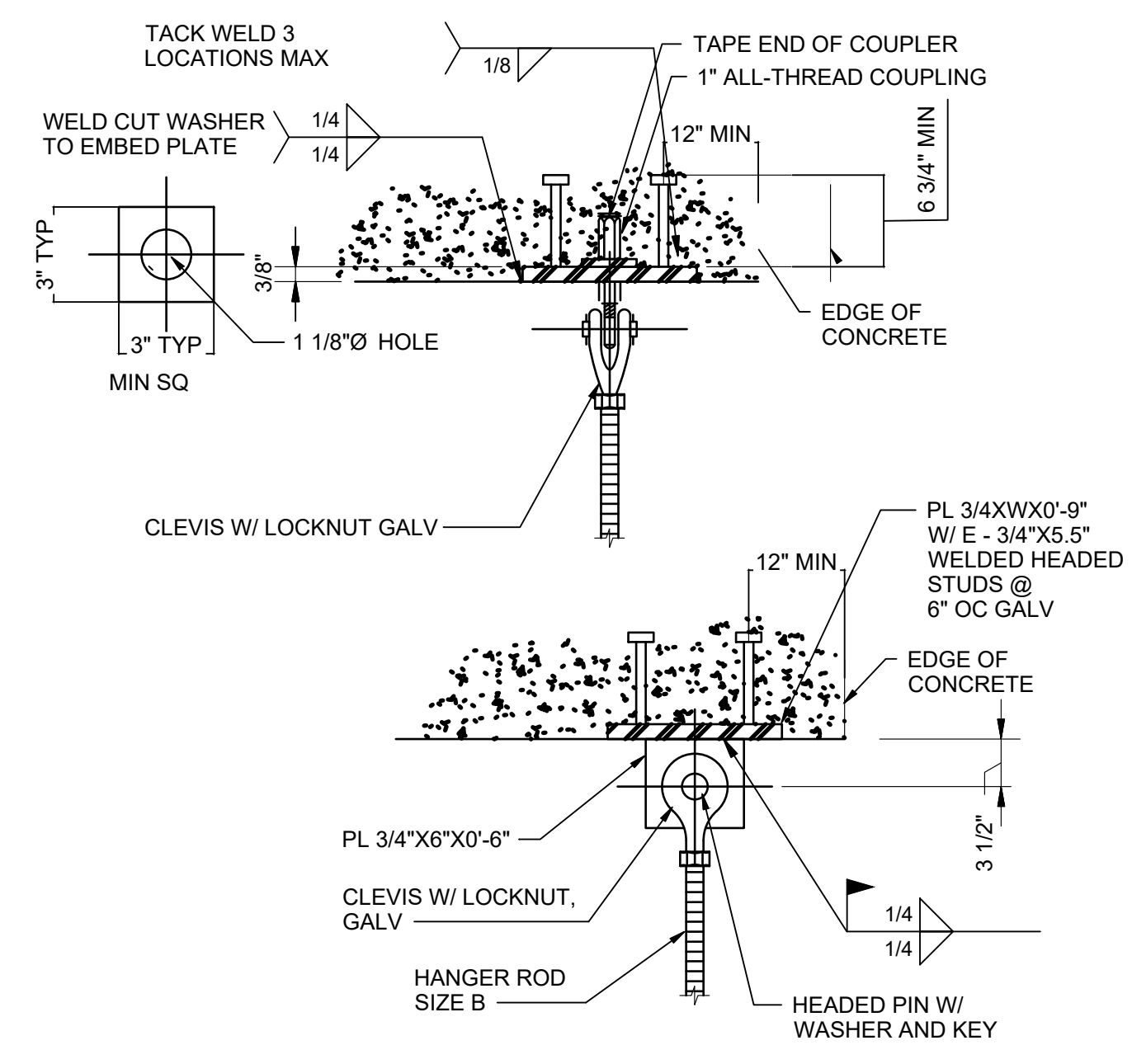
TRANSVERSE BRACE



LONGITUDINAL BRACE



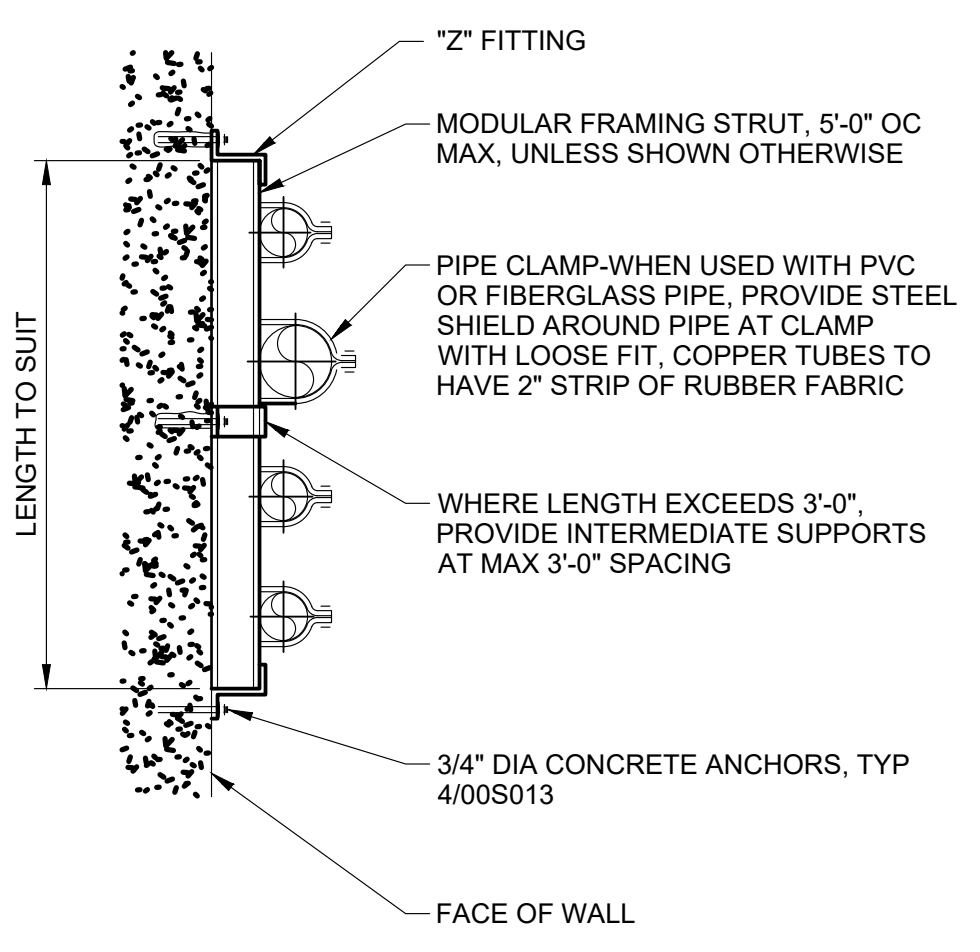
4 ADJUSTABLE PIPE SUPPORT
- NTS



| CONNECTION INFORMATION | | | | |
|------------------------|-----------|---------|---------------|---------|
| HANGER RODS SIZE B | CLEVIS NO | PIN DIA | PLATE WIDTH W | E STUDS |
| 3/8" OR 1/2" | 2 | 3/4" | 4" | 2 |
| 3/4" OR 7/8" | 2 1/2 | 1 1/2" | 4" | 2 |
| 1" OR 1 1/4" | 3 | 1 3/4" | 9" | 4 |

- NOTE:
1. HOT-DIPPED GALVANIZED AFTER FABRICATION.
 2. CONTRACTOR MAY PROPOSE TO UTILIZE AN ALTERNATIVE HIGH CAPACITY, HOT ROLLED, EMBEDDED CHANNEL ANCHORING SYSTEM FOR ATTACHING LARGE DIAMETER PIPE SUPPORT HANGER TO OVERHEAD CONCRETE STRUCTURES. SUCH A SYSTEM SHALL UTILIZE HALFEN HTA SERIES EMBEDDED ANCHORED CHANNELS, OR AN ACCEPTABLE EQUIVALENT SYSTEM, WITH STRUCTURAL GRADE T-BOLTS ATTACHED TO A CONNECTOR AND CLEVIS DETAIL SIMILAR TO THE STANDARD HANGER ROD CONNECTION ABOVE. THE ALTERNATIVE ANCHORING SYSTEM COMPONENTS SHALL BE SELECTED AS REQUIRED TO SUPPORT THE LARGE PIPE HANGER LOADINGS PROVIDED BY ENGINEER AFTER AWARD OF CONTRACT. IF ADEQUATE ALTERNATIVE SUPPORTS ARE NOT AVAILABLE, THE SUPPORT DETAIL INDICATED ABOVE SHALL BE UTILIZED.

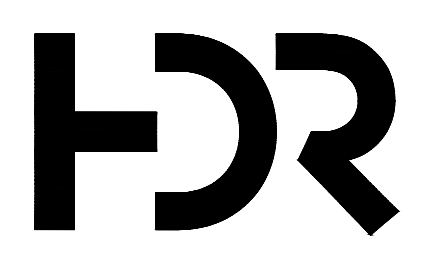
2 HANGER ROD CONNECTION
- NTS



- NOTES:
1. UP TO 8" DIAMETER PIPES ONLY.
 2. MAXIMUM OF 3 TO 6 PIPES.

3 SURFACE MOUNT MODULAR STRUT
- NTS

| PIPE SIZE | FLOOR PIPE SUPPORT SCHEDULE DIMENSIONS IN INCHES | | | | | | | ANCHORS | |
|-----------|--|-----|--------|----------|----------|-------|---------|---------|-------|
| | "A" | "B" | "C" | "D" | | "E" | "F" | DIA | EMBED |
| | | | | MINIMUM | MAXIMUM | | | | |
| 2 | 2 1/2 | - | 9 | - | - | N/A | N/A | 5/8 | 5 |
| 2 1/2 | 2 1/2 | - | 9 | - | - | N/A | N/A | 5/8 | 5 |
| 3 | 2 1/2 | - | 9 | - | - | N/A | N/A | 5/8 | 5 |
| 3 1/2 | 2 1/2 | - | 9 | 10 1/4 | 10 1/4 | N/A | N/A | 5/8 | 5 |
| 4 | 4 | 3 | 9 | 9 1/2 | 14 | 3 5/8 | 4 3/16 | 5/8 | 5 |
| 5 | 4 | 3 | 9 | 10 1/8 | 14 5/8 | 3 5/8 | 4 3/16 | 5/8 | 5 |
| 6 | 4 | 3 | 9 | 10 3/4 | 15 1/4 | 3 5/8 | 5 7/16 | 5/8 | 5 |
| 8 | 4 | 3 | 9 | 12 1/4 | 16 3/4 | 3 5/8 | 6 15/16 | 5/8 | 5 |
| 10 | 4 | 3 | 9 | 13 3/4 | 18 1/4 | 3 5/8 | 8 7/16 | 5/8 | 5 |
| 12 | 4 | 3 | 9 | 14 5/8 | 19 1/8 | 3 5/8 | 9 15/16 | 5/8 | 5 |
| 14 | 4 | 3 | 11 | 15 13/16 | 20 5/16 | 6 | 10 1/2 | 3/4 | 6 5/8 |
| 16 | 4 | 3 | 11 | 16 13/16 | 21 5/16 | 6 | 11 1/2 | 3/4 | 6 5/8 |
| 18 | 6 | 4 | 13 1/2 | 19 1/8 | 23 5/8 | 6 | 13 1/2 | 3/4 | 6 5/8 |
| 20 | 6 | 4 | 13 1/2 | 20 1/8 | 24 5/8 | 6 | 14 1/2 | 3/4 | 6 5/8 |
| 22 | 6 | 4 | 13 1/2 | 21 5/16 | 25 13/16 | 6 | 15 1/2 | 3/4 | 6 5/8 |
| 24 | 6 | 4 | 13 1/2 | 23 5/16 | 27 13/16 | 6 | 17 1/2 | 3/4 | 6 5/8 |
| 26 | 6 | 4 | 13 1/2 | 24 5/16 | 28 13/16 | 6 | 18 1/2 | 3/4 | 6 5/8 |
| 30 | 6 | 4 | 13 1/2 | 26 7/16 | 30 15/16 | 6 | 20 5/8 | 3/4 | 6 5/8 |
| 32 | 6 | 4 | 13 1/2 | 27 7/16 | 31 15/16 | 6 | 21 5/8 | 3/4 | 6 5/8 |
| 36 | 6 | 4 | 13 1/2 | 29 7/16 | 33 15/16 | 6 | 23 5/8 | 3/4 | 6 5/8 |



| ISSUE | DATE | DESCRIPTION |
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|---------------------------|--------------|
| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

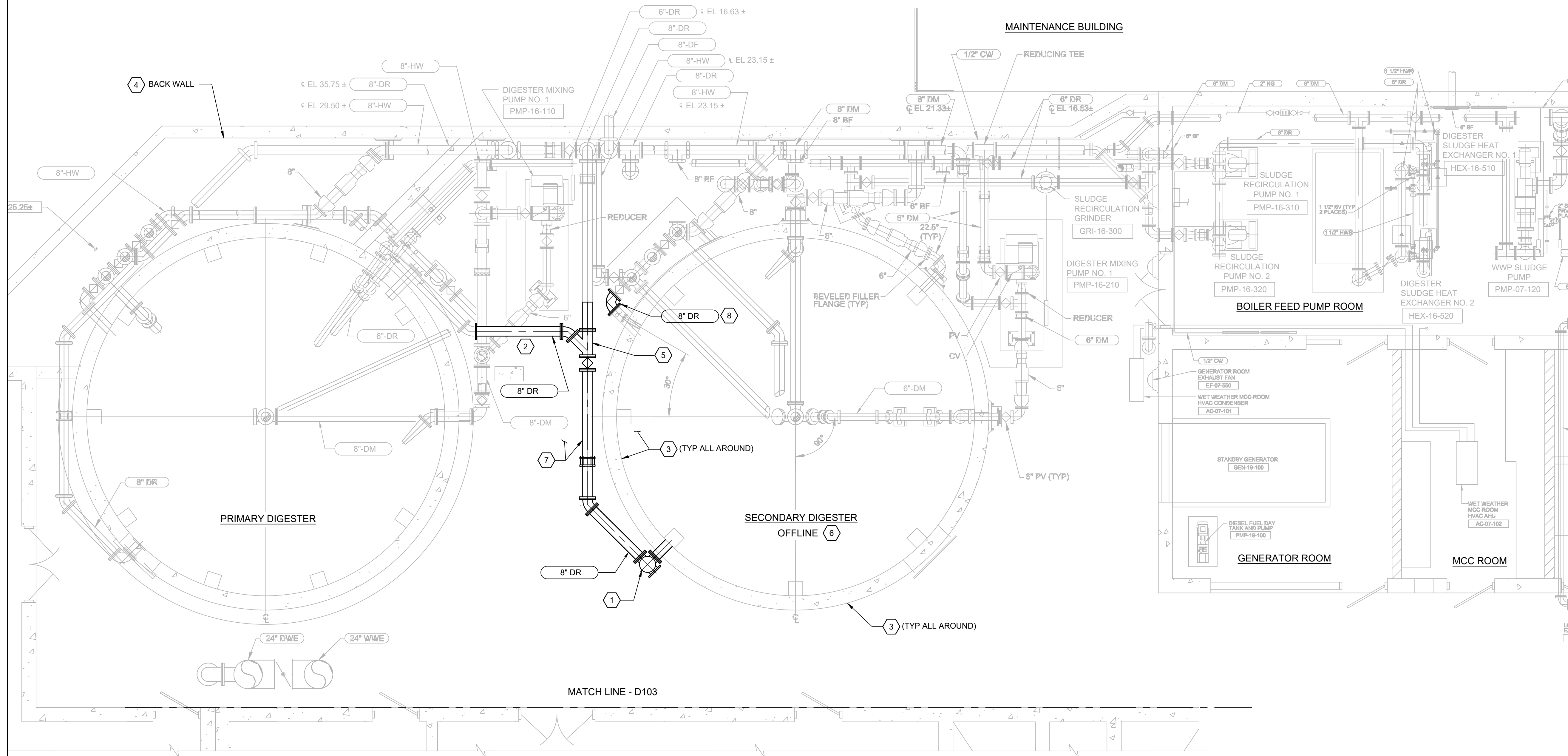
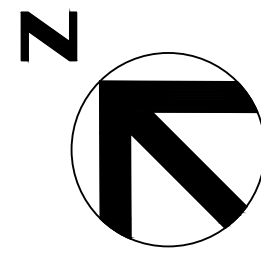


DIGESTER CLEANING AND REHABILITATION PIPE SUPPORT DETAILS



FILENAME | D001.dwg
SCALE | NTS

SHEET
D001



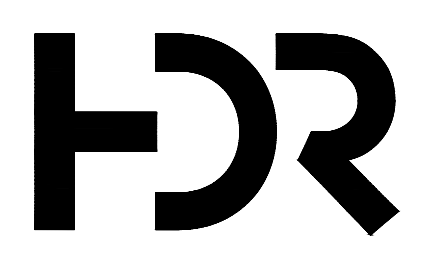
GENERAL NOTES:

1. NOT ALL EXISTING PIPING SHOWN FOR CLARITY. INSULATION NOT SHOWN FOR DM OR DR PIPING.
2. SEE SPEC 40 05 00 FOR PIPING SYSTEMS. IF FIELD CONDITIONS DIFFER FROM PIPING SYSTEMS SPEC, NOTIFY ENGINEER VIA RFI.
3. PROVIDE FITTINGS AS REQUIRED TO INSTALL NEW PIPING AND VALVES TO EXISTING PIPING.
4. BACKGROUND OF DRAWING BASED ON SHEET 16M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.
5. VIDEO DOCUMENT INSIDE OF ANY PIPE CONTRACTOR WORKS ON. SUBMIT VIDEO TO ENGINEER BEFORE REQUESTING TO PUT PIPE BACK IN SERVICE.
6. REINSTALL CHAIN WHEEL OPERATOR AND INSTALL NEW 316 SST CHAIN FOR ALL VALVE HANDLES 6 FEET ABOVE OPERATING DECK.

SHEET KEYNOTES

1. INSTALL CROSS AT TOP OF PIPE AND CAP UNCONNECTED CONNECTIONS.
2. INSTALL PIPE WITH 1-INCH NIPPLE AND PIPE SADDLE. MATCH EXISTING PIPE MATERIAL, SIZE AND INSULATION. SLOPE PIPE TO SECONDARY DIGESTER AT 1% MINIMUM.
3. REPAIR SPALLED CONCRETE, EXPOSED REBAR AND VISIBLE CRACKS. REFER TO DETAIL 1/S005 FOR SPALLED CONCRETE REPAIR AND SPECIFICATION SECTION 03 01 30. INJECT CRACKS WITH AN INJECTION MATERIAL IN ACCORDANCE WITH SPECIFICATION SECTION 03 01 38 AND DETAIL 3/S005. REPAIRS SHALL BE CONDUCTED ON SECONDARY DIGESTER INTERIOR FLOOR, INTERIOR WALLS, EXTERIOR WALLS AND EXTERIOR FOUNDATION.
4. INSTALL NEW UNISTRUT PIPE SUPPORTS ALONG BACK WALL (APPROX 6). MATCH NUMBER AND APPROXIMATE LOCATION OF EXISTING SUPPORTS. FIELD VERIFY NUMBER WITH DISTRICT STAFF.
5. INSTALL NEW PIPE. MATCH EXISTING PATH, SIZE, MATERIAL AND INSULATION. SLOPE PIPE TO SECONDARY DIGESTER AT 1% MINIMUM.
6. REMOVE DIGESTER LID. DISCONNECT BIOGAS PIPING ON TOP OF LID (NOT SHOWN ON DRAWING) AS NEEDED TO REMOVE LID. LAY LID DOWN IN AREA SHOWN ON G101. CLEAN LID AND COORDINATE WITH ENGINEER FOR INSPECTION FROM STRUCTURAL OR COATINGS ENGINEER. SANDBLAST AND RECOAT PER SECTION 09 96 00. REPLACE ALL ELASTOMERIC COMPONENTS AND GASKETS OF THE FLANGES BEFORE ISOLATION TO THE DIGESTER LID. THIS INCLUDES, BUT IS NOT LIMITED TO, GASKETS BELOW AND IN ALL VAREC HATCHES AND THE FLANGES BEFORE THE FIRST ISOLATION VALVE. REINSTALL LID. WATER TEST DIGESTER PER SECTION 01 11 00.
7. REPLACE ANY CORRODED OR BENT PIPE HANGERS IN DIGESTER AREA TO CONCRETE IN KIND (APPROX 20). MATCH NUMBER AND LOCATION OF EXISTING SUPPORTS.
8. REPLACE ELBOW WITH NEW. MATCH EXISTING SIZE AND MATERIAL.

DIGESTER AREA BOTTOM PLAN - PHASE 1
SCALE: 1/4" = 1'-0"

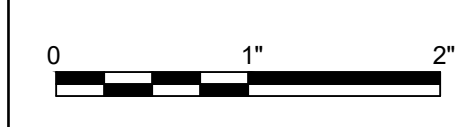


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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

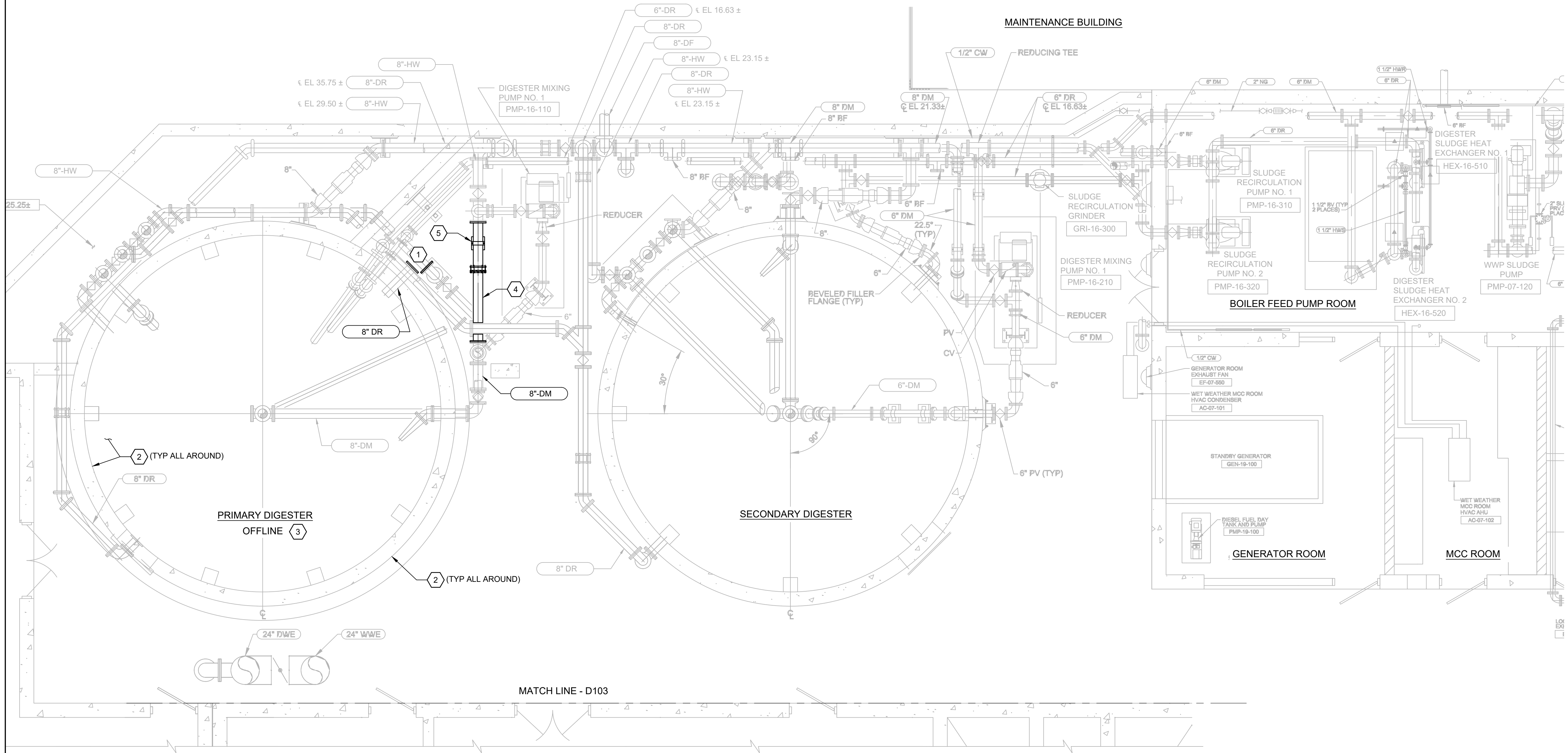
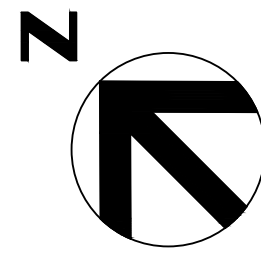


**DIGESTER CLEANING AND REHABILITATION
DIGESTER PROCESS PLAN
PHASE 1**



FILENAME | D101.dwg
SCALE | 1/4" = 1'-0"

SHEET
D101



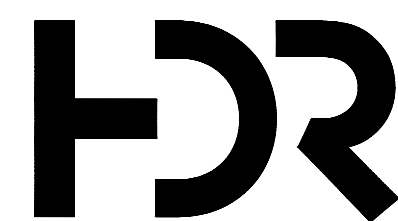
DIGESTER AREA BOTTOM PLAN - PHASE 2
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. NOT ALL EXISTING PIPING SHOWN FOR CLARITY. INSULATION NOT SHOWN FOR DM OR DR PIPING.
2. SEE SPEC 40 05 00 FOR PIPING SYSTEMS. IF FIELD CONDITIONS DIFFER FROM PIPING SYSTEMS SPEC, NOTIFY ENGINEER VIA RFI.
3. PROVIDE FITTINGS AS REQUIRED TO INSTALL NEW PIPING AND VALVES TO EXISTING PIPING.
4. BACKGROUND OF DRAWING BASED ON SHEET 16M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.
5. VIDEO DOCUMENT INSIDE OF ANY PIPE CONTRACTOR WORKS ON. SUBMIT VIDEO TO ENGINEER BEFORE REQUESTING TO PUT PIPE BACK IN SERVICE.
6. REINSTALL CHAIN WHEEL OPERATOR AND INSTALL NEW 316 SST CHAIN FOR ALL VALVE HANDLES 6 FEET ABOVE OPERATING DECK.

SHEET KEYNOTES

1. INSTALL BLIND FLANGES TO CAP CONNECTIONS
2. REPAIR SPALLED CONCRETE, EXPOSED REBAR AND VISIBLE CRACKS. REFER TO DETAIL 1/S005 FOR SPALLED CONCRETE REPAIR AND SPECIFICATION SECTION 03 01 30. INJECT CRACKS WITH AN INJECTION MATERIAL IN ACCORDANCE WITH SPECIFICATION SECTION 03 01 38 AND DETAIL 3/S005. REPAIRS SHALL BE CONDUCTED ON PRIMARY DIGESTER INTERIOR FLOOR, INTERIOR WALLS, EXTERIOR WALLS AND EXTERIOR FOUNDATION.
3. REMOVE DIGESTER LID. DISCONNECT BIOGAS PIPING ON TOP OF LID (NOT SHOWN ON DRAWING) AS NEEDED TO REMOVE LID. LAY LID DOWN IN AREA SHOWN ON G101. CLEAN LID AND COORDINATE WITH ENGINEER FOR INSPECTION FROM STRUCTURAL OR COATINGS ENGINEER. SANDBLAST AND RECOAT PER SECTION 09 96 00. REPLACE ALL ELASTOMERIC COMPONENTS AND GASKETS OF THE FLANGES BEFORE ISOLATION TO THE DIGESTER LID. THIS INCLUDES, BUT IS NOT LIMITED TO, GASKETS BELOW AND IN ALL VAREC HATCHES AND THE FLANGES BEFORE THE FIRST ISOLATION VALVE. REINSTALL LID. WATER TEST DIGESTER PER SECTION 01 11 00.
4. INSTALL FLEXIBLE EXPANSION JOINT. FLEXIBLE EXPANSION JOINT HAS BEEN PRE-PURCHASED BY DISTRICT AND IS ON SITE.
5. REPLACE EXISTING PIPE SUPPORT WITH NEW. SEE DETAIL 4/D001.



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

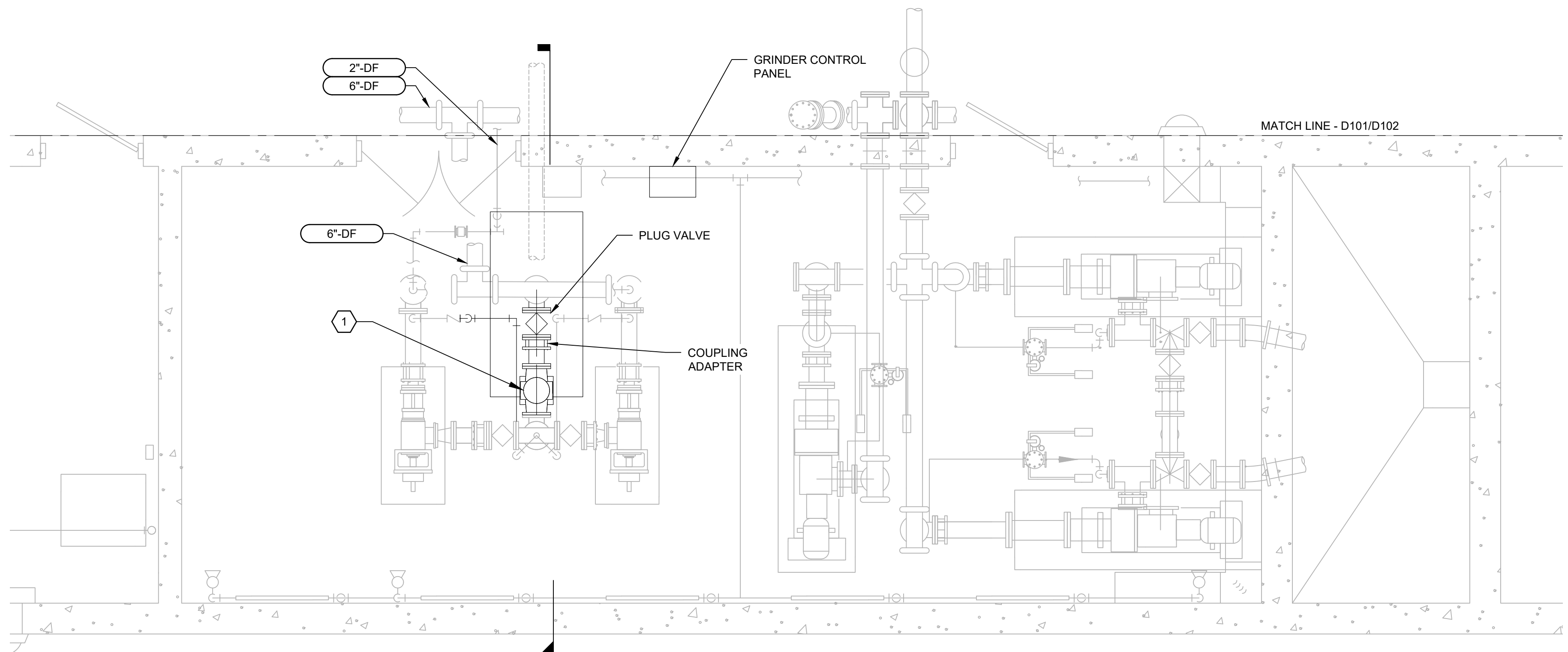


**DIGESTER CLEANING AND REHABILITATION
DIGESTER PROCESS PLAN
PHASE 2**



FILENAME | D102.dwg
SCALE | 1/4" = 1'-0"

SHEET
D102



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D103

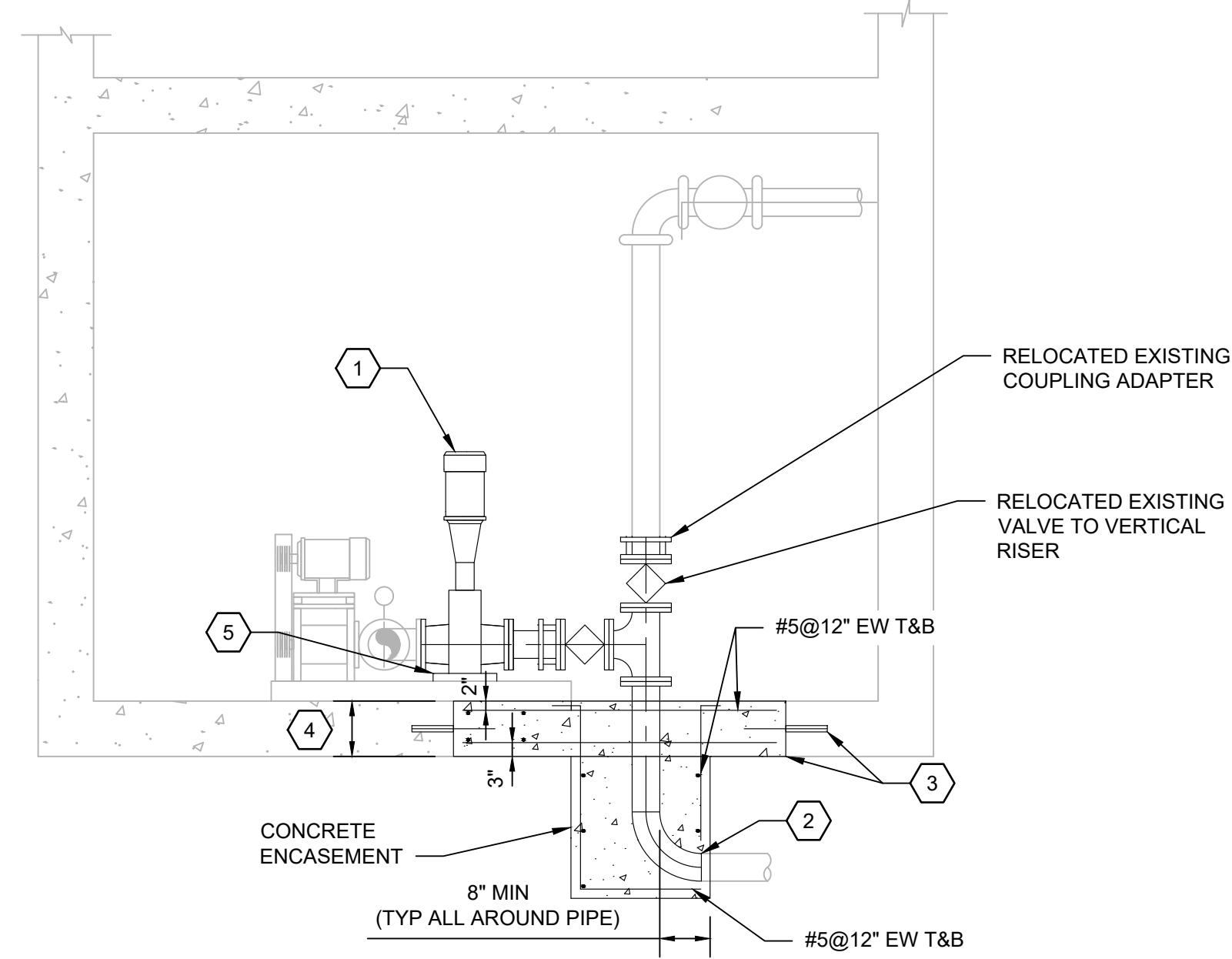
PLAN VIEW - SLUDGE PUMP ROOM EL. 97.0'
SCALE: 3/8" = 1'-0"

GENERAL NOTES:

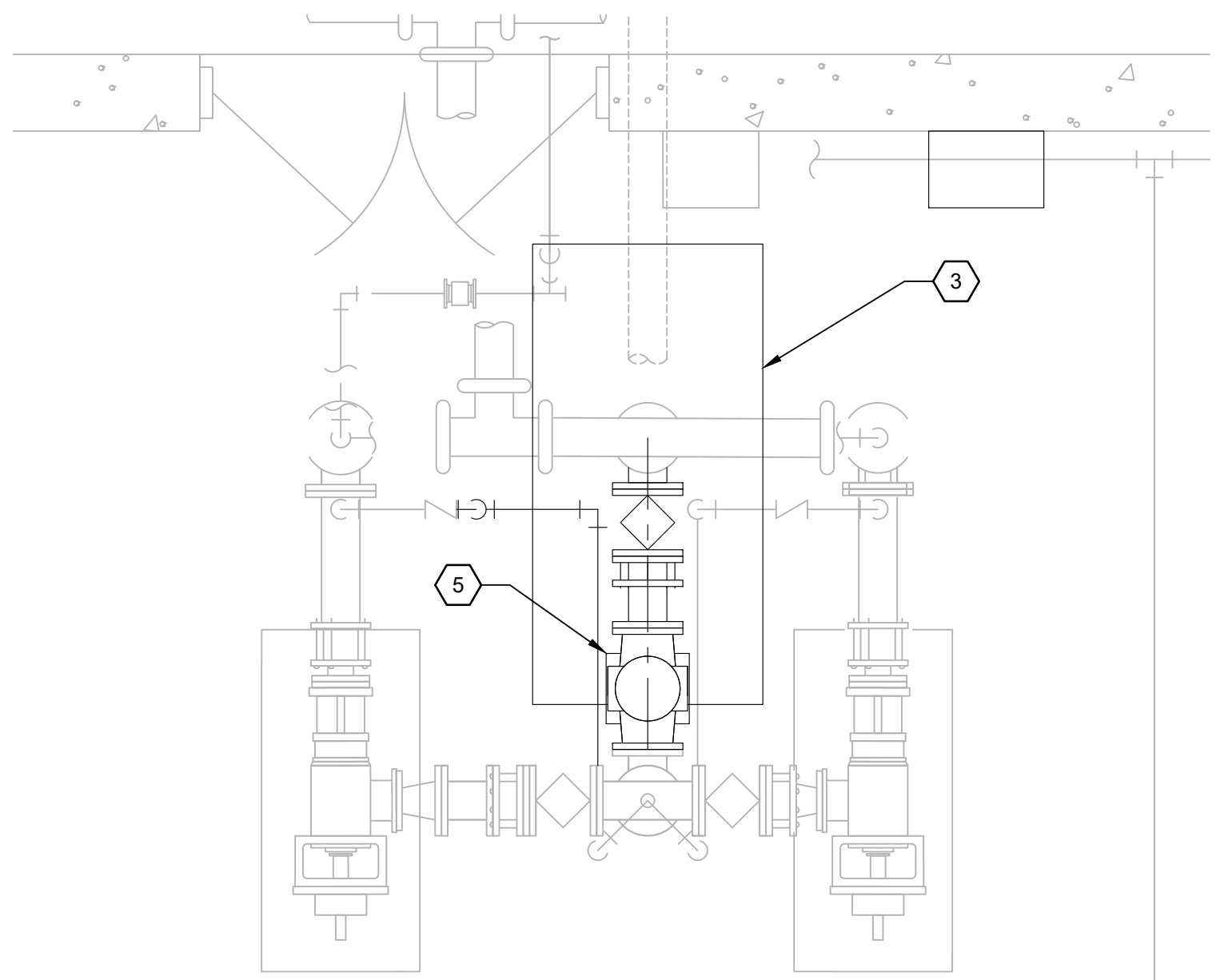
1. NOT ALL PIPING SHOWN FOR CLARITY.
2. SEE SPEC 40 05 00 FOR PIPING SYSTEMS. IF FIELD CONDITIONS DIFFER FROM PIPING SYSTEMS SPEC, NOTIFY ENGINEER VIA RFI.
3. PERFORM WORK DURING DEWATERING SYSTEM SHUTDOWN DURING PHASE 1.
4. DISTRICT HAS THIRTY 8" DIAMETER AND SIX 6" DIAMETER VALVES ONSITE. USE THESE VALVES BEFORE BUYING ANY NEW VALVES.
5. BACKGROUND OF DRAWING BASED ON SHEET 0M2 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

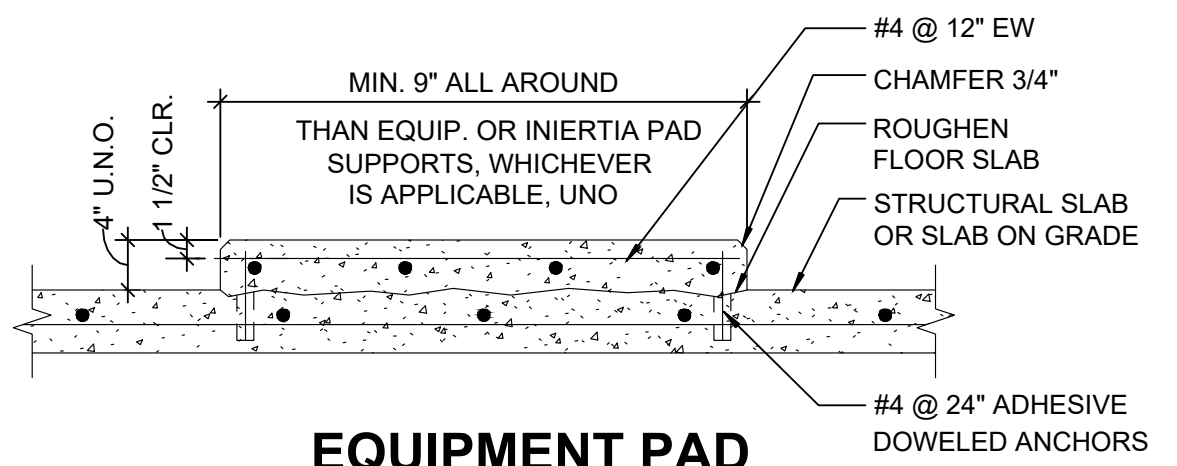
1. PROVIDE GRINDER WITH BASEPLATE SUPPORT AND CONTROL PANEL. GRINDER SHALL BE MUFFIN MONSTER MODEL 10K SERIES.
2. CONNECT TO EXISTING CONCRETE ENCASED PIPE UNDER SLAB. NEW PIPE SHALL BE ENCASED IN CONCRETE SIMILAR TO EXISTING PIPE.
3. ROUGHEN EXISTING SURFACE ALL AROUND TO 1/4" AMPLITUDE. PROVIDE #5 DOWELS AT 12" EMBED DRILLED AND EPOXIED WITH 6" ALL AROUND ENTIRE AREA OF REMOVED CONCRETE SLAB. DOWELS SHALL LAP A MINIMUM OF 18".
4. NEW CONCRETE TO MATCH DEPTH OF EXISTING SLAB. VERIFY IN FIELD.
5. INSTALL EQUIPMENT BASE FOR GRINDER TO SIT ON. FIELD VERIFY HEIGHT, LENGTH AND WIDTH OF THE EQUIPMENT BASE. SEE DETAIL 1/D103 FOR TYPICAL EQUIPMENT PAD DETAIL.



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D103
SECTION 1
SCALE: 3/8" = 1'-0"



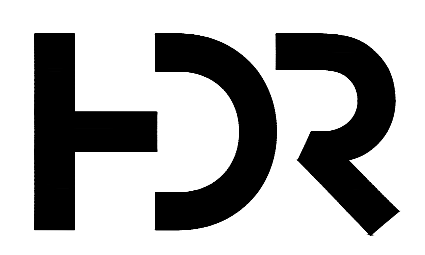
ENLARGED PLAN VIEW - SLUDGE PUMP ROOM EL. 97.0'
SCALE: 1/2" = 1'-0"



EQUIPMENT PAD

- NOTE:
1. THE CONTRACTOR SHALL OBTAIN EXACT SIZES, LOCATIONS, WEIGHTS, AND ANY SPECIAL DETAILS FOR THE PADS OR CURBS FROM THE EQUIPMENT CONTRACTOR BEFORE CONSTRUCTING PADS OR CURBS.
 2. THE CONTRACTOR SHALL VERIFY THAT ALL ITEMS REQUIRED BY THE EQUIP THAT ARE TO BE EMBEDDED INTO PADS OR CURBS ARE PLACED BEFORE CONCRETE IS POURED.
 3. STOP #4 HORIZ BARS AT CONTROL JOINTS.

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D103
EQUIPMENT PAD DETAIL
SCALE: NTS



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | D. GREENFIELD |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
SLUDGE PUMP ROOM
PHASE 1**

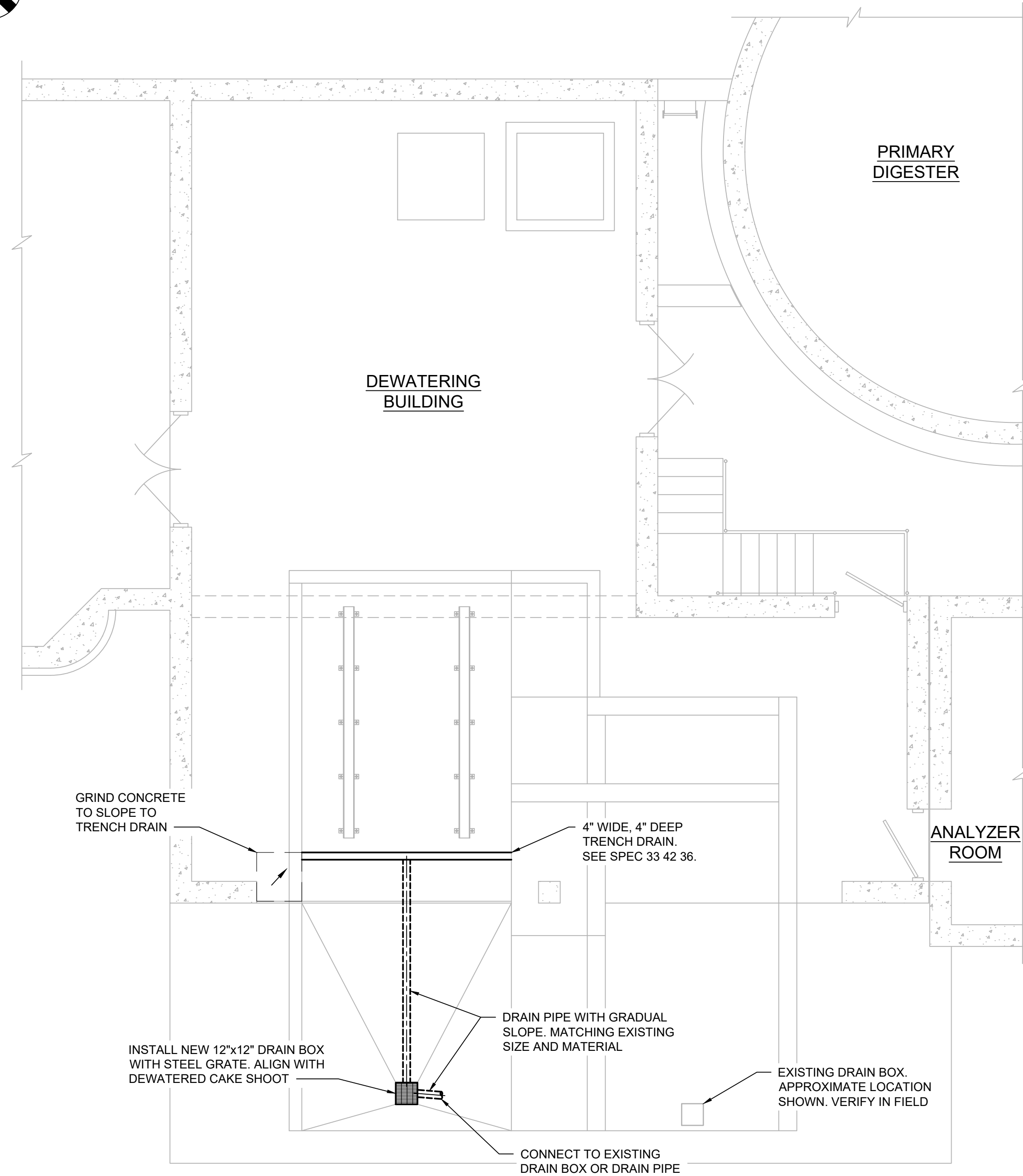
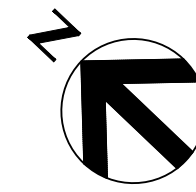


FILENAME | D103.dwg
SCALE | VARIES

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D103

GENERAL NOTES

1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17D1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.



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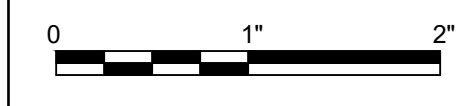


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|-----------------|--------------|
| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

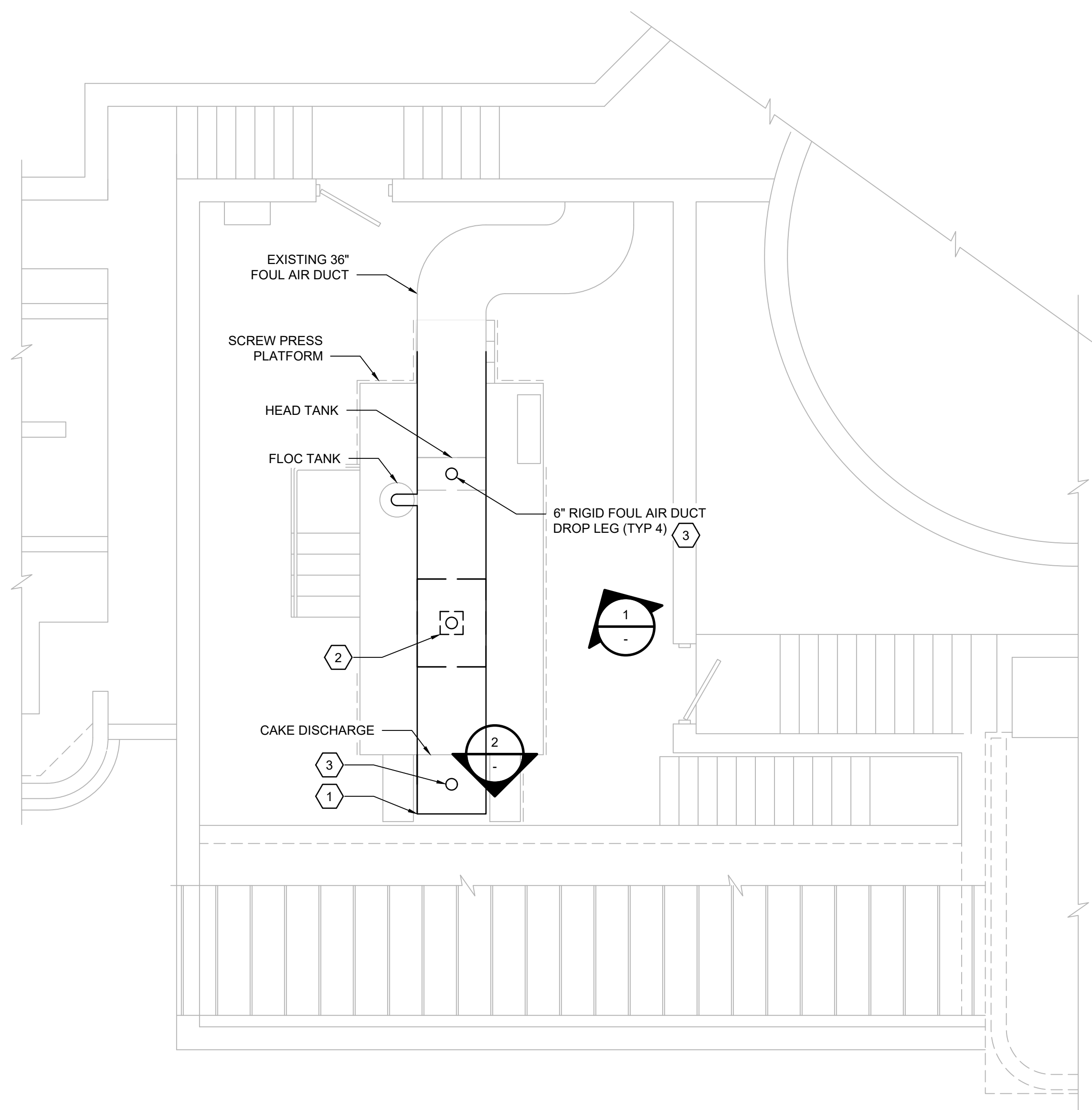
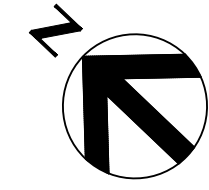


**DIGESTER CLEANING AND REHABILITATION
DEWATERING BUILDING
PROCESS PLAN**

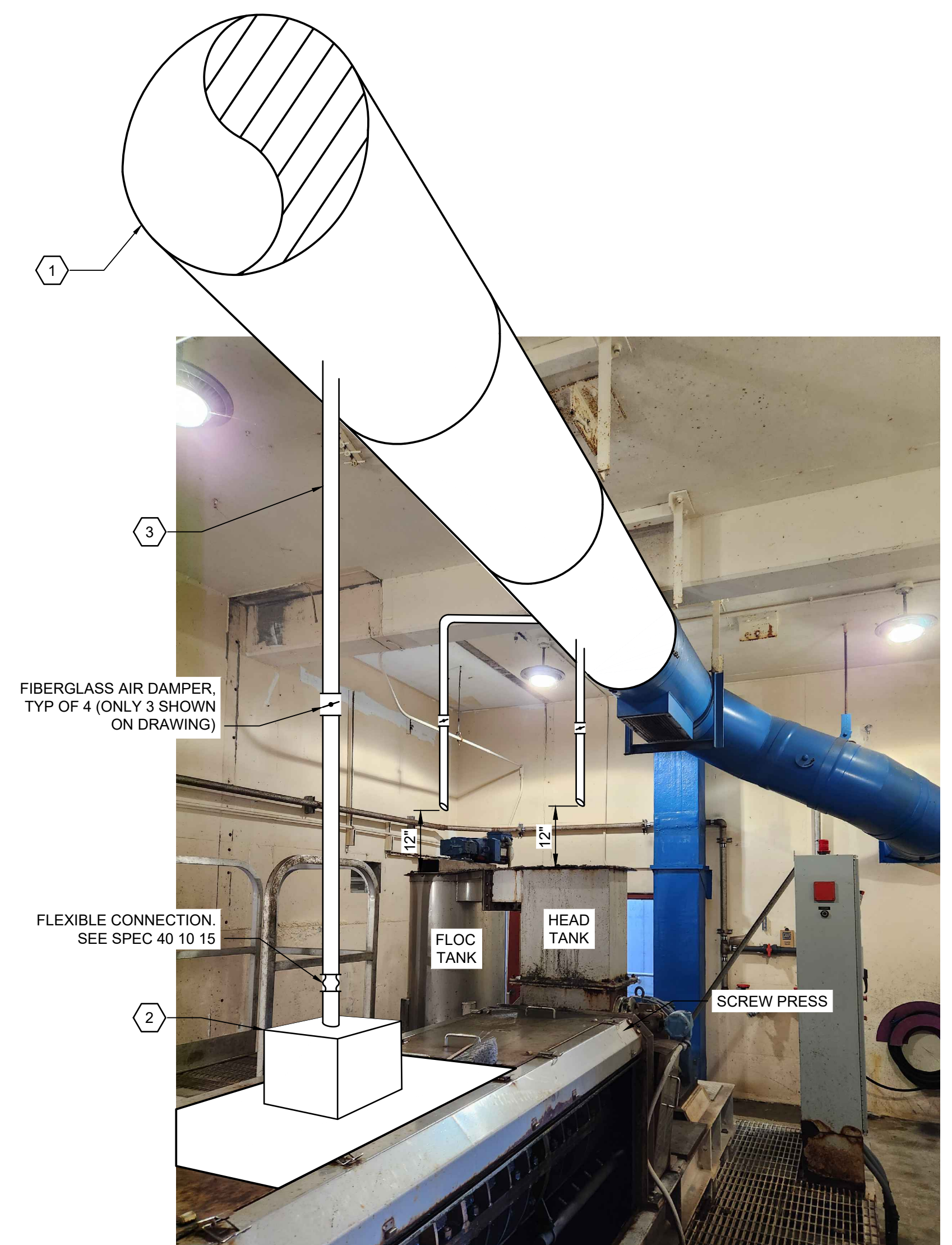


FILENAME | D104.dwg
SCALE | 1/4" = 1'-0"

SHEET
D104



SCREW PRESS ROOM PROCESS PLAN
SCALE: 1/4" = 1'-0"



1 PHOTOGRAPH 1
SCALE: NTS



2 PHOTOGRAPH 2
SCALE: NTS

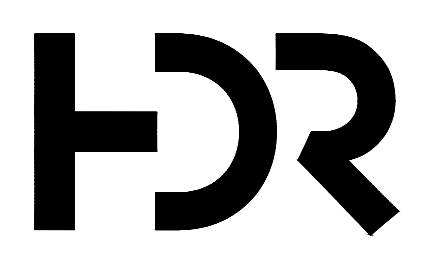
GENERAL NOTES

1. EQUIPMENT LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY ALL DIMENSIONS AND LOCATIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17E1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING PROCESS/MECHANICAL WORK.

SHEET KEYNOTES

1. EXTEND FOUL AIR DUCT LENGTH OF ROOM. CONNECT TO EXISTING DUCT. DESIGN AND INSTALL PIPE SUPPORTS. PIPE SUPPORT DESIGN, LAYOUT, AND CONNECTION DETAILS MUST BE SUBMITTED TO AND APPROVED BY ENGINEER.
2. CONTACT FKC TO REPLACE PANEL 2 WITH NEW PANEL WITH 12"x12"x12" BOX AND 6" FLANGE.

FKC CONTACT:
WES BOND
(360) 452-9472 ext103
wbond@fkcscrewpress.com
3. INSTALL FOUR 6" RIGID FOUL AIR DUCT FIBERGLASS DROP LEGS: THREE TO END 12" ABOVE FLOC TANK, HEAD TANK, AND CAKE DISCHARGE SECTION (NOT SHOWN IN PHOTO 1 FOR CLARITY); ONE TO CONNECT TO BOX ON SCREW PRESS PANEL 2. EACH DROP LEG SHALL HAVE A FRP BUTTERFLY DAMPER HALFWAY DOWN THE PIPE. DESIGN AND INSTALL PIPE SUPPORTS. PIPE SUPPORT DESIGN, LAYOUT, AND CONNECTION DETAILS MUST BE SUBMITTED TO AND APPROVED BY ENGINEER. SEE SPEC 40 10 15 FOR MORE INFORMATION.
4. REPLACE ELBOW UNDER SCREW PRESS WITH TEE WITH BOTH END CONNECTIONS OPEN. MATCH EXISTING SIZE AND MATERIAL. ALIGN NEW FITTING TO DISCHARGE DIRECTLY INTO DRAIN.



| ISSUE | DATE | DESCRIPTION |
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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | S. JOSLYN |
| DESIGNER 2 | |
| CHECKED | D. REARDON |
| DRAWN | P. HERMANSON |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
SCREW PRESS ROOM
PROCESS PLAN**



FILENAME | D105.dwg
SCALE | NTS

SHEET
D105

GENERAL STRUCTURAL NOTES (GSN)

GENERAL

- G1 SCOPE**
THE NOTES ON THIS SHEET AND THE STANDARD STRUCTURAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT WHETHER SPECIFICALLY CALLED OUT OR NOT, EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY ON STRUCTURAL SHEETS. IF THERE ARE QUESTIONS, THEY SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER AND ANSWERED IN WRITING PRIOR TO CONSTRUCTION.
- G2 EXISTING DRAWINGS**
THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION AS REQUIRED TO COORDINATE NEW CONSTRUCTION. SUBMIT REQUIRED CHANGES FOR APPROVAL. THE PLANS AND DETAILS FOR THE EXISTING STRUCTURES PRESENTED IN THE DRAWINGS ARE FOR REFERENCE ONLY BASED ON THE FOLLOWING AS-BUILT DRAWINGS:
- MARIN COUNTY SANITARY DISTRICT NO. 5, WASTEWATER TREATMENT PLANT - 1980 ADDITIONS, 1980, BY JOHN CAROLLO ENGINEERS.
 - SANITARY DISTRICT NO. 5 OF MARIN COUNTY, ENTRYWAY AND ACCESS IMPROVEMENTS PROJECT, 2012, BY CAROLLO ENGINEERS.
- G3 APPLICABLE SPECIFICATIONS AND CODES**
- CALIFORNIA BUILDING CODE 2019 WITH APPLICABLE EDITIONS OF THE CODE REFERENCED STANDARDS.
 - ASCE 7-16
 - AISC 360-16
 - ACI 318-14, ACI 350-06, ACI 350.3-06
 - LOCAL JURISDICTION AMENDMENTS
- G4 DESIGN CRITERIA**
- 1. APPLIES TO ALL STRUCTURES (UNO)**
- DEAD LOAD:**
 - ACTUAL TRIBUTARY STRUCTURE WEIGHT
 - SUPERIMPOSED DEAD LOAD: ACTUAL WT. OF ANY MECHANICAL EQUIPMENT.
 - LIVE LOAD:**

| | |
|---|------------------------|
| LOCATION | LOAD (PSF/LB, NOTE A) |
| 1. SLAB ON GRADE | 250/2000 |
| 2. PROCESS, MECHANICAL, EQUIPMENT AREAS | 300/3000 |
| 3. STORAGE, SHOP, MAINTAINANCE AREAS | 250/2000 |
| 4. ELEVATED WALKWAYS, STAIRWAYS | 100/1000 |
| 5. ROOFS | 20/300 (NOT REDUCIBLE) |

A. UNIFORMLY DISTRIBUTED AND CONCENTRATED LOADS TO NOT OCCUR SIMULTANEOUSLY.
 - WIND:**
 - BASIC WIND SPEED: 97 MPH
 - EXPOSURE CATEGORY: C
 - RISK CATEGORY: III
 - SEISMIC:**
 - PROJECT STRUCTURES:
 - RISK CATEGORY: III
 - IMPORTANCE FACTOR: 1.25
 - SITE CLASS: D (DEFAULT)
 - SEISMIC DESIGN CATEGORY: D
 - SPECTRAL RESPONSE COEFFICIENT, $S_d1 = 1.2$
 - SPECTRAL RESPONSE COEFFICIENT, $S_d1 = 0.7$
 - SNOW LOAD:** NOT APPLICABLE
- G5 SAFETY**
SAFETY AND STRUCTURE STABILITY DURING CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. STRUCTURES HAVE BEEN DESIGNED TO RESIST THE DESIGN LIVE LOADS ONLY AS A COMPLETED STRUCTURE.
- G6 OPENINGS**
OPENINGS FOR PIPES, DUCTS, CONDUITS, ETC. ARE NOT ALL SHOWN ON THE STRUCTURAL DRAWINGS. COORDINATE AND PROVIDE OPENINGS AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.
- G7 SPECIAL INSPECTIONS**
SPECIAL INSPECTIONS ARE REQUIRED IN ACCORDANCE WITH CHAPTER 1 AND CHAPTER 17 OF THE CBC. PAYMENT FOR THESE INSPECTIONS IS NOT THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL PROVIDE FOR FULL ACCESS TO THE WORK BY THE SPECIAL INSPECTOR AND SHALL PROVIDE FOR THESE INSPECTIONS IN HIS CONSTRUCTION SCHEDULE. SCHEDULE OF SPECIAL INSPECTIONS IS PROVIDED ON SHEET S02.
- G8 STANDARD DETAILS**
THE STANDARD DETAILS DEPICT TYPICAL DETAILING TO BE USED ON THIS PROJECT. IF CONDITIONS ARE NOT EXPLICITLY SHOWN ON THE DRAWINGS THEY SHALL BE MADE SIMILAR TO THE STANDARD DETAILS. OBTAIN APPROVAL OF ENGINEER IN WRITING FOR SIMILAR CONDITIONS PRIOR TO CONSTRUCTION.
- G9 CONTRACTOR TO SUBMIT FOR REVIEW ALL EQUIPMENT SIZES, OPERATING WEIGHTS, VIBRATION FORCES, SUPPORT LOCATIONS, ALONG WITH ANY FLOOR OPENINGS, NOTCHES, AND RECESSES REQUIRED BY SUCH EQUIPMENT. CONCRETE SUPPORT PADS AND/OR FRAMING REQUIRED TO SUPPORT SAID EQUIPMENT SHALL NOT BE FABRICATED AND PLACED UNTIL THE CONCRETE SUPPORT PADS AND/OR FRAMING IS APPROVED TO SUPPORT THE EQUIPMENT.**

CONCRETE:

- C1 DESIGN STRENGTHS:**
 $f_c = 4,500$ PSI
 $f_y = 60,000$ PSI
- C2 CONCRETE COVER**
UNLESS OTHERWISE NOTED, PROVIDE CONCRETE COVER FOR REINFORCING PER DETAIL
- C3 SEE SPECIFICATIONS FOR REINFORCING PLACEMENT REQUIREMENTS.**
- C4 REFER TO OTHER DISCIPLINE DRAWINGS PRIOR TO CONSTRUCTION FOR EMBEDDED ITEMS AND PENETRATIONS NOT SHOWN ON STRUCTURAL DRAWINGS. AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.**
- C5 PROVIDE 3/4" CHAMFERS AT ALL EXPOSED EDGES AND 1/2" CHAMFERS AT JOINTS. NOT ALL CHAMFERS MAY BE SHOWN ON DRAWINGS.**
- C6 FIELD ADJUST REINFORCING AT OPENINGS AND EMBEDDED ITEMS TO MAINTAIN CONCRETE CLEARANCE REQUIREMENTS.**
- C7 ANCHOR BOLTS NOT SPECIFIED BY ENGINEER SHALL BE DESIGNED AND CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF CALIFORNIA RETAINED BY THE CONTRACTOR. IN ACCORDANCE WITH APPLICABLE PROJECT AND CODE REQUIREMENTS. SUBMIT AS A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE ENGINEER. COORDINATE LOCATION, SIZE AND EMBEDMENT PRIOR TO CASTING CONCRETE.**
- C8 UNLESS SPECIFICALLY AUTHORIZED BY THE ENGINEER IN WRITING, ABSOLUTELY NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED.**
- C9 CONTRACTOR SHALL SUBMIT A CONCRETE PLACEMENT PLAN IDENTIFYING JOINT TYPES, JOINT LOCATIONS AND CONCRETE PLACEMENT SEQUENCE.**
- C10 ALL CAST IN PLACE AND POST-INSTALLED ANCHORS INDICATED IN THE STRUCTURAL DOCUMENTS SHALL COMPLY WITH SPECIFICATION 03 15 19, CHAPTER 17 OF ACI 318 AND CHAPTER 19 OF THE CBC. ALL ADHESIVE ANCHORS SHALL HAVE THE ICC REPORT. SUBMIT AND INSTALL PER THE ICC EVALUATION REPORT.**
- C11 UNLESS OTHERWISE NOTED, ALL WALL REINFORCING BARS SHALL BE CONTINUOUS AROUND CORNERS AND THROUGH COLUMNS OR PILASTERS. REINFORCEMENT SHALL BE EXTENDED INTO CONNECTING WALLS, AND LAPPED ON THE OPPOSITE FACE OF THE CONNECTING WALLS, AS INDICATED ELSEWHERE ON THIS SHEET OR ON THE DRAWINGS. VERTICAL WALL BARS SHALL BE LAPPED WITH DOWELS FROM BASE SLABS AND EXTENDED INTO THE TOP FACE OF ROOF OR FLOOR SLABS AND LAPPED WITH TOP SLAB REINFORCEMENT. UNLESS INDICATED OTHERWISE, CONTRACTOR MAY SPLICE CONTINUOUS SLAB OR LONGITUDINAL BEAM BARS AT LOCATIONS OF ITS CHOOSING, EXCEPT THAT TOP BAR SPLICES SHALL BE LOCATED AT MIDSPAN AND BOTTOM BAR SPLICES SHALL BE LOCATED AT SUPPORTS. ALL REINFORCEMENT BENDS AND LAPS, UNLESS OTHERWISE NOTED, SHALL SATISFY STANDARD DETAIL.**
- C13 UNLESS OTHERWISE NOTED, WALL VERTICAL REINFORCING LAYER SHALL BE CLOSEST TO WALL SURFACE, AND WALL HORIZONTAL REINFORCING LAYERS SHALL BE PLACED ATTACHED TO & BETWEEN VERTICAL LAYERS.**
- C14 CONCRETE, MATERIALS AND PROPORTIONING SHOULD BE IN ACCORDANCE WITH SPECIFICATION SECTION 03 31 30.**

STEEL:

- S1 DESIGN STRENGTHS:**
WIDE FLANGE AND TEES (ASTM A992): $F_y = 50$ KSI
PIPES (ASTM A53): $F_y = 35$ KSI
STAINLESS STEEL (ASTM A240 or A276): $F_y = 33$ KSI
HSS SECTIONS (ASTM A500): $F_y = 46$ KSI
ALL OTHER PLATES AND SHAPES (ASTM A36): $F_y = 36$ KSI
- S2 DIMENSIONS:**
TO CENTERLINES OF COLUMNS AND BEAMS, TOP SURFACES OF BEAMS AND TUBES AND BACKS OF CHANNELS AND ANGLES UNO.
- S3 CONFORM TO AISC 360, STEEL CONSTRUCTION MANUAL AND AISC 341, SEISMIC DESIGN MANUAL.**
- S4 WHEN FILLET WELD SIZE IS NOT INDICATED, PROVIDE MAXIMUM WELD SIZE BASED ON MATERIAL THICKNESS IN ACCORDANCE WITH AISC SPECIFICATIONS.**
- S5 ALL BOLTED STRUCTURAL CONNECTIONS ARE BEARING TYPE CONNECTIONS UNLESS OTHERWISE SPECIFIED TO BE SLIP-CRITICAL. PROVIDE LOAD INDICATING WASHERS AT SLIP-CRITICAL CONNECTIONS.**
- S6 PAINTING:**
STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH SPECIFICATIONS.
- S7 STAINLESS STEEL:**
STAINLESS STEEL CONSTRUCTION SHALL BE IN ACCORDANCE WITH AISI SPECIFICATIONS. UNLESS OTHERWISE NOTED, STEEL IN CONTACT WITH SEWAGE SHALL BE AISI TYPE 316 STAINLESS STEEL. ALL STEEL WITHIN ONE FOOT HORIZONTALLY OR VERTICALLY OF SEWAGE SHALL BE STAINLESS STEEL. WHERE NOT SPECIFICALLY INDICATED ON DRAWINGS OR IN ABOVE NOTE, STAINLESS STEEL SHALL BE AISI TYPE 304, OR TYPE 316.
- S8 ALL SHOP AND FIELD WELDS SHALL BE PREQUALIFIED WELDS. ANY WELDS BEYOND THE RANGE OR TOLERANCE OR REQUIREMENTS FOR PREQUALIFICATION SHALL BE QUALIFIED BY TEST PER AWS D1.1 SECTION 5 PART B. WELDS AT BASE METALS OVER 2" IN THICKNESS ARE NOT ALLOWED AS PREQUALIFIED WELD JOINTS WITHOUT TESTING.**

ALUMINUM:

- A1 STRUCTURAL ALUMINUM YIELD STRENGTHS $F_y = 35$ KSI**
STRUCTURAL ALUMINUM IS ALLOY 6061-T6 UNO
- A2 DIMENSIONS:**
TO CENTERLINES OF COLUMNS AND BEAMS, TOP SURFACES OF BEAMS AND TUBES AND BACKS OF CHANNELS AND ANGLES UNO.
- A3 ELEVATIONS:**
TOP OF ALUMINUM REFERS TO TOP SURFACE OR FLANGE OF MEMBER UNO.
- A4 WHEN FILLET WELD SIZE IS NOT INDICATED, PROVIDE MAXIMUM WELD SIZE FOR THE MATERIAL THICKNESS IN ACCORDANCE WITH THE LATEST EDITION OF THE "ALUMINUM DESIGN MANUAL" BY THE ALUMINUM ASSOCIATION.**
- A5 ALUMINUM IN CONTACT WITH DISSIMILAR MATERIALS OR CONCRETE:**
CONTACT SURFACES SHALL BE PROVIDED WITH GALVANIC SEPARATION PER SPECIFICATIONS.

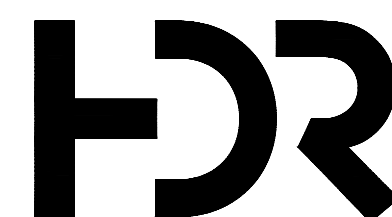
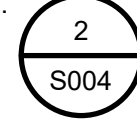
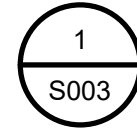
CONSTRUCTION AT EXISTING STRUCTURES:

- E1 TO PROVIDE NEW OPENINGS IN EXISTING CONCRETE OR CMU WALL. CARE SHALL BE TAKEN NOT TO OVER SAW CUT CONCRETE. CORE 6" DIAMETER HOLES AT FOUR CORNERS OF NEW PROPOSED OPENING TO LIMIT SAW CUT ON 4 EDGES, AND PREVENT DAMAGE TO CONCRETE AND REINFORCEMENT TO REMAIN BEYOND OPENING.**
- E2 WHERE DRILL AND ADHESIVE REINFORCING OR ANCHORS ARE INSTALLED, CONTRACTOR SHALL NOT DAMAGE EXISTING REINFORCING. CONTRACTOR SHALL HAVE EXISTING CONCRETE INVESTIGATED USING GROUND PENETRATING RADAR OR SIMILAR EQUIPMENT TO LOCATE EXISTING REINFORCING, AND CLEARLY MARK CONCRETE SURFACE.**
- E3 WHERE EXISTING REINFORCING IS TO BE PRESERVED, CONTRACTOR SHALL STRAIGHTEN AND SAND BLAST REINFORCING JUST PRIOR TO PLACEMENT OF NEW CONCRETE.**

DEFERRED SUBMITTAL NOTES:

- DS1 DEFERRED SUBMITTALS ARE THOSE PORTIONS OF THE DESIGN WHICH ARE NOT SUBMITTED AT THE TIME OF PERMIT APPLICATION AND WHICH ARE TO BE SUBMITTED TO THE PERMITTING AGENCY FOR ACCEPTANCE PRIOR TO INSTALLATION OF THAT PORTION OF THE WORK. CONTRACTOR TO FURNISH, DESIGN, DETAIL, AND INSTALL THE STRUCTURAL COMPONENTS LISTED BELOW. INSTALLATION AND DESIGN SHALL BE IN CONFORMANCE WITH THE 2019 CALIFORNIA BUILDING CODE (CBC), DRAWINGS, AND SPECIFICATIONS.**
- DS2 THE FOLLOWING IS A LIST OF DEFERRED SUBMITTALS PER CBC SECTION 107.3.4.1 THAT ARE EXPECTED TO CONTAIN STRUCTURAL CALCULATIONS FOR REVIEW TO MEET BUILDING PERMITTING REQUIREMENTS. PRIOR TO INSTALLATION OF HTE INDICATED STRUCTURAL ELEMENT, EQUIPMENT, OR COMPONENT OR ITS ANCHORAGE, THE CONTRACTOR SHALL SUBMIT THE REQUIRED CALCULATIONS AND SUPPORTING DATA AND DRAWINGS FOR REVIEW AND ACCEPTANCE BY THE ENGINEER. ADDITIONALLY, ACCEPTANCE INDICATED ON THE ENGINEER'S COMMENT FORM, ALONG WITH THE COMPLETED, FINAL SUBMITTAL SHALL THEN BE FILED BY THE CONTRACTOR AND ACKNOWLEDGED AS ACCEPTED BY THE PERMITTING AGENCY PRIOR TO INSTALLATION OF THESE ITEMS. ALL THE SUBMITTED CALCULATIONS AND DRAWINGS SHALL BE SIGNED AND STAMPED BY A PROFESSIONAL ENGINEER IN THE STATE OF CALIFORNIA.**
- DS3 DEFERRED SUBMITTAL ITEMS DELEGATED TO THE CONTRACTOR FOR DESIGN ARE THE ITEMS LISTED BELOW OR NOTED ON DRAWINGS OR SPECIFICATIONS.**

| DEFERRED SUBMITTALS | |
|---------------------|---|
| 03 15 19 | ANCHORAGE TO CONCRETE |
| 05 50 00 | STAIRS |
| 05 52 46 | ALUMINUM RAILINGS |
| 06 82 00 | FIBERGLASS REINFORCED PLASTIC GRATING AND SUPPORT |
| 40 05 07 | PIPE SUPPORTS |



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARASAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
GENERAL STRUCTURAL NOTES**

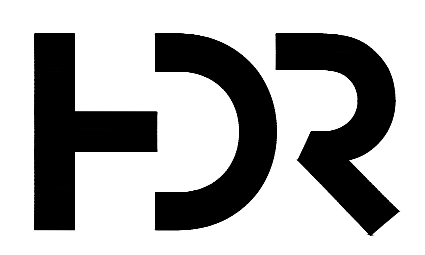


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SHEET
S001

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | |
|---|------------|----------|--|---|
| INSPECTION ITEM REQUIRED | FREQUENCY | | CODE REFERENCE | REMARKS |
| | CONTINUOUS | PERIODIC | | |
| SOIL & EARTHWORK | | | | |
| VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY. | | ● | CBC 1705.6 | |
| VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL. | | ● | | |
| PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS. | | ● | | |
| VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL. | ● | | | |
| PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY. | | ● | | |
| OBSERVE, TEST AS NEEDED, AND APPROVE FOOTING BEARING PRIOR TO PLACING OF REINFORCING STEEL AND CONCRETE. | | ● | | |
| CONCRETE & REINFORCING STEEL | | | | |
| INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT. | | ● | ACI 318: 3.5, 7.1-7.7 CBC 1910.4 | PER ICC REPORT |
| INSPECTION OF REINFORCING STEEL WELDING IN ACCORDANCE WITH CBC TABLE 1705.2.2, ITEM 2B. | | | AWS D1.4 ACI 318: 3.5.2 | |
| INSPECTION OF ANCHORS CAST IN CONCRETE WHERE ALLOWABLE LOADS HAVE BEEN INCREASED OR WHERE STRENGTH DESIGN IS USED. | | ● | ACI 318: 8.1.3, 21.2.8, CBC 1908.5, 1909.1 | |
| INSPECTION OF ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS. | | ● | ACI 318: 3.8.6, 8.1.3, 21.2.8, CBC 1909.1 | |
| OBSERVE PLACEMENT OF REINFORCING STEEL PRIOR TO THE CLOSING OF THE FORMS AND ARRIVAL OF CONCRETE ONSITE. | | ● | | |
| OBSERVE WELDING OF STEEL REINFORCEMENT, IF ANY | ● | | AWS D1.4; ACI 318-3.5.2; & CBC 1903.5.2 | |
| VERIFY CORRECT MATERIAL USED, INCLUDING THE USE OF A706 IN WELDED SPLICES | | ● | | |
| OBSERVE & VERIFY PLACEMENT OF EMBEDDED BOLTS PRIOR TO CONCRETE PLACEMENT. | ● | | CBC 1704.4 | |
| VERIFY USE OF CORRECT CONCRETE MIX DESIGN AND REVIEW DELIVERY TICKETS | | ● | ACI 318: CH. 4, 5.2-5.4 CBC 1904.2, 1910.2, 1910.3 | |
| AT THE TIME FRESH CONCRETE IS SAMPLED TO FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE. | ● | | ASTM C-172 ASTM C 31 ACI 318: 5.6, 5.8 CBC 1910.10 | ADDITIONAL CYLINDERS SHALL BE MADE AS NEEDED FOR EARLY FORM REMOVAL. NOTE: TWO CYLINDERS ARE REQUIRED FOR AN ACCEPTABLE TEST. A SINGLE CYLINDER BREAK IS UNACCEPTABLE FOR STRENGTH EVALUATION PURPOSES. |
| TAKE CONCRETE SPECIMENS FOR STRENGTH TESTS TO BE PERFORMED IN LAB. A MINIMUM OF FOUR (4) CYLINDERS SHALL BE MADE. TEST ONE AT SEVEN DAYS AND TWO AT 28-DAYS. THE 4TH CYLINDER SHALL BE TESTED AT 28 DAYS IF ONE OR BOTH OF THE 28-DAY CYLINDER RESULTS ARE BELOW REQUIRED STRENGTH. | ● | | CBC 1704.4 | |
| PERFORM CONCRETE STRENGTH TESTING IN LAB | | ● | | |
| MAINTAIN A SPREADSHEET SHOWING DATE, SEQUENTIAL ORDER OF STRENGTH TEST RESULTS AND INDICATE RUNNING AVERAGE | ● | | ACI 318 PAR. 5.6.3.3 | |
| OBSERVE FOR PROPER CONCRETE PLACEMENT | ● | | ACI 318 PAR. 5.9 & 5.10 | |
| VERIFY THAT THE NECESSARY DESIGN STRENGTH HAS BEEN REACHED PRIOR TO THE REMOVAL OF FORMS. | | ● | | |
| MEASURE FLOOR FLATNESS AND LEVELNESS AS NEEDED WHEN QUESTIONABLE SURFACES ARE OBSERVED. | | ● | | |
| POST INSTALLED ANCHORS EPOXY INSTALLED REINFORCING | ● | | | PER ICC REPORT |
| INSPECTION OF CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES. | ● | | ACI 318: 5.9, 5.10 CBC 1910.6, 1910.7, 1910.8 | |
| INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES. | | ● | ACI 318: 5.11-5.13 CBC 1910.9 | |
| VERIFICATION OF IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS. | | ● | ACI 318: 6.2 | |
| INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED. | | ● | ACI 318: 6.1.1 | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES (CONT) | | | | |
|---|------------|----------|---|---|
| INSPECTION ITEM REQUIRED | FREQUENCY | | CODE REFERENCE | REMARKS |
| | CONTINUOUS | PERIODIC | | |
| STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL | | | | |
| A. REINFORCING STEEL: | | | | |
| 1) SHEAR REINFORCEMENT | ● | | AWS D1.3 | AWS D1.3 AWS D1.4, ACI 318: SEC. 3.5.2 |
| 2) OTHER REINFORCING STEEL | | ● | | |
| GENERAL STRUCTURAL OBSERVATIONS | | | | |
| CONDUCT WEEKLY VISUAL OBSERVATION OF THE STRUCTURAL SYSTEMS FOR GENERAL CONFORMANCE TO THE CONSTRUCTION DOCUMENTS. PREPARE WEEKLY REPORT OF OBSERVATIONS DESCRIBING WORK PROGRESS AND NON-CONFORMING ITEMS. | | ● | | |
| SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE | | | | |
| PERFORM OBSERVATIONS, INSPECTIONS & TESTING FOR SEISMIC FORCE RESISTING SYSTEMS. | ● | | CBC 1707 | |
| OBSERVE & VERIFY ANCHORAGES FOR HVAC DUCTWORK, MECHANICAL UNITS, & PIPING SYSTEMS. | | ● | CBC 1705 | |
| OBSERVE & VERIFY ANCHORAGES FOR ELECTRICAL EQUIPMENT USE FOR EMERGENCY OR STAND-BY SYSTEMS. | | ● | | |
| PRIOR TO GROUTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE: | | | | |
| A. GROUT SPACE | | ● | TMS 602 ART 3.2 D, 3.2 F | |
| B. GRADE, TYPE, AND SIZE OF REINFORCEMENT AND ANCHOR BOLTS, AND ANCHORAGES | | ● | TMS 602 ART 3.4, 3.6 D | |
| C. PLACEMENT OF REINFORCEMENT, CONNECTORS, AND ANCHORAGES | | ● | TMS 602 ART 3.2 E, 3.4 | |
| D. PROPORTIONS OF SITE-PREPARED GROUT | | ● | TMS 602 ART 2.6 B, 2.4 G1b | |
| E. CONSTRUCTION OF MORTAR JOINTS | | ● | TMS 602 ART 3.3 B | |
| VERIFY DURING CONSTRUCTION: | | | | |
| A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS | | ● | TMS 602 ART 3.3 F | |
| B. PLACEMENT OF GROUT | ● | | TMS 602 ART 3.5, 3.6 C | |
| OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS | | ● | TMS 602 ART 1.4 B.2 a.3, 1.4 B.2 b.3, 1.4 B.2 c.3, 1.4 B.3, 1.4 B.4 | |

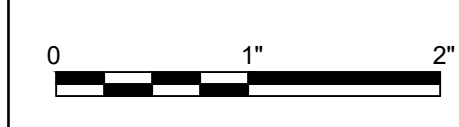


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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION SCHEDULE OF SPECIAL INSPECTION



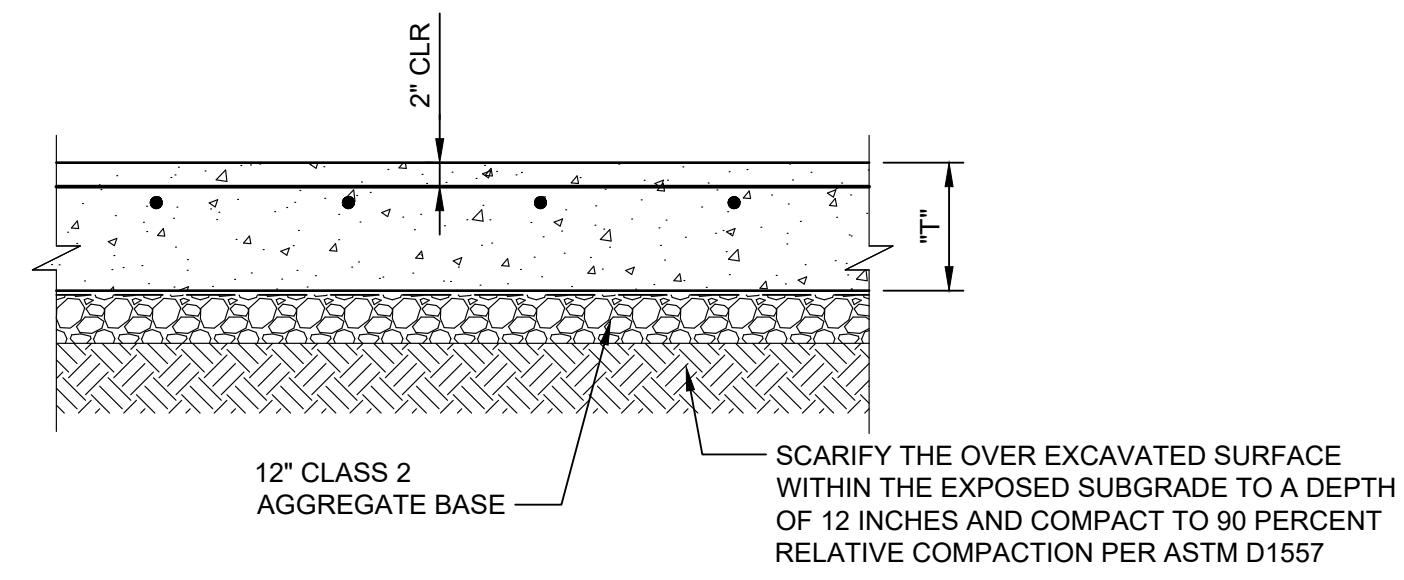
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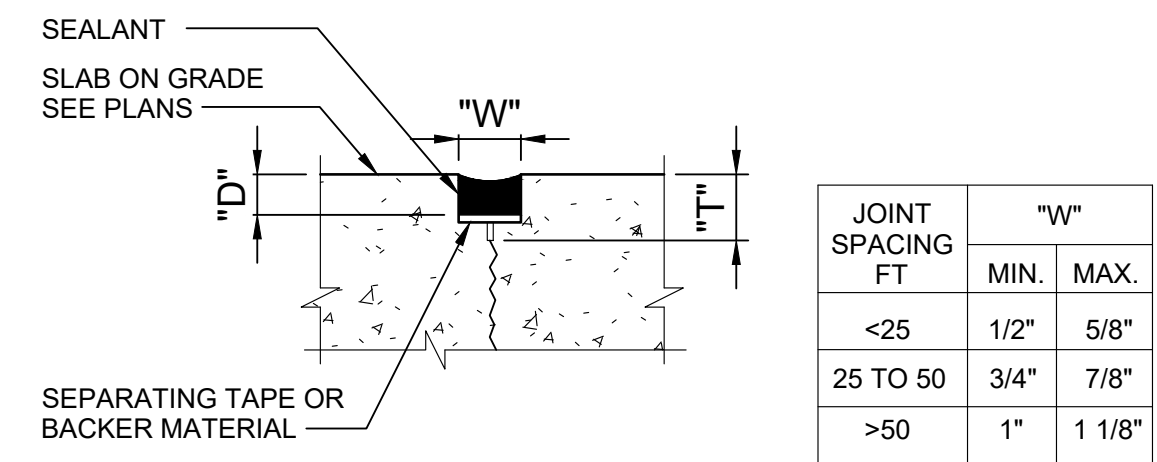
LOCATION **MINIMUM COVER UNO (SEE NOTE)**

| | |
|---|----------------|
| UNFORMED SURFACES ADJACENT TO EARTH: | 3" |
| FORMED OR TOP SURFACES EXPOSED TO WEATHER OR SATURATED AIR, SUBMERGED OR IN CONTACT WITH EARTH: | 2" |
| OTHER LOCATIONS: BARS IN BEAMS OR GIRDERS, INCLUDING STIRRUPS AND COLUMN SPIRALS OR TIES: | 1 1/2" |
| SLABS, WALLS AND JOINTS #10 AND LARGER: | BAR DIA + 1/4" |
| #9 AND SMALLER: | 1 1/2" |

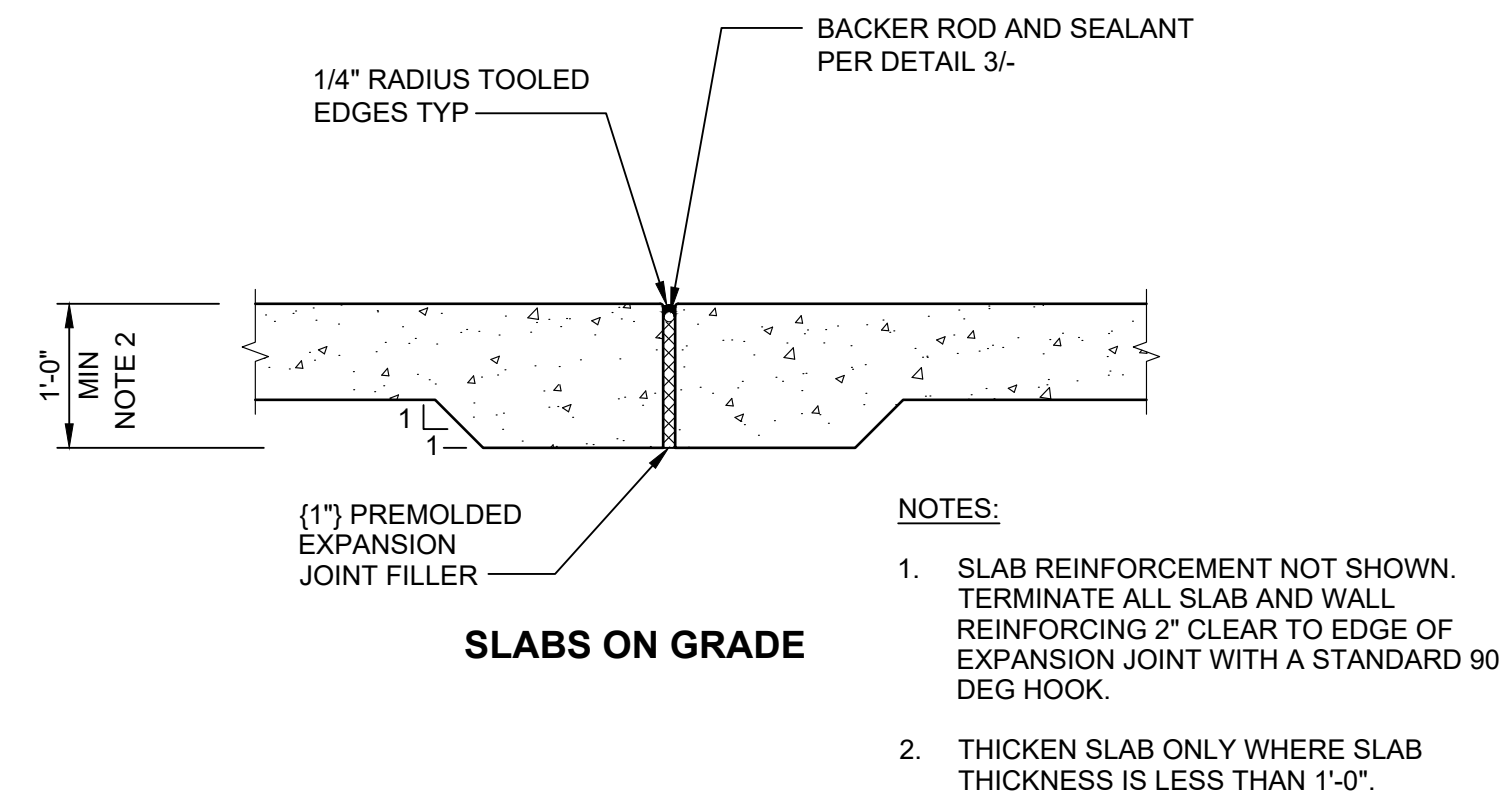
NOTE:
COVER FOR REINFORCING STEEL SHALL NOT BE LESS THAN THE MINIMUM GIVEN ABOVE (NO MINUS TOLERANCE) , AND SHALL NOT EXCEED THE MINIMUM BY MORE THAN 1/4 INCH WHERE THE CONCRETE THICKNESS IS 24" OR LESS, OR MORE THAN 1/2 INCH WHERE THE CONCRETE THICKNESS IS MORE THAN 24 INCHES.



| THICK "T" | REINFORCEMENT |
|-----------|-----------------|
| 8" UNO | #5 @ 12" EA WAY |



- NOTES:**
- TOP OF SEALANT WILL BE 1/8"-TO-1/4" BELOW TOP OF CONCRETE.
 - "D" = 1.0-TO-1.5 TIMES W.
 - "W" SHALL BE PER SCHEDULE UNO ON DRAWINGS.
 - "T" IS DEPTH OF INITIAL SAW CUT FOR CENTRAL JOINT (DOES NOT APPLY TO OTHER JOINTS) AND SHALL BE 1/4 OF THE SLAB THICKNESS. FOR SLABS LESS THAN 12", 3" FOR SLABS 12"-TO-18", OR 1/6 OF THE SLAB THICKNESS FOR SLABS OVER 18".

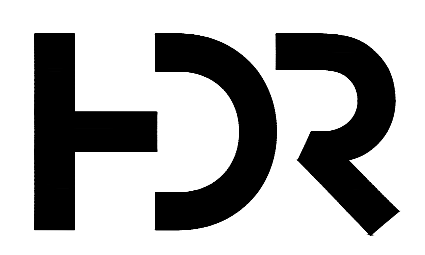


1 REINFORCEMENT CONCRETE COVER
- NTS

2 TYPICAL SLAB-ON-GRADE
- NTS

3 TYPICAL SEALANT GROOVE DETAIL
- NTS

4 EXPANSION JOINTS (EJ)
- NTS

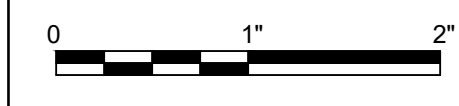


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
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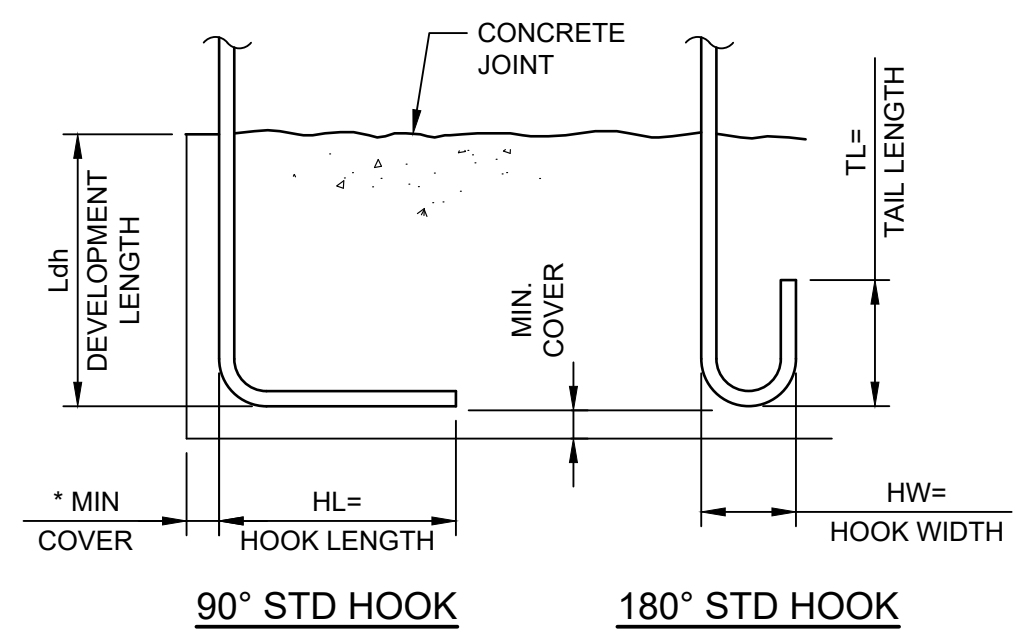


**DIGESTER CLEANING AND REHABILITATION
TYPICAL CONCRETE DETAILS I**



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SCALE | NTS

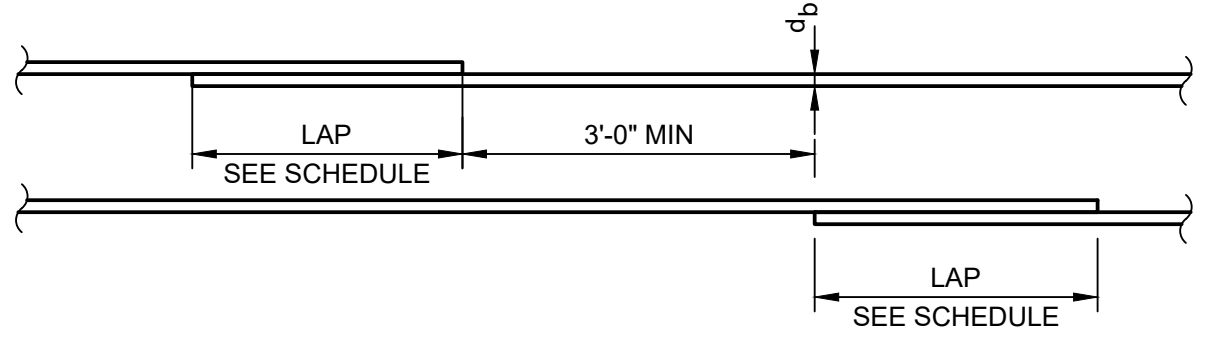
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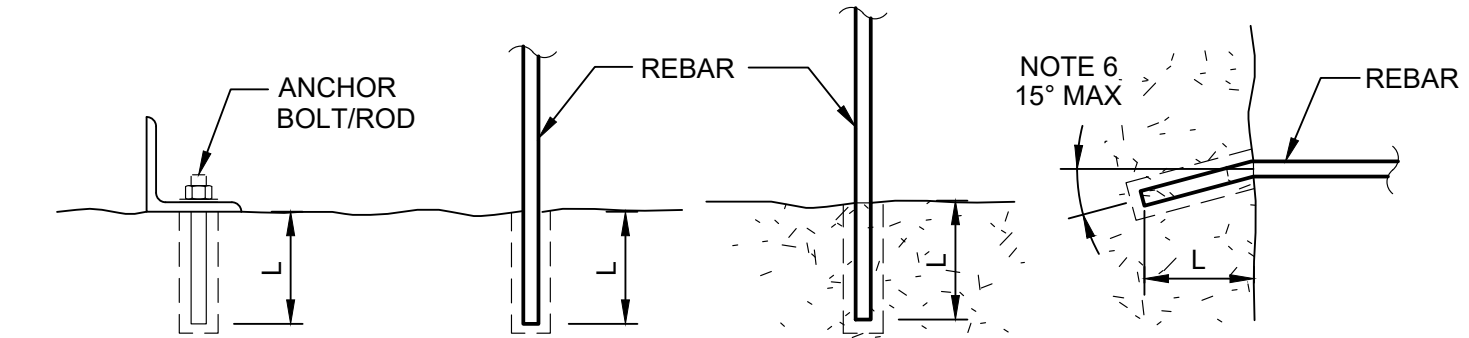
| BAR SIZE GRADE 60 | f _c =5000 psi | | |
|----------------------|--------------------------|-----------|---------|
| | HL | HW | TL |
| #3 | 6" | 3" | 4" |
| #4 | 8" | 4" | 4 1/2" |
| #5 | 10" | 5" | 5" |
| #6 | 1'-0" | 6" | 6" |
| #7 | 1'-2" | 7" | 7" |
| #8 | 1'-4" | 8" | 8" |
| #9 | 1'-7" | 11 3/4" | 10 1/2" |
| #10 | 1'-10" | 1'-1 1/4" | 11 1/2" |
| #11 | 2'-0" | 1'-2 3/4" | 1'-1" |

* COMPLYING WITH MINIMUM COVER REQUIREMENTS OF ACI 318, 25.4.3.2. OTHERWISE L_{dh} MUST BE RE-CALCULATED.

| BAR | LAPS FOR BARS | |
|-----|---------------|------------|
| | VERTICAL | HORIZONTAL |
| #3 | 1'-4" | 1'-6" |
| #4 | 1'-7" | 2'-0" |
| #5 | 1'-11" | 2'-6" |
| #6 | 2'-4" | 3'-0" |
| #7 | 3'-6" | 4'-6" |
| #8 | 4'-7" | 5'-11" |
| #9 | 5'-9" | 7'-6" |
| #10 | 7'-4" | 9'-6" |
| #11 | 9'-0" | 11'-8" |



- NOTES:
- ALL SPLICES SHALL BE CONTACT SPLICES AND WIRED TOGETHER.
 - NO WELDED OR MECHANICAL SPLICES ARE PERMITTED UNLESS INDICATED OTHERWISE.



VERTICAL APPLICATION HORIZONTAL APPLICATION

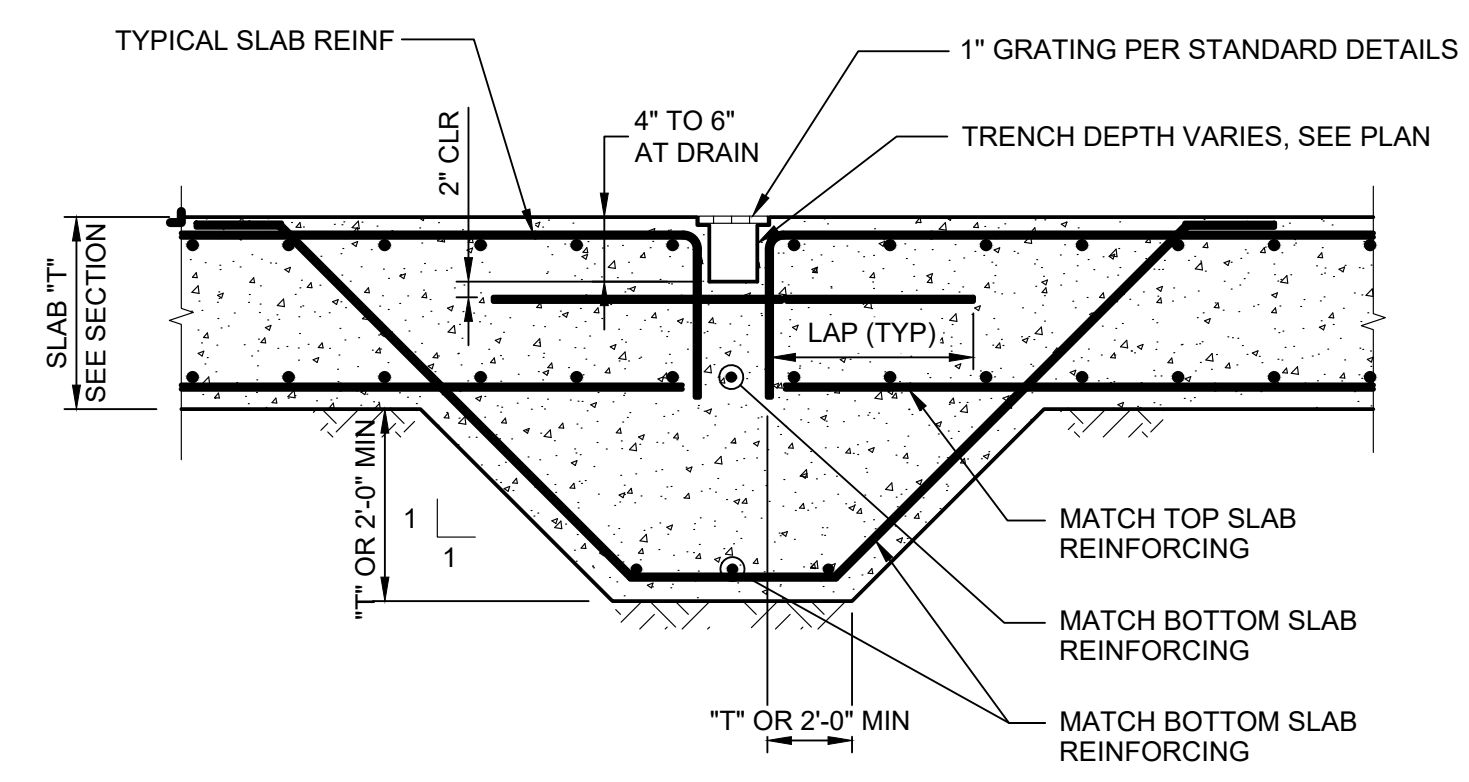
| ADHESIVE ANCHOR SCHEDULE | | | |
|--------------------------|------------------|-------------------|------------------|
| REINFORCING BARS | | ANCHOR BOLTS/RODS | |
| BAR SIZE | EMBED LENGTH (L) | DIA (IN) | EMBED LENGTH (L) |
| #3 | 4" | 3/8" | 5" |
| #4 | 5" | 1/2" | 6" |
| #5 | 6" | 5/8" | 7" |
| #6 | 7" | 3/4" | 8" |
| #7 | 8" | 7/8" | 9" |
| #8 | 9" | 1" | 10" |

- NOTES:
- ADHESIVE SHALL BE PER SPECIFICATIONS AND ICC ESR-3187 OR EQUAL.
 - EMBEDMENT LENGTHS SHOWN ARE MINIMUM. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION.
 - DO NOT USE ADHESIVE ANCHORS FOR UPWARDLY INCLINED APPLICATIONS.
 - EMBED LENGTHS SHOWN REFLECT CRACKED CONCRETE, SEISMIC LOADING CONDITION USING HILTI HIT-HY200 ADHESIVE OR EQUAL. FOR ADHESIVE WITH A LOWER BOND STRENGTH CONSULT ENGINEER FOR ALTERNATE EMBEDMENT.
 - FOR ANCHORS WITH LESS THAN 1.5L OF EDGE DISTANCE, CONSULT ENGINEER.
 - ACI/CRSI ADHESIVE ANCHOR INSTALLER CERTIFICATION REQUIRED FOR HORIZONTAL INSTALLATIONS.

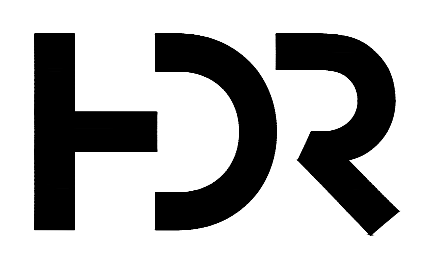
1 REINFORCING HOOK SCHEDULE
- NTS

2 CONCRETE REINFORCING LAP SPLICE SCHEDULE
- NTS

3 ADHESIVE ANCHOR DETAILS & SCHEDULE
- NTS



4 TYPICAL TRENCH SECTION
- 1/2" = 1'-0"

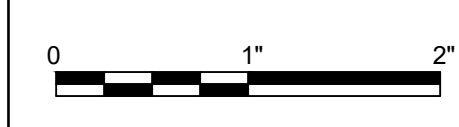


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION
TYPICAL CONCRETE DETAILS II



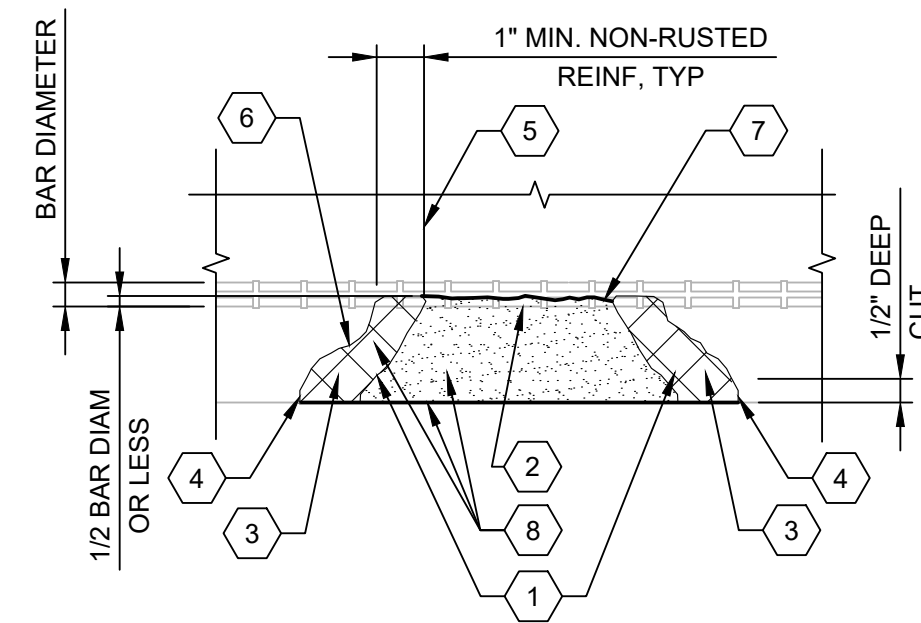
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GENERAL NOTES:

- REFER TO TABLE A ON THIS SHEET FOR BID QUANTITIES OF THE DIFFERENT CONCRETE SPALL REPAIR METHODS AND CRACK REPAIR. BID QUANTITIES APPLY TO PRIMARY DIGESTER, SECONDARY DIGESTER AND DEWATERING BUILDING AREAS SPECIFIED ON THE DRAWINGS.

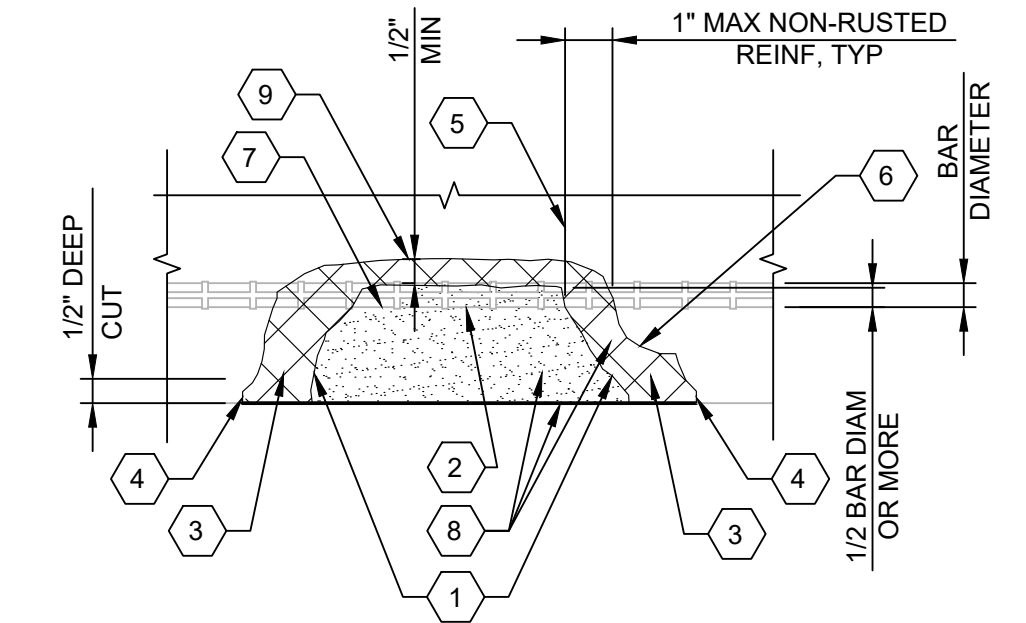
| TABLE A: CONCRETE REPAIR AND REHABILITATION SCHEDULE | | |
|--|--------------|------------------------|
| DESCRIPTION | SPEC SECTION | ESTIMATED BID QUANTITY |
| CONCRETE SPALL WITH NO EXPOSED REINFORCEMENT | 03 01 30 | 40 SQ FT |
| CONCRETE SPALL WITH EXPOSED REINFORCEMENT | 03 01 30 | 40 SQ FT |
| SECTION 03 01 38 CONCRETE CRACK REPAIR | 03 64 23 | 90 FT |



1A
NO EXPOSED REINFORCEMENT OR EXPOSED REINFORCEMENT < 1/2 BAR DIAM

KEYNOTES: #

- LINE OF EXISTING SPALL IN STRUCTURAL MEMBER.
- EXISTING EXPOSED AND RUSTED REINFORCEMENT.
- CONCRETE REMOVED DURING SANDBLASTING AND FILLED WITH PATCH MATERIAL.
- 1/4" DEEP, MINIMUM, PERIMETER CUT TO ELIMINATE FEATHERED EDGES.
- EDGE OF NON-RUSTED REINFORCEMENT.
- LINE OF CONCRETE AFTER SANDBLASTING AND BOTTOM OF PATCH.
- COAT CONCRETE SURFACE TO RECEIVE BONDING AGENT. IF EXPOSED REBAR IS PRESENT, DETERMINE SECTION LOSS OF REINFORCING STEEL. FOR SECTION LOSS OF STEEL GREATER THAN 20%, SPLICE NEW REINFORCING STEEL AS DIRECTED BY THE ENGINEER. ANTI-CORROSION BONDING AGENT SHALL BE USED TO COAT EXISTING REINFORCING STEEL.
- PATCH VOID WITH CEMENTITIOUS POLYMER MODIFIED PATCH AND SMOOTH SURFACE.
- GOUGE CONCRETE TO A DEPTH > 1/2" DEEPER THAN DEPTH TO BACK OF REINFORCEMENT USING CARE TO NOT DAMAGE CONCRETE BEYOND LIMITS SHOWN.

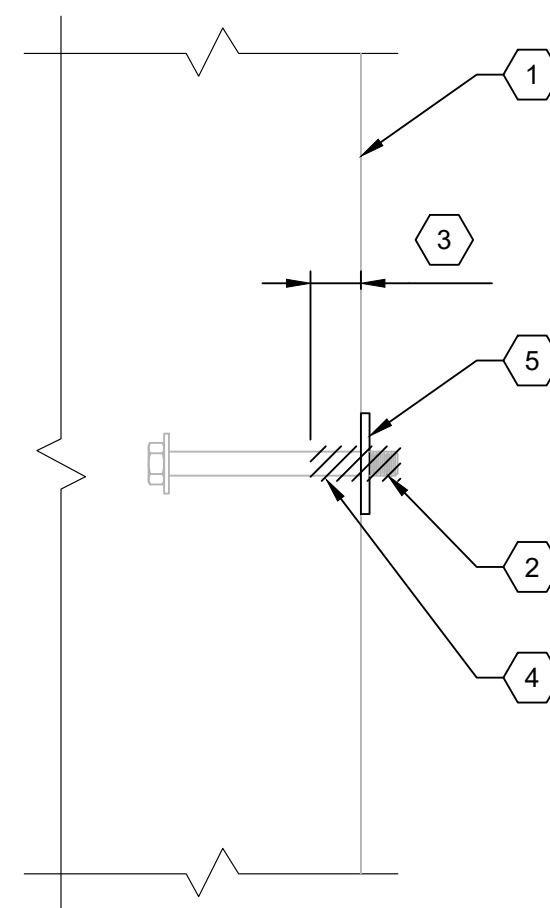


1B
EXPOSED REINFORCEMENT > 1/2 BAR DIAM

REPAIR NOTES:

- IF THERE IS NO EXPOSED REINFORCEMENT IN THE SPALLED AREA, THEN SANDBLAST THE SURFACE OF SPALLED AREA TO REMOVE LOOSE MATERIAL AND EXPOSE A CLEAN SURFACE FOR THE PATCH MATERIAL.
 - IF NO REINFORCEMENT IS EXPOSED AFTER SANDBLASTING, THEN USE THE REPAIR SHOWN IN SECTION 1A. DISREGARDING KEY NOTES 2, 5 AND 7.
 - IF REINFORCEMENT IS EXPOSED AFTER SANDBLASTING, THEN USE THE REPAIR DESCRIBED IN NOTE 2 BELOW.
- IF THERE IS EXPOSED REINFORCEMENT IN THE SPALLED AREA, SANDBLAST AND GOUGE CONCRETE TO REVEAL NON-RUSTED REINFORCEMENT A MAXIMUM OF ±1 INCH BEYOND ORIGINAL EXTENT OF RUST.
 - IF THE DEPTH OF CONCRETE REMOVED DURING SANDBLASTING RESULTS IN LESS THAN 1/2 BAR DIAMETER BEING EXPOSED, THEN USE THE REPAIR SHOWN IN SECTION 1A.
 - IF THE DEPTH OF CONCRETE REMOVED DURING SANDBLASTING RESULTS IN MORE THAN 1/2 BAR DIAMETER BEING EXPOSED, THEN USE THE REPAIR SHOWN IN SECTION 1B.
- REFER TO SPEC SECTION 03 01 30 FOR ADDITIONAL CONCRETE REPAIR REQUIREMENTS.

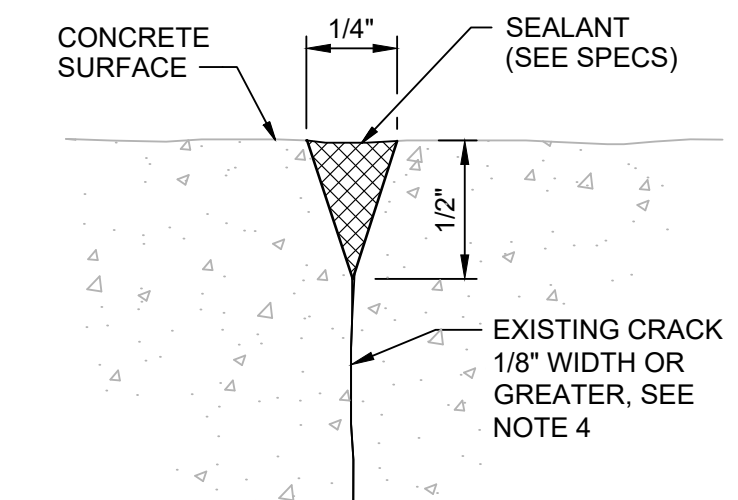
1
REPAIR DETAIL AT CONCRETE SPALL AND AT EXPOSED AND RUSTED REINFORCEMENT
NOT TO SCALE



2
GRIND DOWN AND COAT OVER EXISTING BOLT DETAIL
NTS

KEYNOTES: #

- FACE OF EXISTING CONC WALL. TOP OF CONC SLAB AT SIMILAR CONDITION.
- EXISTING ANCHOR BOLT. CUT BOLT PROJECTION FLUSH TO SURFACE OF CONC.
- DRILL EXPOSED END OF EXISTING ANCHOR BOLT TO A DEPTH OF 1" MINIMUM BELOW SURFACE OF CONC.
- PATCH HOLE AT DRILLED END OF ANCHOR BOLT USING ANTI-CORROSION BONDING AGENT & NON-SHRINK GROUT.
- COAT OVER PATCH WITH EPOXY PATCH SEAL MATERIAL.



NOTES:

- ENLARGE CRACK AT CONCRETE SURFACE AS SHOWN AND APPLY JOINT SEALANT.
- WIDEN CRACK 1/8" MINIMUM EACH SIDE OF THE CRACK CENTERLINE.
- SEE SPECIFICATIONS FOR ADDITIONAL REPAIR REQUIREMENTS.
- APPLY INJECTION MATERIAL PER SPECIFICATIONS.

3
CONCRETE CRACK REPAIR DETAIL
NOT TO SCALE

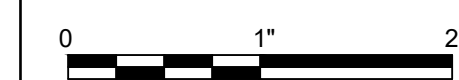


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION CONCRETE REPAIR DETAILS

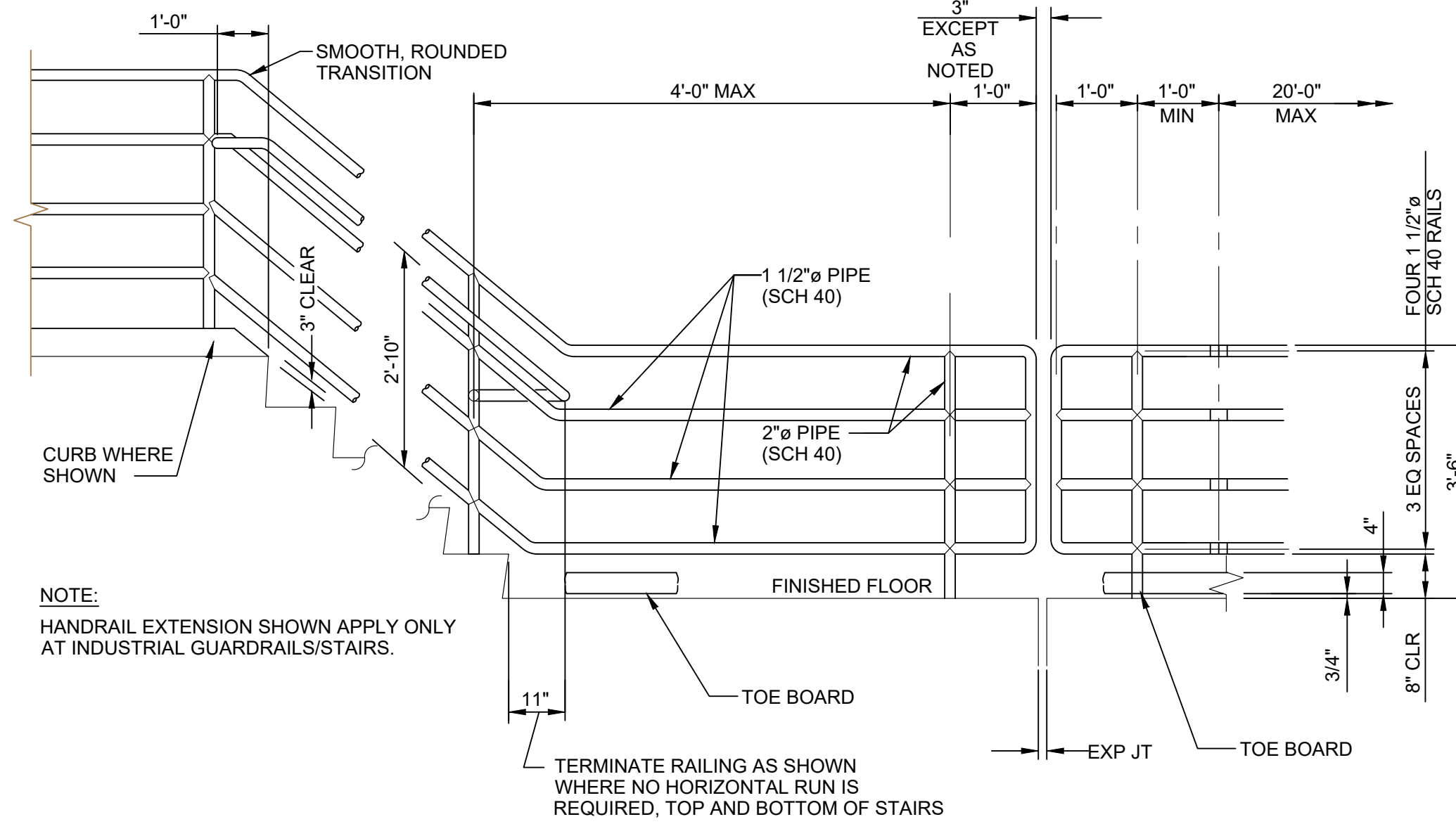


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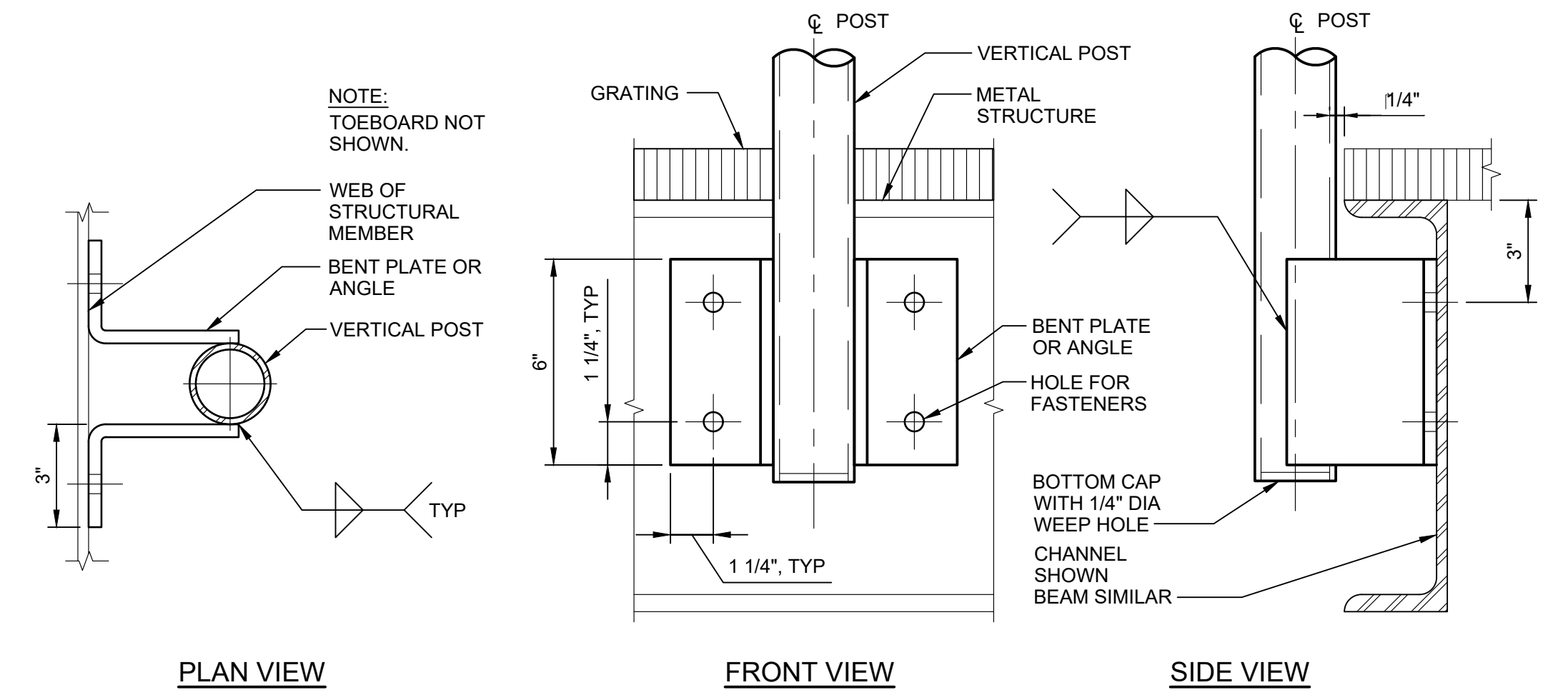
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GUARDRAIL NOTES:

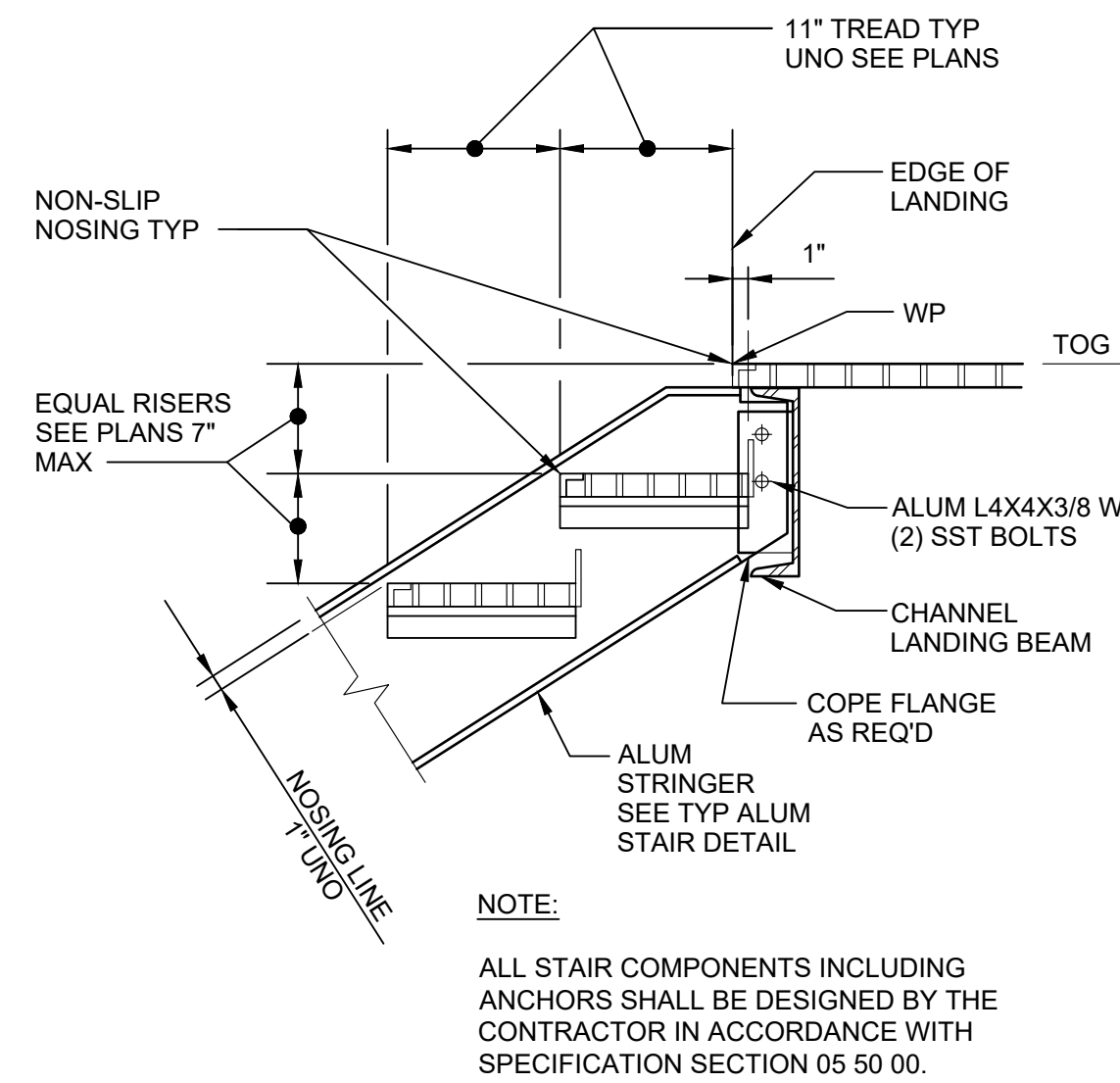
- ALL GUARDRAIL COMPONENTS INCLUDING ANCHORS SHALL BE DESIGNED BY THE CONTRACTOR IN ACCORDANCE WITH SPECIFICATION SECTION 05 52 46.
- ALL RAILING SHALL BE ALUMINUM, UNLESS OTHERWISE SPECIFIED.
- ALL FASTENERS SHALL BE STAINLESS STEEL.
- RAILING SHALL BE INSTALLED SO AS NOT TO INTERFERE WITH ANY PIPING, EQUIPMENT OR EASE-OUT AIR PIPING ASSEMBLY. CONTRACTOR TO COORDINATE.
- RAILING POST LOCATIONS SHALL BE FIELD MEASURED AND RAILING FABRICATED TO FIT. NO FIELD CUTTING OR WELDING WILL BE PERMITTED. RAILING WHICH DOES NOT FIT MOUNTING PREVIOUSLY SET IN CONCRETE WILL BE REJECTED.
- WHERE NO CURB, PROVIDE TOE BOARD UNLESS SPECIFICALLY CALLED OUT AS NO TOE BOARD REQUIRED.
- SPACING OF EXPANSION JOINT IN RAIL AND TOE BOARD SHALL NOT EXCEED 20 FEET.
- RAILING POST TO BE EVENLY SPACED.



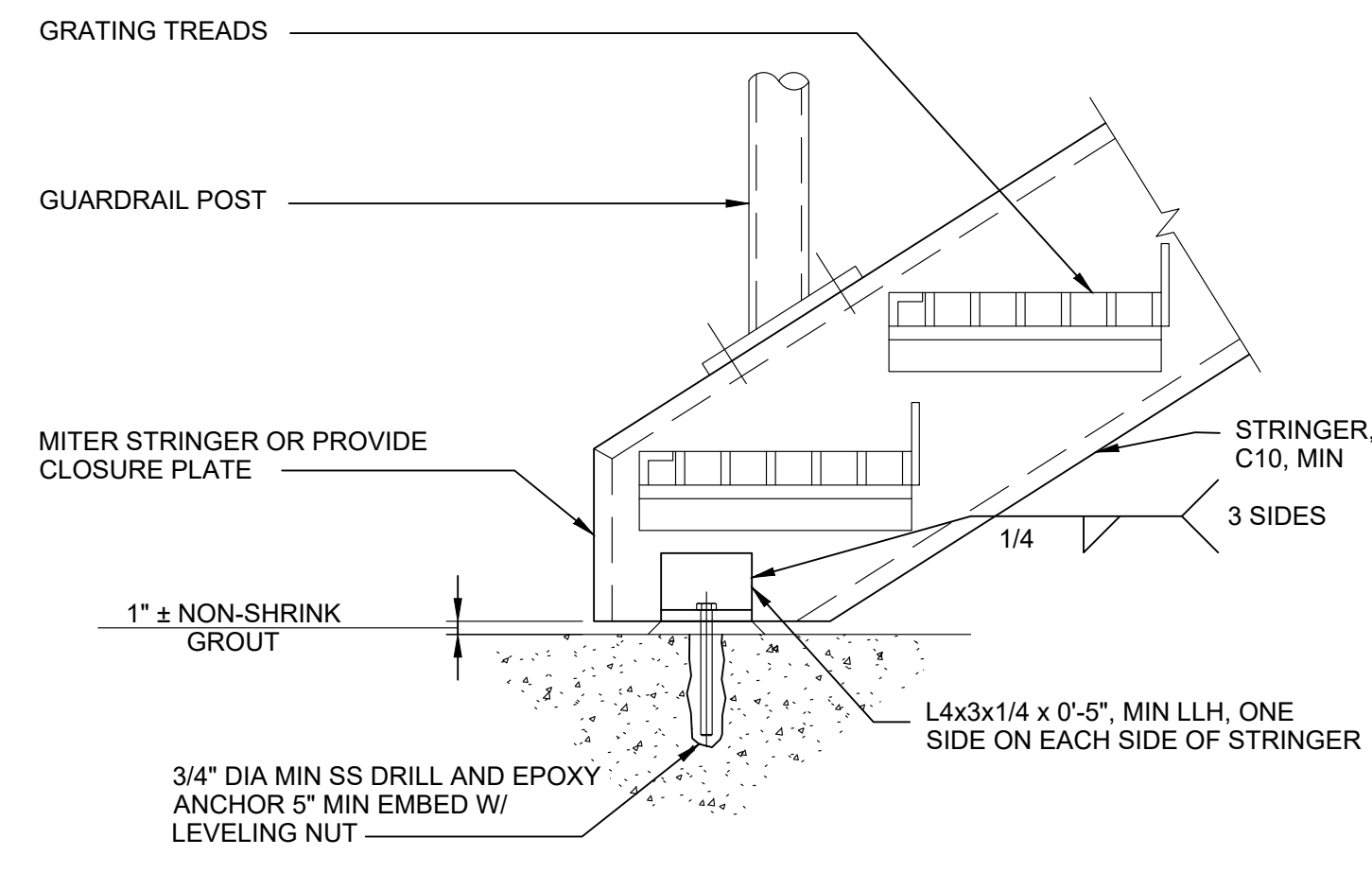
1 INDUSTRIAL GUARDRAIL
- NTS



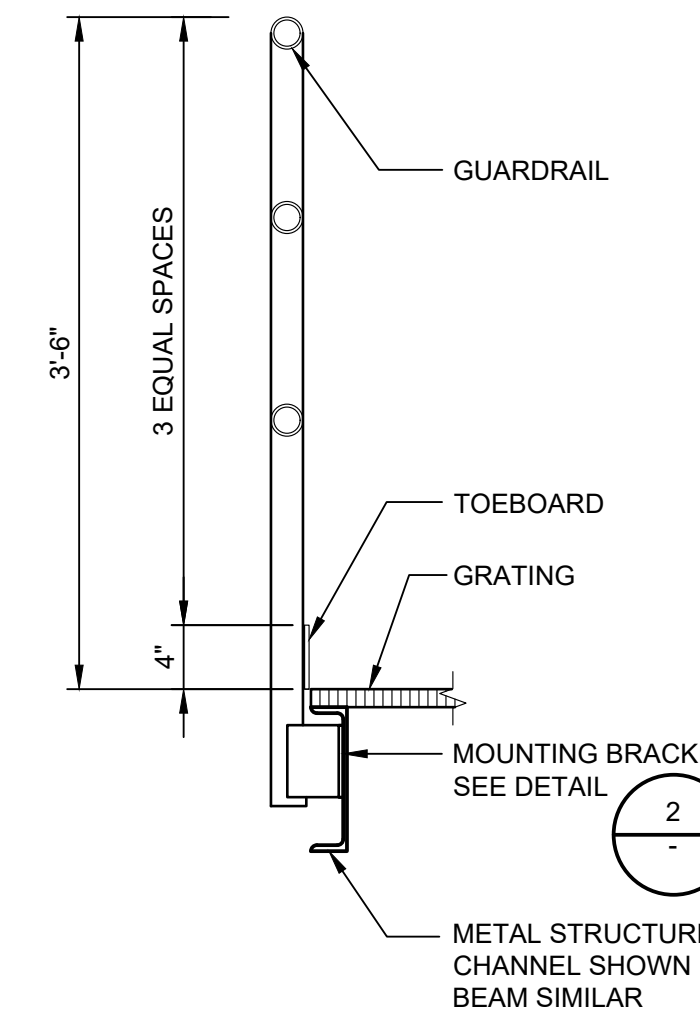
2 GUARDRAIL SIDE-MOUNTING BRACKET TO METAL FRAMING
- NTS



3 ALUMINUM STAIR AT TOP
- NTS



4 ALUMINUM STAIR AT BOTTOM
- NTS



5 GUARDRAIL SIDE MOUNTED TO METAL FRAMING
- NTS



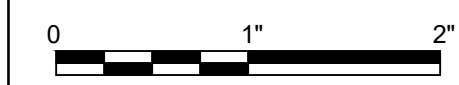
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PROJECT MANAGER MIKE FALK

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|----------------|--------------|
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |

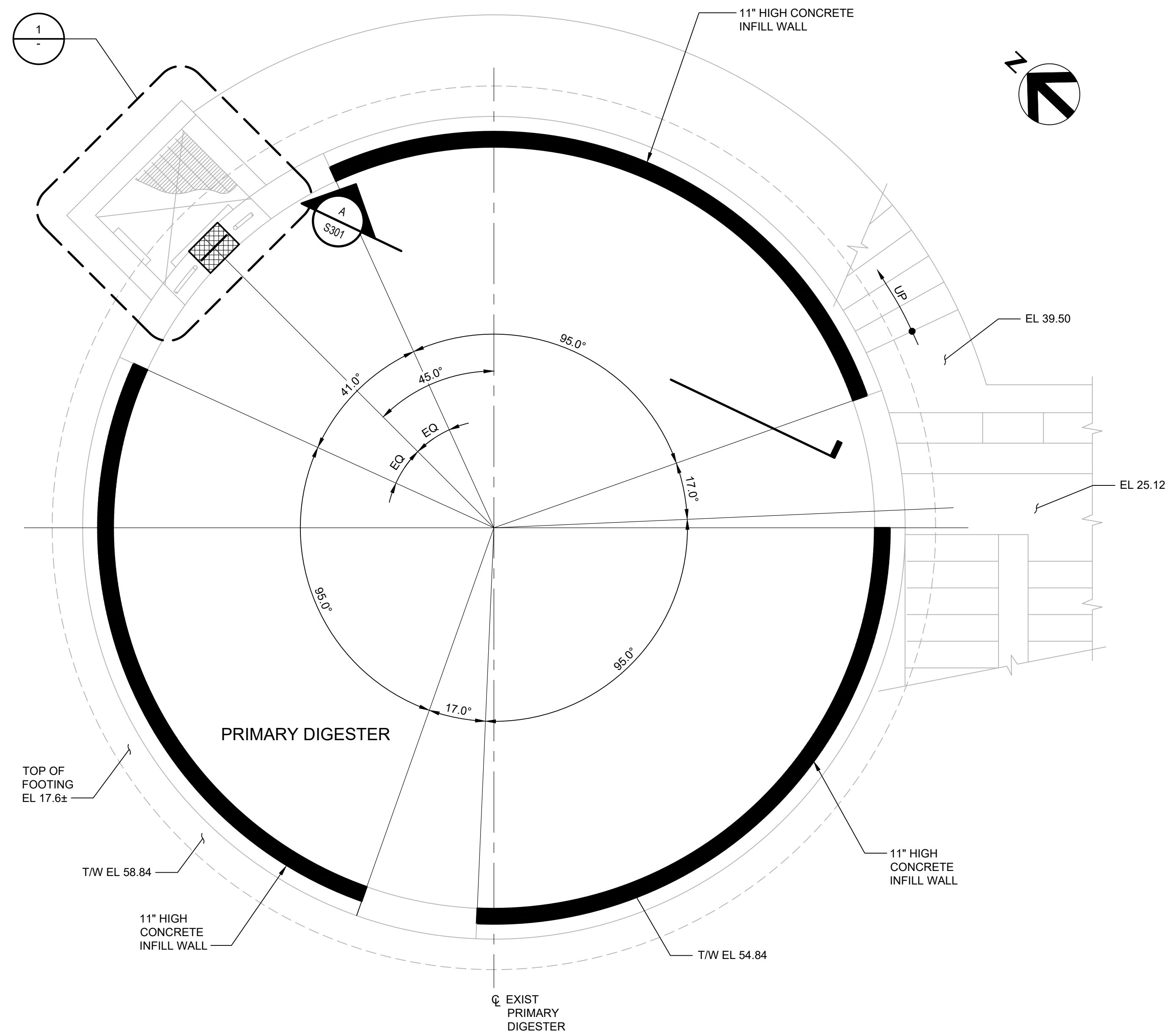


DIGESTER CLEANING AND REHABILITATION RAILING / GUARDRAIL DETAILS

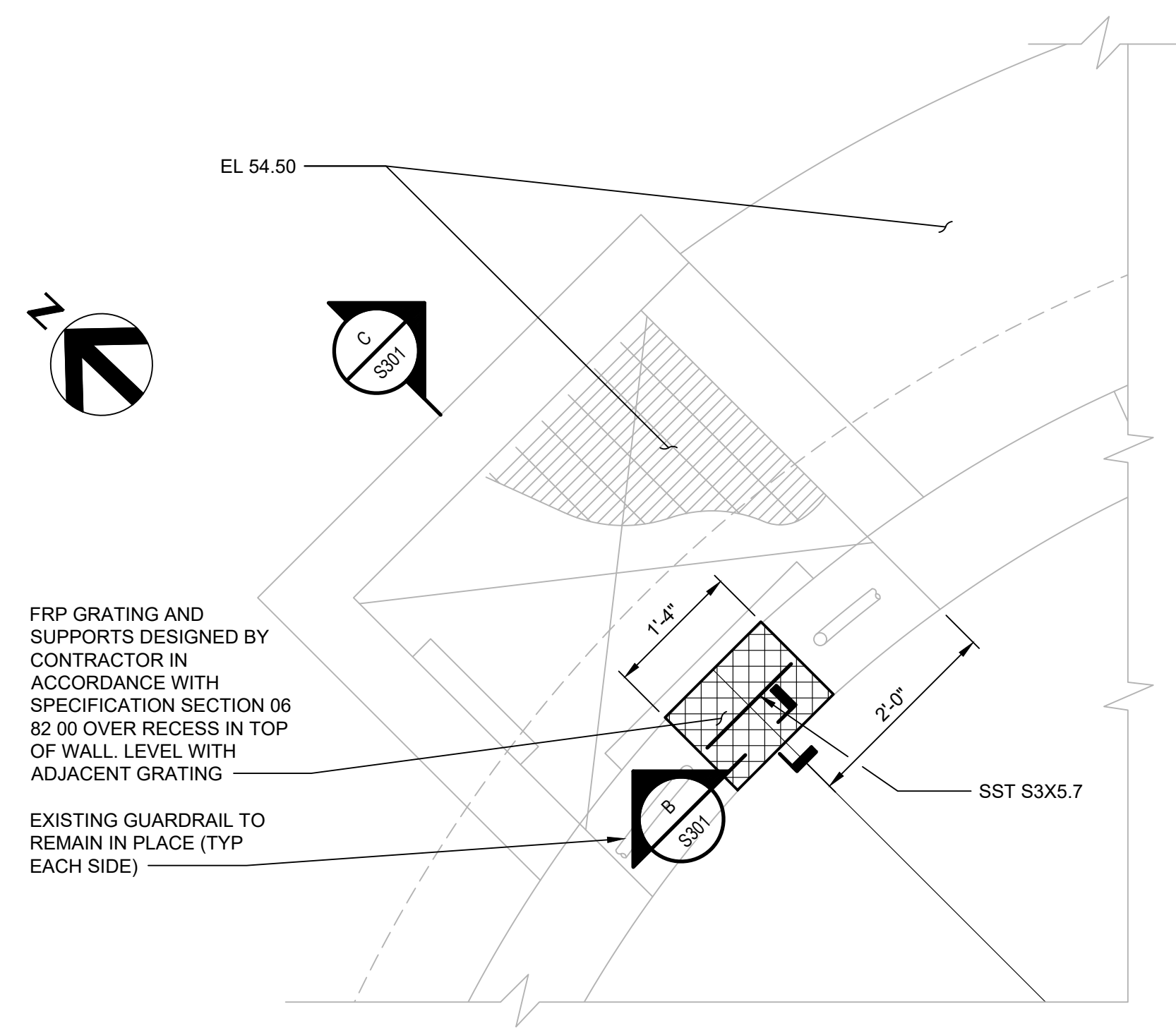


FILENAME | S006.dwg
SCALE | NTS

SHEET
S006



PRIMARY DIGESTER PLAN
SCALE: 3/8" = 1'-0"



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

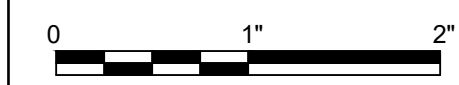


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
PRIMARY DIGESTER
STRUCTURAL PLAN AND SECTION**



FILENAME | S101.dwg
SCALE | NTS

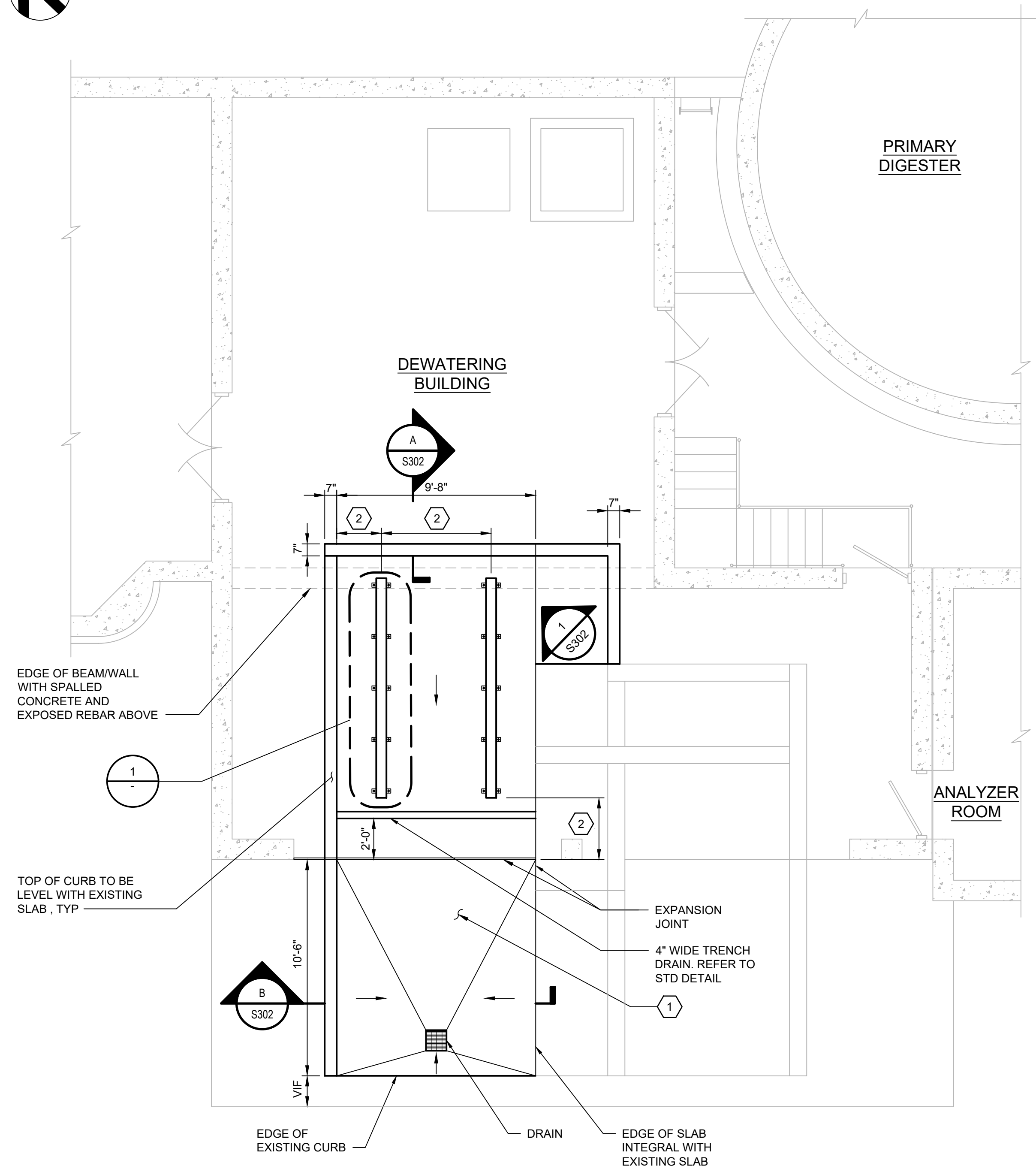
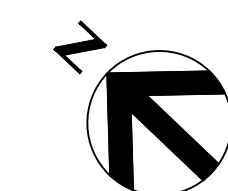
SHEET
S101

GENERAL NOTES

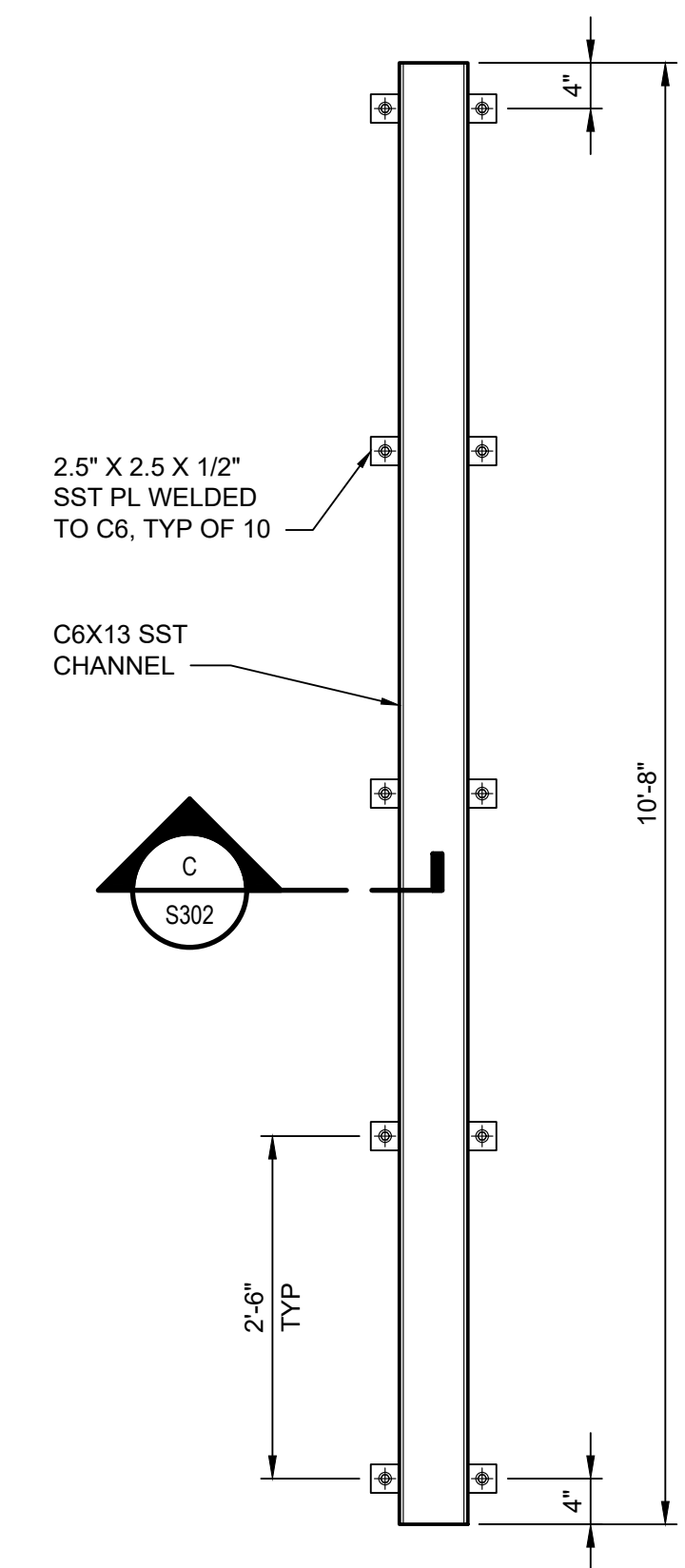
1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17D1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING WORK.

SHEET KEYNOTES

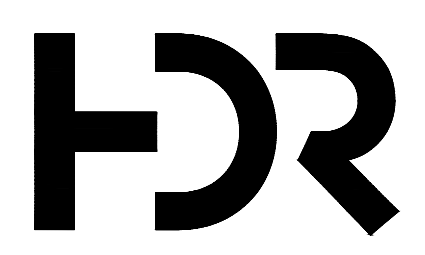
- 1 12" THICK CONCRETE SLAB AND CURB ALL AROUND BUILT INTEGRAL WITH EXISTING SLAB AND TO SLOPE TO DRAIN.
- 2 VERIFY DIMENSIONS BETWEEN RAILS AND TO EDGE OF CURB IN COORDINATION WITH THE DUMPSTER AND DISTRICT REQUIREMENTS.



PLAN EL 14.50
SCALE: 1/4" = 1'-0"



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



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
DEWATERING BUILDING
STRUCTURAL PLAN**



FILENAME | S102.dwg
SCALE | NTS

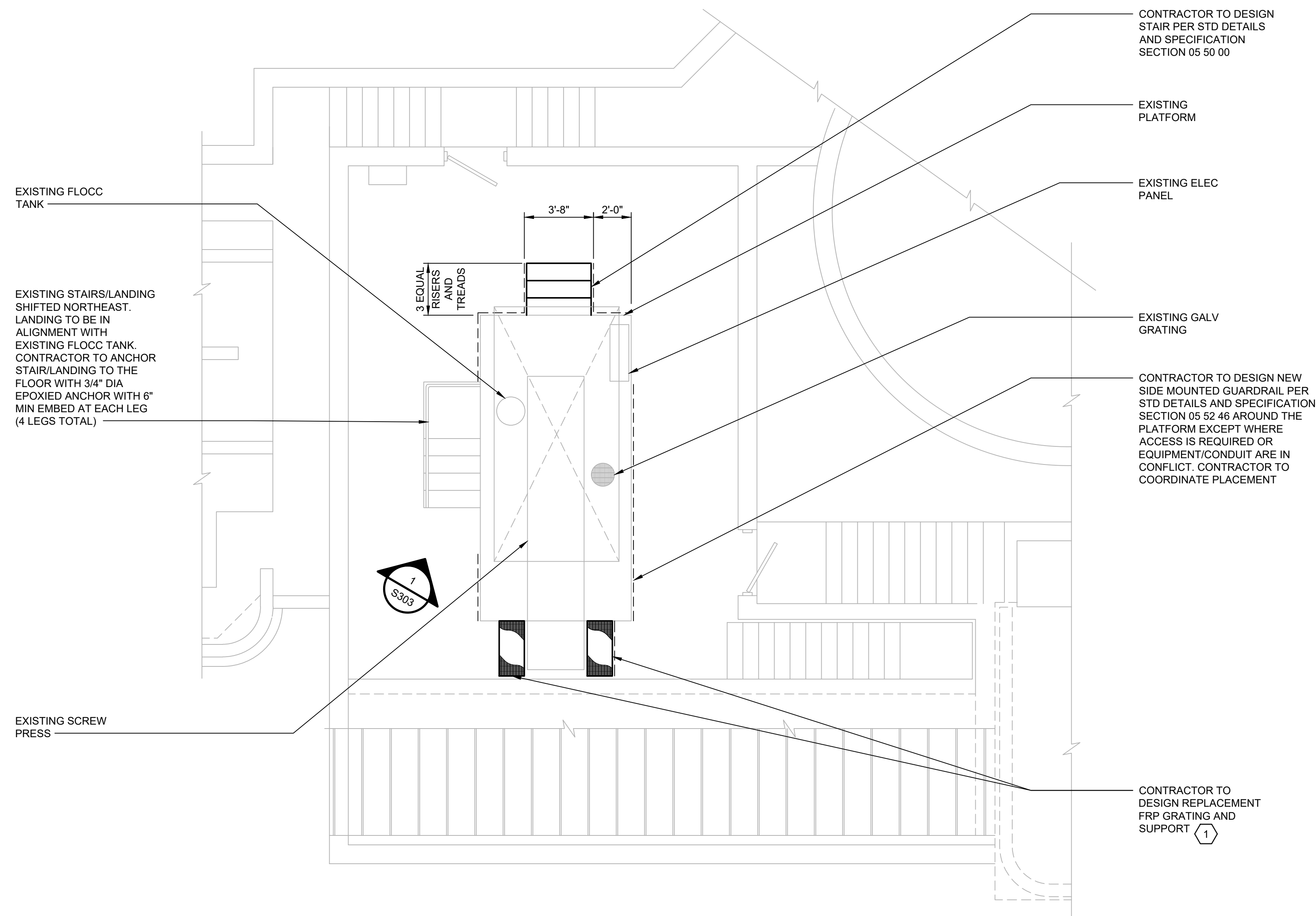
SHEET
S102

GENERAL NOTES

1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.
2. BACKGROUND OF DRAWING BASED ON SHEET 17E1 FROM 2014 MAIN PLANT REHABILITATION PROJECT RECORD DRAWINGS. FIELD VERIFY EXISTING PIPING, ELEVATIONS, AND MATERIALS PRIOR TO PERFORMING WORK.

SHEET KEYNOTES

1. CONTRACTOR TO PROVIDE STAMPED AND SIGNED CALCULATIONS FOR THE DESIGN AND REPLACEMENT OF THE FRP PLATFORM SECTIONS IN ACCORDANCE WITH SPECIFICATION SECTION 06 82 00.



PLAN EL 38.00

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



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
SCREW PRESS ROOM
STRUCTURAL PLAN**

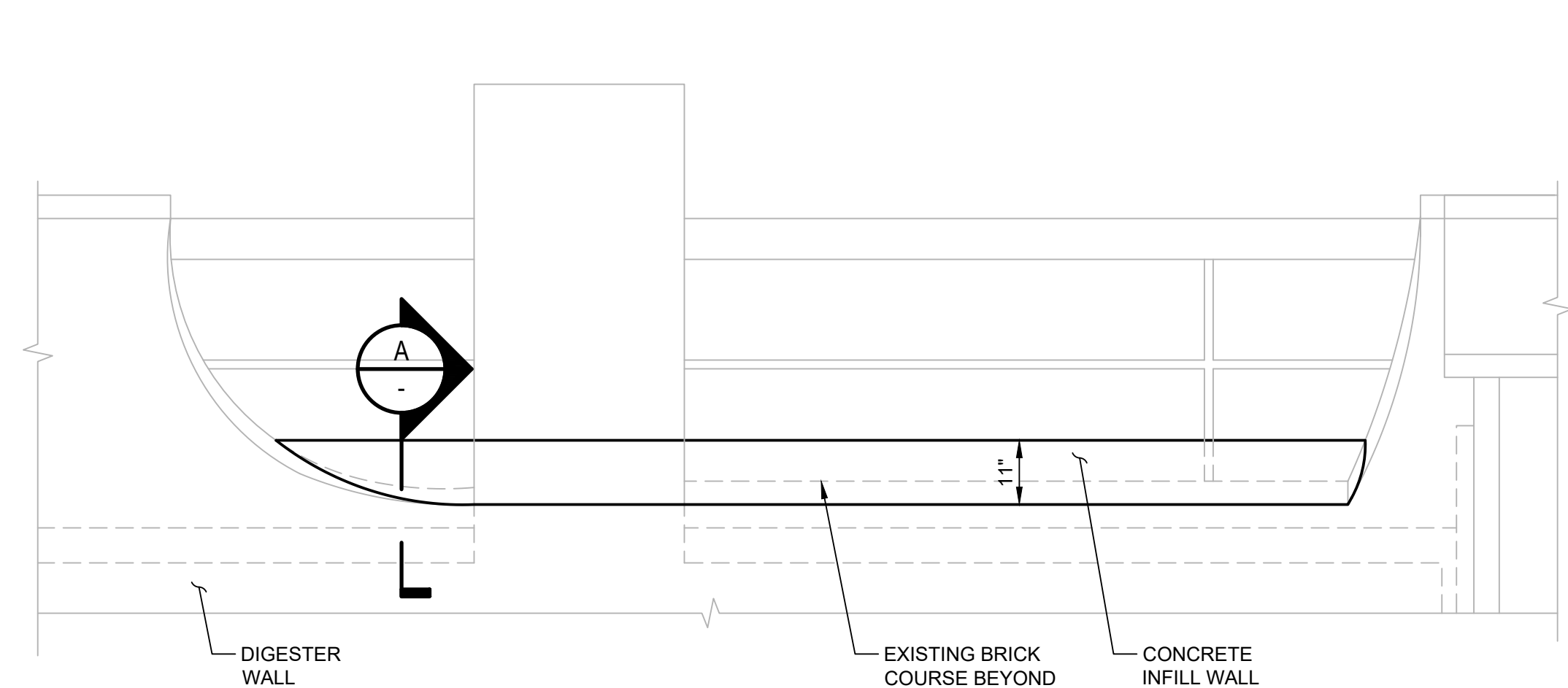


FILENAME | S103.dwg
SCALE | NTS

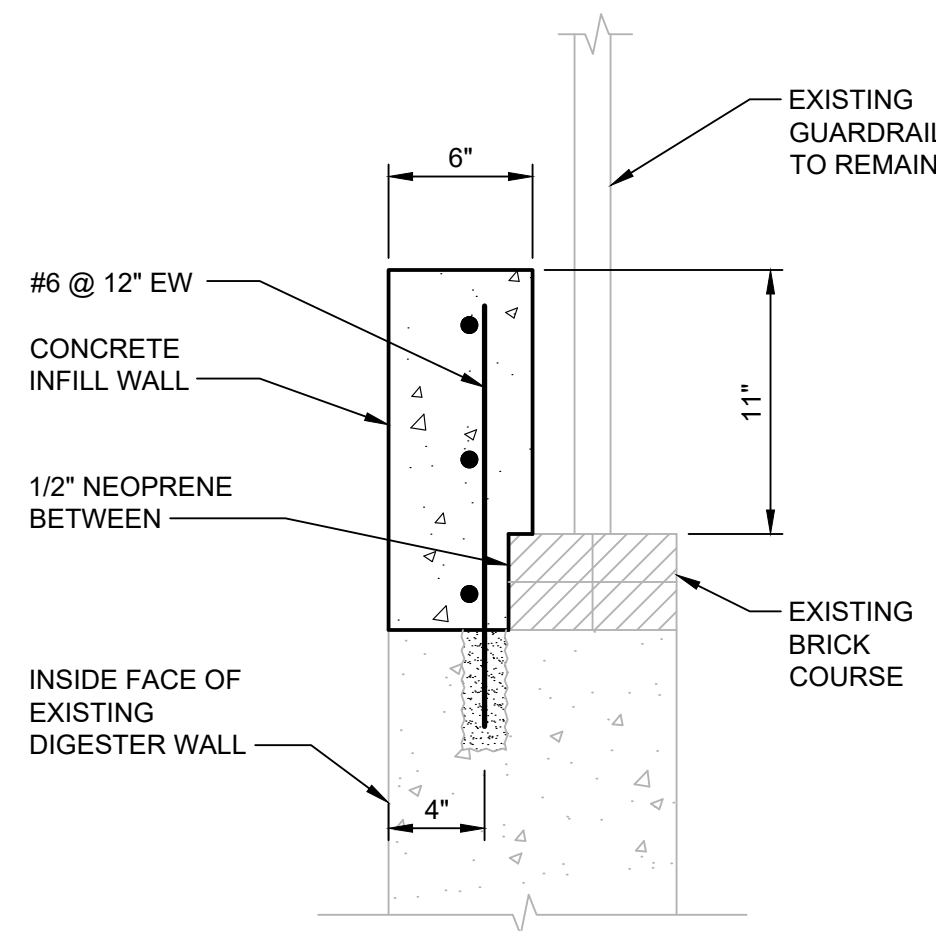
SHEET
S103

GENERAL NOTES

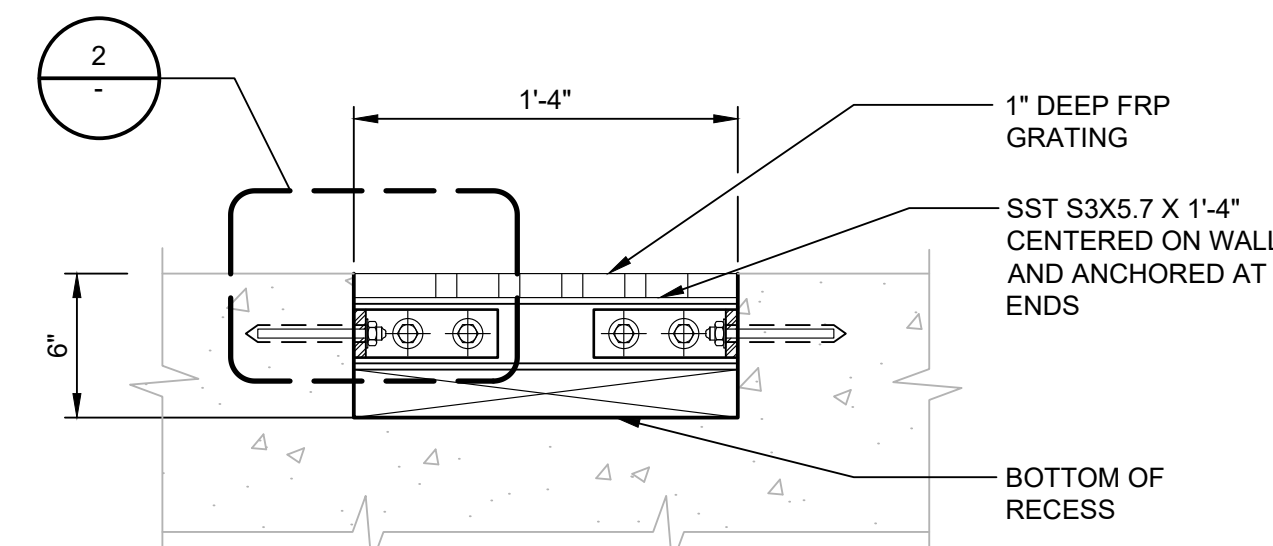
1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.



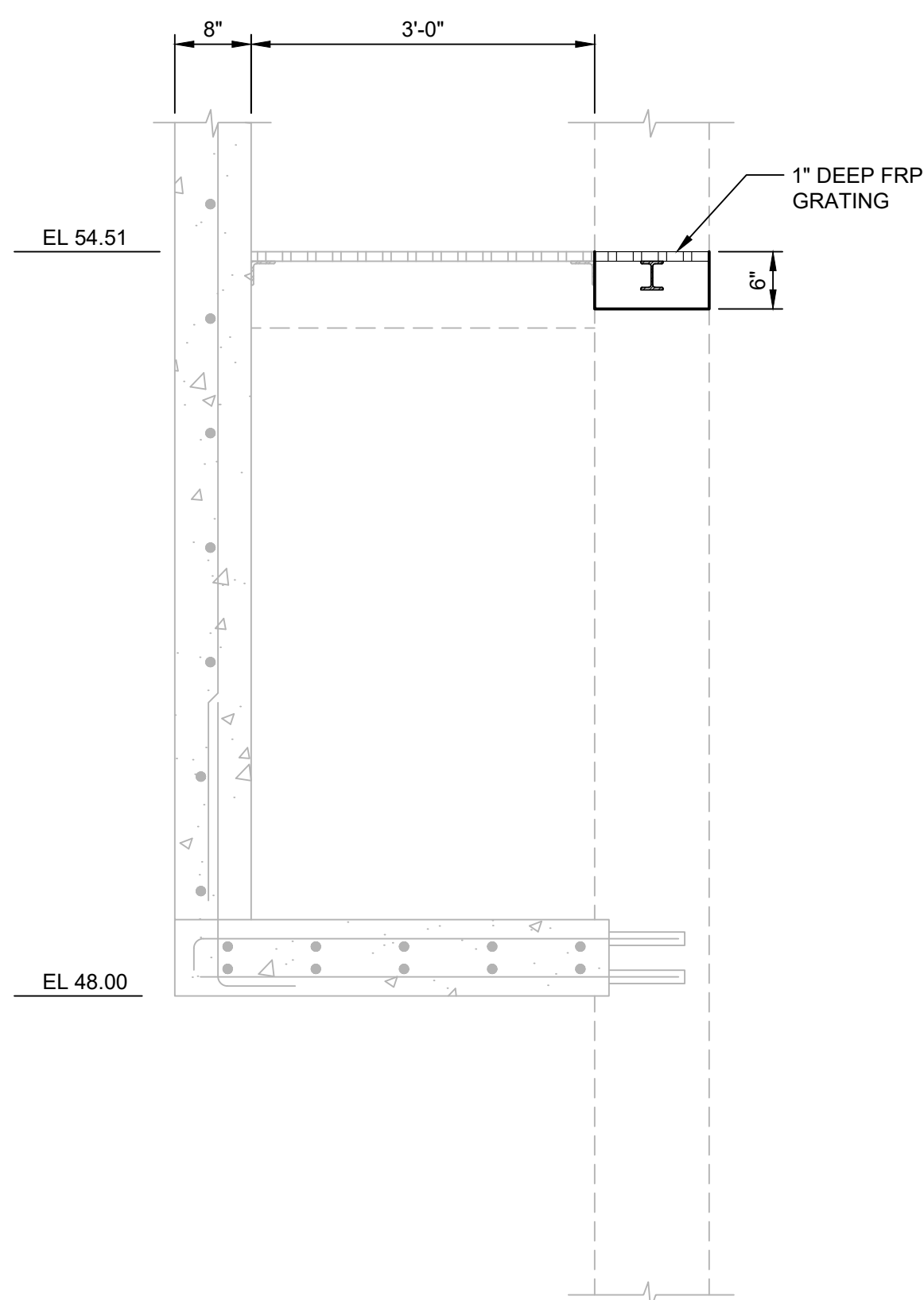
A
S101
TYPICAL INFILL WALL
1/2" = 1'-0"



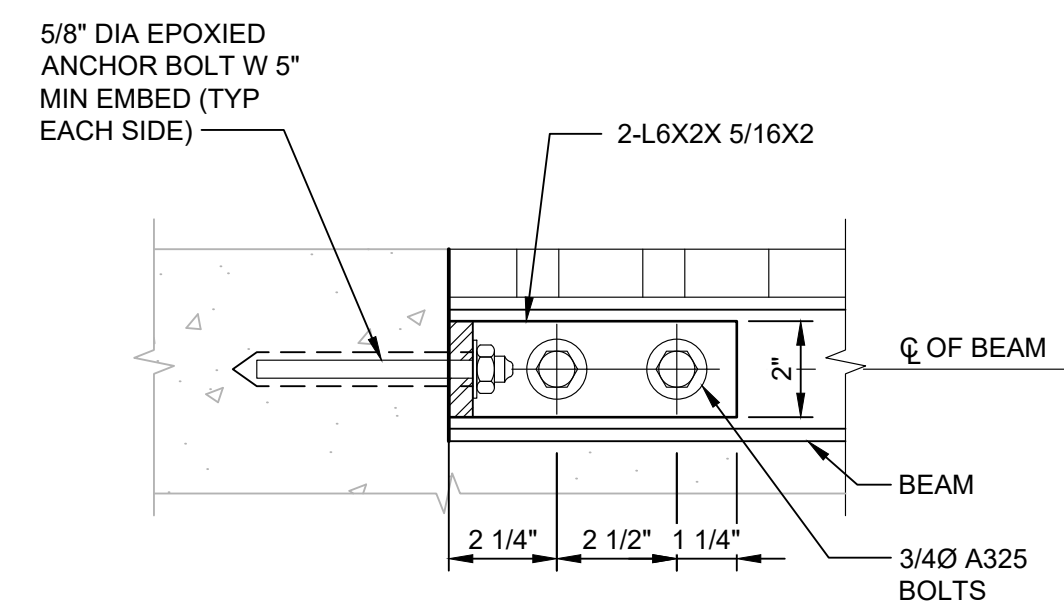
A
SECTION
1 1/2" = 1'-0"



B
S101
SECTION
1 1/2" = 1'-0"



C
S101
SECTION
3/4" = 1'-0"



2
DETAIL
3" = 1'-0"



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
STRUCTURAL SECTIONS AND DETAILS - 1**



FILENAME | S301.dwg
SCALE | NTS

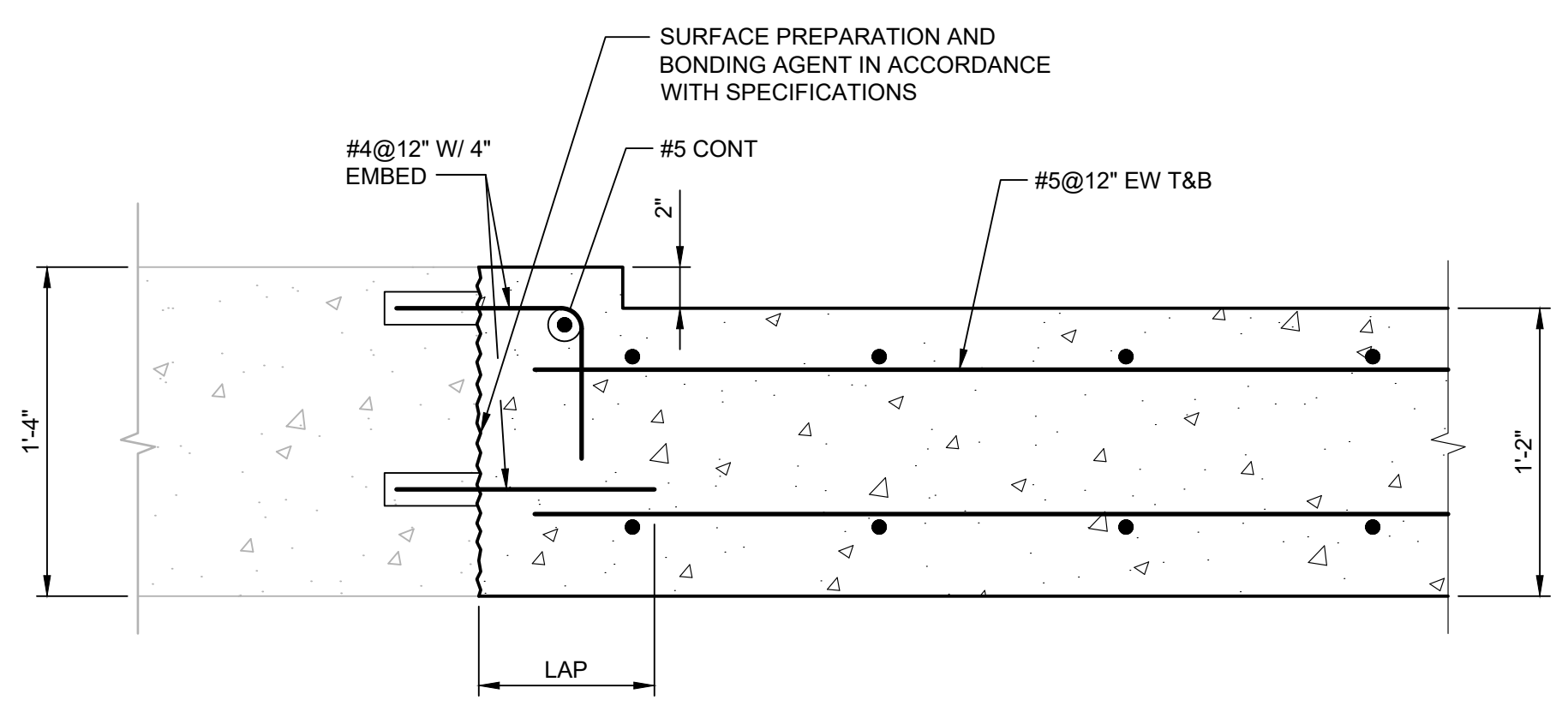
SHEET
S301

GENERAL NOTES

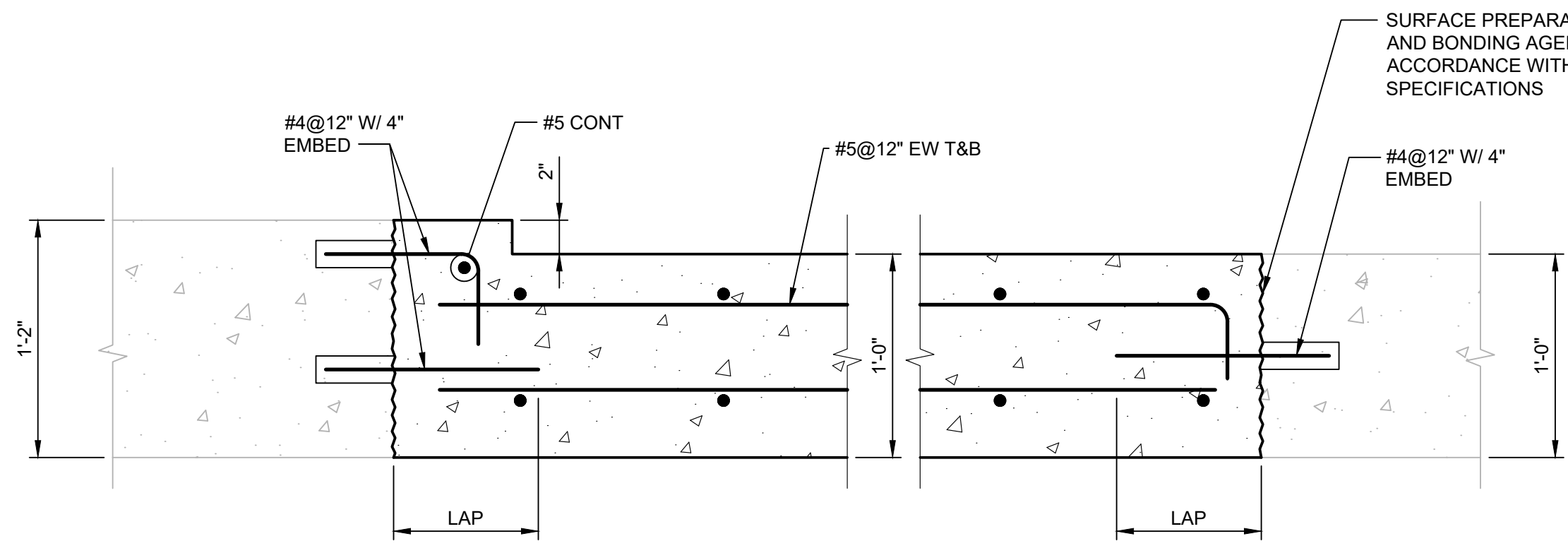
1. DIMENSIONS PROVIDED ARE FOR REFERENCE ONLY. FIELD VERIFY ALL DIMENSIONS.

SHEET KEYNOTES

1 REPAIR SPALLED CONCRETE AND TREAT EXPOSED REBAR PER DETAIL 2/S005 FOR SPALLED CONCRETE REPAIR AND SPECIFICATION 03 01 30.



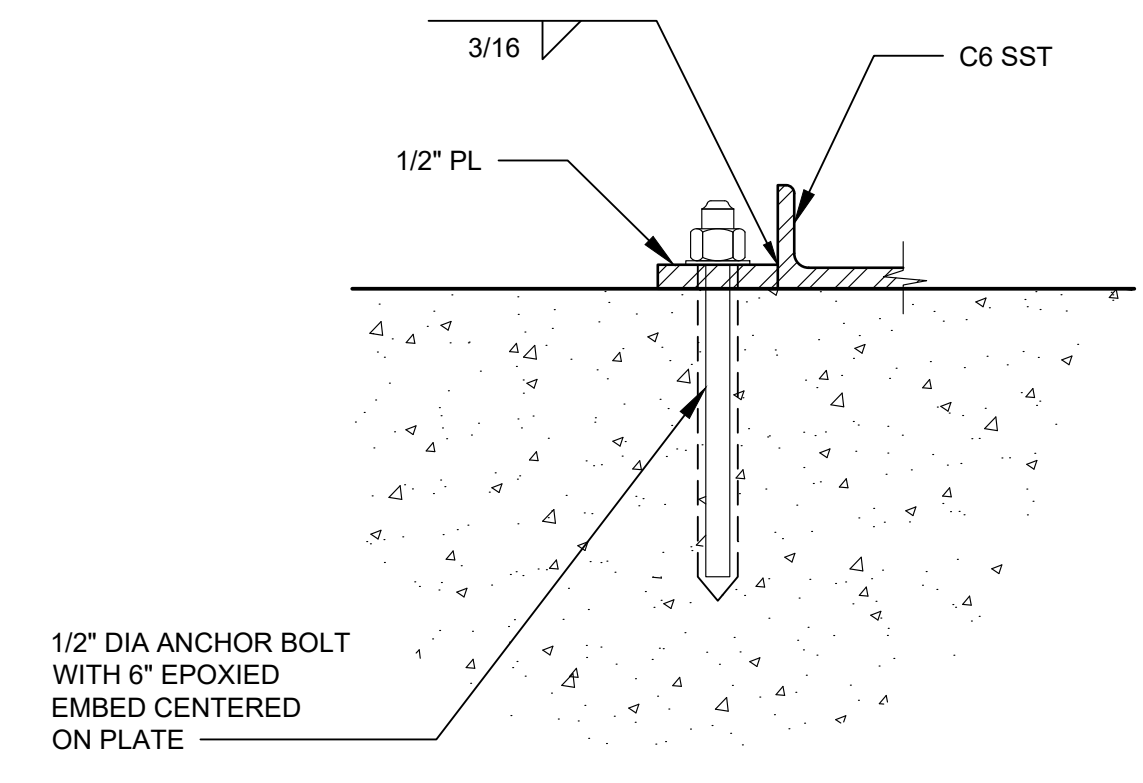
A SECTION
S102 1 1/2" = 1'-0"



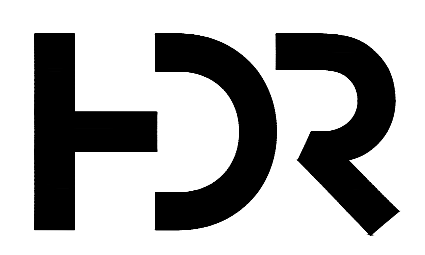
B SECTION
S102 1 1/2" = 1'-0"



1 DETAIL
S102 NTS



C SECTION
S102 3" = 1'-0"

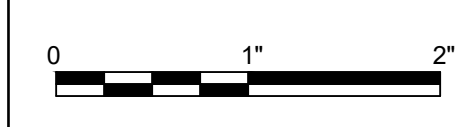


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
STRUCTURAL SECTIONS AND DETAILS - 2**



FILENAME | S302.dwg
SCALE | AS NOTED

SHEET
S302

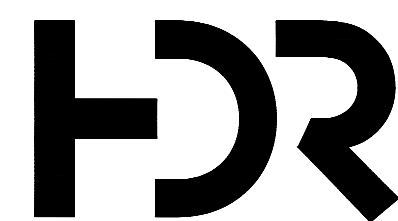


EXISTING FLOC TANK

SHIFT EXISTING STAIR/LANDING TO THE NORTHEAST. LANDING TO BE IN ALIGNMENT WITH EXISTING FLOC TANK TO ALLOW EASE OF ACCESS TO THE TANK. STAIRS/LANDING SHALL BE ANCHORED TO THE FLOOR

1
S103
DETAIL
NTS

D
C
B
A



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | C. STARR |
| DESIGNER 2 | |
| CHECKED | M. FARSAD |
| DRAWN | R. PRASAD |
| DATE | JANUARY 2024 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
STRUCTURAL SECTIONS AND DETAILS - 3**



FILENAME | S303.dwg
SCALE | NTS

SHEET
S303

ONE LINE, POWER, AND LIGHTING SYMBOLOGY

LOW - VOLTAGE CIRCUIT BREAKER (CB), RATING AND NO. OF POLES AS SHOWN, WHEN SPECIFIC TYPE, OTHER THAN MCCB, IS REQUIRED, X INDICATES TYPE.

TYPES:
 MCCB - MOLDED CASE
 ICCB - INSULATED CASE
 LVP - LOW VOLTAGE POWER
 MCP - MOTOR CIRCUIT PROTECTOR (RATING PER CONNECTED LOAD)

TRIP UNIT:
 L - LONG TIME PICKUP
 S - SHORT TIME PICKUP
 I - INSTANTANEOUS PICKUP
 G - GROUND FAULT PICKUP
 A - ARC FLASH MAINTENANCE

GROUND FAULT PROTECTION

MEDIUM - VOLTAGE CIRCUIT BREAKER

FUSE, SIZE, AND NUMBER OF FUSES AS NOTED

FUSED CUTOUT, CURRENT RATING, FUSE SIZE, AND NUMBER OF POLES AS NOTED

FUSIBLE SWITCH, CURRENT RATING, FUSE SIZE, AND QUANTITY AS NOTED

NON-FUSED SWITCH, CURRENT RATING, AND NUMBER OF POLES AS NOTED

DISCONNECT OR DRAWOUT CONNECTION

MAGNETIC MOTOR STARTER AND SEPARATELY MOUNTED COMBINATION MAGNETIC MOTOR STARTER

MOTOR CONTROLLER AND SEPARATELY MOUNTED MOTOR CONTROLLER WITH SHORT CIRCUIT PROTECTION AND DISCONNECT

MOTOR STARTER AND CONTROLLER SUBSCRIPTS:
 A - MAGNETIC STARTER NEMA SIZE
 B - STARTER TYPE
 NONE - FULL VOLTAGE NON-REVERSING (FVNR)
 FVR - FULL VOLTAGE REVERSING
 ZS - TWO SPEED
 RVAT - REDUCED VOLTAGE AUTO TRANSFORMER

C - CONTROL DIAGRAM OR CONTROLS SCHEDULE NUMBER (IF REQUIRED)

D - CONTROLLER TYPE
 VFD - VARIABLE FREQUENCY DRIVE
 SS - SOLID STATE
 CONT - CONTACTOR

SEPARATELY MOUNTED COMBINATION MOTOR STARTER OR CONTROLLER; SEE ELECTRICAL ONE - LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION

SEPARATELY MOUNTED MOTOR STARTER OR CONTROLLER; SEE ELECTRICAL ONE-LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION.

DISCONNECT OR SAFETY SWITCH, 30A, 3P, X INDICATES AMP RATING GREATER THAN 30A, NON-FUSED UNLESS OTHERWISE NOTED

FUSED DISCONNECT OR SAFETY SWITCH, 3P, X INDICATES AMP RATING GREATER THAN 30A, Y INDICATES FUSE SIZE

SEPARATELY MOUNTED CIRCUIT BREAKER; SEE ELECTRICAL ONE - LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION

MOTOR WITH DESIGN HORSEPOWER (WHEN INDICATED)

CONTROLLING CABLING

INDICATING LIGHT; X INDICATES LENS COLOR
 PUSH TO TEST INDICATING LIGHT; X INDICATES LENS COLOR

LENS COLORS:
 R - RED
 G - GREEN
 B - BLUE
 Y - YELLOW
 W - WHITE
 A - AMBER

Thermal Overload Element
 Thermal Overload Relay Contact
 Control Power Transformer (CPT)
 Run Time Meter

TRANSFORMER

3-PHASE, 3-WIRE DELTA CONNECTION
 3-PHASE, 4-WIRE GROUNDED WYE CONNECTION

SWITCHBOARD OR PANELBOARD; NAME, VOLTAGE, PHASE, NUMBER OF WIRES WHEN INDICATED

NON-MOTOR LOAD WITH DESIGN KVA, KW, OR AMP

VOLTAGE TRANSFORMER (VT OR PT)

CURRENT TRANSFORMER (CT)

UTILITY WATT-HOUR METER PER UTILITY REQUIREMENTS

DIGITAL METERING PACKAGE

GROUND

LIGHTNING ARRESTER

LOW VOLTAGE SURGE PROTECTIVE DEVICE

SELECTOR SWITCH

PUSHBUTTON

INSTRUMENTATION/CONTROL DEVICE

CONTROL PANEL INTEGRAL OR PROVIDED WITH ASSOCIATED EQUIPMENT

CONTROL PANEL WITH DISCONNECT SWITCH INTEGRAL OR PROVIDED WITH ASSOCIATED EQUIPMENT

CONDULET

JUNCTION OR PULL BOX

PANELBOARD (250V TO 600V)

PANELBOARD (LESS THAN 250V)

ELECTRICAL EQUIPMENT ENCLOSURE: SWITCHBOARD, MOTOR CONTROL CENTER, CONTROL PANEL, TRANSFORMER OR OTHER EQUIPMENT AS INDICATED, ESTIMATED SIZE AS INDICATED, WHEN USED X INDICATES EQUIPMENT TYPE.

- EQUIPMENT TYPES:**
 ATS - AUTOMATIC TRANSFER SWITCH
 CP - CONTROL PANEL
 LC - LIGHTING CONTROL PANEL
 MTS - MANUAL TRANSFER SWITCH
 MCC - MOTOR CONTROL CENTER
 UPS - UNINTERRUPTIBLE POWER SUPPLY
 VFD - VARIABLE FREQUENCY DRIVE
 SB - SWITCHBOARD
 SG - SWITCHGEAR
 T - TRANSFORMER

ELECTRICAL CONNECTION

NO ELECTRICAL CONNECTION

SOLENOID VALVE

CONTROL/RELAY COIL:
 X-INDICATES TYPE
 Y-INDICATES LOOP NUMBER, WHEN USED

TYPES:
 CR-CONTROL RELAY TC-TIME CLOCK
 PC-PHOTOCELL LC-LIGHTING CONTACTOR
 DP-DEFINITE PURPOSE TR-TIMING RELAY
 M-MOTOR STARTER

NORMALLY OPEN CONTACT (N.O.)

NORMALLY CLOSED CONTACT (N.C.)

NORMALLY OPEN TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS ENERGIZED

NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON OPENING AFTER COIL IS ENERGIZED

NORMALLY OPEN TIME DELAY RELAY CONTACT WITH TIME DELAY ON OPENING AFTER COIL IS DE-ENERGIZED

NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS DE-ENERGIZED

NORMALLY OPEN TEMPERATURE SWITCH; CLOSE ON RISING TEMPERATURE

NORMALLY CLOSED TEMPERATURE SWITCH; OPEN ON RISING TEMPERATURE

NORMALLY OPEN FLOW SWITCH; CLOSE ON INCREASING FLOW

NORMALLY CLOSED FLOW SWITCH; OPEN ON INCREASING FLOW

NORMALLY OPEN LEVEL SWITCH, CLOSE ON RISING LEVEL

NORMALLY CLOSED LEVEL SWITCH, OPEN ON RISING LEVEL

NORMALLY OPEN PRESSURE SWITCH, CLOSE ON INCREASING PRESSURE

NORMALLY CLOSED PRESSURE SWITCH, OPEN ON INCREASING PRESSURE

NORMALLY OPEN LIMIT SWITCH, CLOSE ON REACHING LIMIT

NORMALLY CLOSED LIMIT SWITCH, OPEN ON REACHING LIMIT

MICROPROCESSOR (PLC, RTU, ETC.) OUTPUT

MICROPROCESSOR (PLC, RTU, ETC.) INPUT

FIELD WIRING EXTERNAL TO CONTROL PANEL

INTERLOCK: X - INDICATES TYPE

TYPES:
 E - ELECTRICAL
 M - MECHANICAL
 K - KEY

3 POSITION SELECTOR SWITCH, MAINTAINED CONTACTS; UNLESS OTHERWISE NOTED, 2-POSITION SIMILAR

NORMALLY OPEN PUSHBUTTON, MOMENTARY CONTACT UNLESS OTHERWISE NOTED

NORMALLY CLOSED PUSHBUTTON, MOMENTARY CONTACT UNLESS OTHERWISE NOTED

PLUG-IN RECEPTACLE STRIP, QUANTITY AND SPACING OF RECEPTACLES AS NOTED OR SPECIFIED

SPECIAL-PURPOSE RECEPTACLE AS DEFINED ON PLANS

TWO RECEPTACLES IN 2-GANG BOX UNDER COMMON COVER PLATE

DUPLEX RECEPTACLE

SIMPLEX RECEPTACLE

RECESSED FLOOR MOUNTED BOX, QUANTITY AND TYPE OF RECEPTACLES AS INDICATED

SUBSCRIPTS:
 X - UPPER CASE LETTER INDICATES TYPE
 GFCI - GROUND FAULT CIRCUIT INTERRUPTER
 IG - ISOLATED GROUND
 TR - TAMPER RESISTANT
 PLH - PLUG LOAD HALF CONTROLLED
 PLD - PLUG LOAD DUAL CONTROLLED
 USB - USB CHARGING STATION
 SPD - SURGE PROTECTIVE DEVICE
 WELD - OUTLET FOR WELDING
 2 - NUMBER INDICATES CIRCUIT NUMBER FROM PANELBOARD

CONDUIT TURNING UP

CONDUIT TURNING DOWN

HOMERUN TO PANEL
 SINGLE PHASE: 2 #12, 1 #12G IN 3/4" C
 THREE PHASE: 3 #12, 1 #12G IN 3/4" C
 UNLESS OTHERWISE NOTED

CONDUIT CONNECTION TO EQUIPMENT

CIRCUIT RUN BETWEEN DEVICES EXPOSED IN NON-ARCHITECTURALLY FINISHED AREAS; CONCEALED IN ARCHITECTURALLY FINISHED AREAS, CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE CIRCUIT.

CONDUIT RUN BETWEEN DEVICES CONCEALED IN NON-ARCHITECTURALLY FINISHED AREAS OR UNDER FLOOR SLAB, CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE CIRCUIT.

CIRCUIT HASH MARKS (WHEN INDICATED); LONG, SHORT, SINGLE DOT, AND DOUBLE DOT REPRESENT PHASE, NEUTRAL, EQUIPMENT GROUND, AND ISOLATED EQUIPMENT GROUND, RESPECTIVELY, #12 IN 3/4" CONDUIT UNLESS OTHERWISE INDICATED.

CIRCUIT CONTINUATION

CONDUIT STUBBED OUT AND CAPPED

CORD AND PLUG CONNECTION

TRANSITION TO FLEX CONDUIT

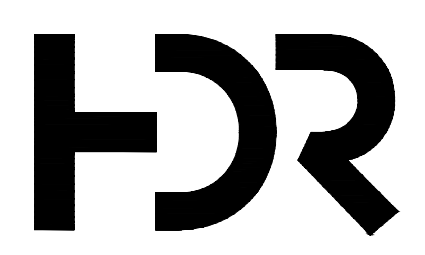
CONDUIT TAG OR CIRCUIT NUMBER - WIRE AND CONDUIT SIZE AS SPECIFIED IN CIRCUIT SCHEDULE ON THE SHEETS

GROUND CONDUCTOR

GROUND ROD

GROUND ROD TEST WELL

- GENERAL NOTES:**
- THIS IS A STANDARD ELECTRICAL SYMBOLOGY SHEET. NOT ALL SYMBOLS MAY BE USED ON THIS PROJECT.
 - SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.
 - SEE P&ID LEGEND SHEET FOR PROJECT SPECIFIC EQUIPMENT SYMBOLS, EQUIPMENT ABBREVIATIONS, AND PIPING SYSTEM ABBREVIATIONS.

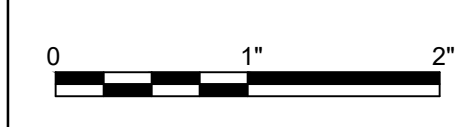


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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION ELECTRICAL LEGEND



FILENAME | E001_Legend.dwg
 SCALE | NTS

SHEET
E001

| FUNCTIONAL IDENTIFICATION | | | | | |
|---------------------------|---|---------------------|-----------------------------|---|----------------------|
| VARIABLE | MEASURED OR INITIATING VARIABLE DESCRIPTION | MODIFIER | READOUT OR PASSIVE FUNCTION | OUTPUT FUNCTION | MODIFIER |
| A | ANALYSIS | | ALARM | | |
| B | BURNER, COMBUSTION | | | | |
| C | CONDUCTIVITY | | | CONTROL | CLOSE |
| D | DENSITY, SPECIFIC GRAVITY | DIFFERENTIAL | | | DEVIATION |
| E | VOLTAGE, SOLENOID | | PRIMARY ELEMENT | | |
| F | FLOW, FLOW RATE | RATIO | | | |
| G | FIRE, SMOKE | | GLASS | | |
| H | HAND | | | | HIGH |
| I | CURRENT | | INDICATE | | |
| J | POWER | | SCAN | | |
| K | TIME, SCHEDULE | TIME RATE OF CHANGE | | CONTROL STATION | |
| L | LEVEL | | LIGHT | | LOW |
| M | MOISTURE, HUMIDITY, MOTION | MOMENTARY | | | MIDDLE, INTERMEDIATE |
| N | EQUIPMENT STATUS | | | | |
| O | DISSOLVED OXYGEN | | ORIFICE | | OPEN |
| P | PRESSURE, VACUUM | | POINT (TEST) CONNECTION | | |
| Q | QUANTITY | INTEGRATE, TOTALIZE | | | |
| R | RADIATION | | RECORD | | RUN |
| S | SPEED, FREQUENCY | SAFETY | | SWITCH | STOP |
| T | TEMPERATURE | | | TRANSMIT | |
| U | MULTIVARIABLE | | MULTIFUNCTION | MULTIFUNCTION | MULTIFUNCTION |
| V | VIBRATION, MECHANICAL ANALYSIS | | | VALVE, DAMPER, LOUVER | |
| W | WEIGHT, FORCE, TORQUE | | WELL, PROBE | | |
| X | UNCLASSIFIED | X AXIS | | | |
| Y | EVENT, STATE OR PRESENCE | Y AXIS | | AUXILIARY DEVICES | |
| Z | POSITION, DIMENSION | Z AXIS | | DRIVER, ACTUATOR, FINAL CONTROL ELEMENT | |

| INSTRUMENT SIGNAL LINES | |
|-------------------------|--|
| | INSTRUMENT SUPPLY, PROCESS TAPS |
| | PNEUMATIC SIGNAL |
| | ELECTRICAL SIGNAL (ANALOG OR DISCRETE) |
| | FIELDBUS (DEVICENET OR FOUNDATION) |
| | CAPILLARY TUBE OR FILLED SYSTEM |
| | ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED) |
| | ELECTROMAGNETIC OR SONIC SIGNAL (UNGUIDED) |
| | SOFTWARE OR DATA LINK |
| | MECHANICAL LINK |
| | HYDRAULIC |
| | ETHERNET (CAT6 CABLE) |
| | PROFIBUS PA |
| | PROFIBUS DP |
| | FIBER OPTIC |
| | ELECTRIC POWER SUPPLY 120 VAC, 1 PHASE, 60 HZ OR AS INDICATED. (e.g. 120/1/60, 480/3/60, ETC.) |
| | SUPPLY SERVICE AIR SUPPLY |
| | INSTRUMENT QUALITY AIR |

PROCESS AND SIGNAL CROSS REFERENCE SYSTEM

WHEN A PROCESS LINE CROSSES FROM DRAWING TO DRAWING, THE P&ID DRAWING NUMBERS NEED TO BE REFERENCED. AS AN EXAMPLE: A PROCESS IS PUMPING TO A TANK ON A SEPARATE P&ID, SEE BELOW

PROCESS DESCRIPTION OF WHERE LINE GOES TO/FROM

IF THERE ARE MULTIPLE LINES CROSSING THE SAME TWO P&ID DRAWINGS, IT IS ACCEPTABLE TO ADD A LETTER FOR CLARITY

PROCESS LINES

| | |
|--|---|
| | NEW PRIMARY PROCESS FLOW |
| | NEW SECONDARY PROCESS FLOW |
| | NEW UTILITY PROCESS FLOW |
| | FUTURE |
| | EXISTING PROCESS FLOW, EQUIPMENT, OR SIGNAL PATH (SCREENED) |
| | NEW/EXISTING CONNECTIONS |
| | TEMPORARY PIPING |
| | PROCESS AREA |
| | VENDOR PACKAGE BOUNDARY |

INSTRUMENT TAG AND LOOP IDENTIFICATION

MEASURED OR INITIATING VARIABLE

MODIFIER WHEN REQUIRED

SUCCEEDING LETTERS, - READOUT OR PASSIVE FUNCTION, OUTPUT FUNCTION, OR MODIFIER

UNIQUE LOOP NUMBER PER INSTRUMENT (# = OPTIONAL)

INSTRUMENT FUNCTIONAL IDENTIFICATION PER TABLE THIS SHEET

- ALPHABETICAL IDENTIFIER FOR LIKE INSTRUMENTS IN SAME LOOP

- NUMERIC IDENTIFIER FOR SIMILAR INSTRUMENTS IN RELATED PROCESSES OR LOOP

AREA CODE TO WHICH LOOP BELONGS

EXAMPLE: 51-201A # OPTIONAL

TYPICAL INSTRUMENT IDENTIFICATION

PANEL LOCATION #

FUNCTIONAL IDENTIFICATION

CONTROL AND MEASUREMENT NOTATIONS #

FUNCTION SYMBOL

PART OF VENDOR PACKAGE #

LOOP NUMBER # = OPTIONAL

CONTROL AND MEASUREMENT NOTATIONS

| | | | |
|------|-------------------------------|--------|--|
| ACK | ACKNOWLEDGE | OCA | OPEN/CLOSE/AUTO |
| AM | AUTO/MAN | OCV | PURGE VALVE OP/CL/PC |
| BYP | BYPASS | OIT | OPERATOR INTERFACE TERMINAL |
| CL | CLOSE | OL | OVERLOAD |
| CL2 | CHLORINE | OP | OPEN |
| CMAT | COMPUTER/MANUAL/AUTO/TRACKING | ORP | OXYGEN REDUCTION POTENTIAL |
| COMB | COMBUSTIBLE GAS | OSC/LP | OPEN/STOP/CLOSE WITH LOCAL/REMOTE SELECT |
| CP | CONTROL POWER | PA | PAUSE |
| COND | CONDUCTIVITY | PAL | LOW PRESSURE |
| DEC | DECREASE | PB | PUSH BUTTON |
| DO | DISSOLVED OXYGEN | pH | pH |
| DS | DISCONNECT SWITCH | | P&ID PIPING AND INSTRUMENTATION DIAGRAM |
| ESP | EMERGENCY STOP | POT | POTENTIOMETER |
| FWD | FORWARD | RDY | READY |
| F/R | FORWARD/REVERSE | REV | REVERSE |
| F/S | FAST/SLOW | RNG | RUNNING |
| FOR | FORWARD/OFF/REVERSE | ROF | REVERSE/OFF/REVERSE |
| | | RST | RESET |
| HLOA | HIGH/LOW/OFF/AUTO | SO2 | SULFUR DIOXIDE |
| HOA | HAND/OFF/AUTO | SP | STOP |
| HOAL | HAND/OFF/AUTO/LOCAL | SPD | SPEED |
| HOR | HAND/OFF/REMOTE | SS | START/STOP |
| INC | INCREASE | ST | START |
| JOA | JOG/OFF/AUTO | TCP | TEST/CLOSE/PC |
| LC | LOCK CLOSED | T/S | TEST/NORMAL/SILENCE |
| LCP | LOCAL CONTROL PANEL | TBL | TROUBLE |
| LL | LEAD/LAG | TSS | TOTAL SUSPENDED SOLIDS |
| LO | LOCK OPEN | TURB | TURBIDITY |
| LOR | LOCAL/OFF/REMOTE | | |
| LOS | LOCKOUT STOP | | |
| L/R | LOCAL/REMOTE | | |
| M/A | MAN/AUTO LOADING STATION | | |
| MCP | MASTER CONTROL PANEL | | |
| NH4 | AMMONIUM | | |
| NO3 | NITRATE | | |

EQUIPMENT IDENTIFICATION SYSTEM

EQUIPMENT NAME

EQUIPMENT NUMBER

SPECIFICATION REFERENCE

EQUIPMENT TYPE

CAPACITY RATING

DISCHARGE PRESSURE RATING

MOTOR POWER

OPTIONAL PER PROJECT

SPEC: 11486

TYPE: MULTIPLE STAGE CENTRIFUGAL

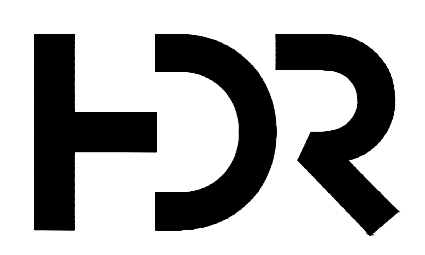
Q: 1500 SCFM

HEAD: 5.5 PSIG

HP: 50

GENERAL NOTES:

- THIS DRAWING IS GENERAL IN NATURE. SOME SYMBOLS AND IDENTIFICATIONS SHOWN HEREON MAY NOT BE USED ON THE CONTRACT DRAWINGS.
- SYMBOLS ARE ARRANGED ON SPECIFIC DRAWINGS AND IN CATEGORIES FOR CONVENIENCE ONLY; SYMBOLS MAY BE USED ON ANY OF THE CONTRACT DRAWINGS.



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| PROJECT MANAGER MIKE FALK | |
|---------------------------|---------------|
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION INSTRUMENTATION LEGEND SHEET 1 OF 2



FILENAME | E002_Legend.dwg
SCALE | NTS

SHEET
E002

| MISCELLANEOUS SYMBOLS | PIPE LINE DEVICES | | VALVES | | | | |
|--|--|---|---|--|--|--|--|
| ETHERNET TO PLC MCC (MOTOR CONTROL/STARTER) PURGE OR FLUSHING DEVICE PROFIBUS TO PLC RESET FOR LATCH-TYPE OPERATOR SEAL WATER CONTROL UNIT INTERLOCKING OR CONTROL FUNCTION INTRINSIC SAFETY BARRIER DISCRETE INPUT DISCRETE OUTPUT ANALOG INPUT ANALOG OUTPUT CAMERA (CCTV) VARIABLE FREQUENCY DRIVE VARIABLE SPEED DRIVE | FLEX CONNECTOR FABRIC EXPANSION JOINT STRAINERS DAMPER FLEX COUPLING | <p>NORMALLY OPEN</p> GATE VALVE PLUG VALVE BALL VALVE GLOBE VALVE NEEDLE VALVE KNIFE GATE VALVE DIAPHRAGM VALVE BUTTERFLY VALVE ANGLE VALVE THREE WAY VALVE FOUR WAY VALVE FLOAT VALVE PINCH VALVE BALANCING COCK THERMOSTATICALLY CONTROLLED VALVE | <p>NORMALLY CLOSED</p> DOUBLE LEAF CHECK VALVE CHECK VALVE BALL CHECK VALVE PUMP DISCHARGE VALVE GAUGE OR ROOT VALVE PRESSURE AND VACUUM RELIEF VALVE VACUUM RELIEF VALVE PRESSURE RELIEF VALVE IN-LINE SPRING LOADED RELIEF VALVE PRESSURE REGULATING VALVE (SELF-CONTAINED) BACK PRESSURE REGULATING VALVE (SELF-CONTAINED) FUSIBLE LINK | SOLENOID VALVE DIAPHRAGM OPERATED VALVE PRESSURE BALANCE OPERATED VALVE MOTOR OPERATED VALVE MOTOR OPERATED VALVE, MODULATING <p>NOTE: USE VALVE BODY SYMBOL TO MATCH TYPE OF VALVE.</p> PISTON OPERATED VALVE TELESCOPING VALVE MUD VALVE ANTI SIPHON VALVE LIFT CHECK VALVE BRAIDED FLEX CONNECTOR | | | |

ACTUATORS/MOTORS/POWER

| | |
|--|---|
| | ADJUSTABLE SPEED DRIVE (MECHANICAL) |
| | ROTARY PISTON ACTUATORS, VALVE OR GATE |
| | LINEAR PISTON ACTUATORS, VALVE OR GATE |
| | SOLENOID ACTUATOR, VALVE |
| | MANUAL OR HAND ACTUATOR, VALVE OR GATE (OR BLANK) |
| | MOTOR (ACTUATOR, VALVE, GATE OR EQUIPMENT) |
| | ENGINE |
| | EJECTOR, PNEUMATIC |
| | GENERATOR |

FUNCTION SYMBOLS

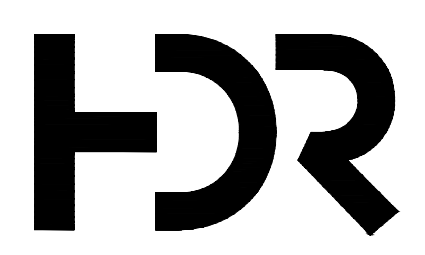
| | |
|---|---|
| | SHARED DISPLAY, PROCESS CONTROL SYSTEM |
| | SOFTWARE FUNCTIONALITY |
| | FIELD OR PANEL DEVICE |
| LOCATION AND ACCESSIBILITY MODIFIERS FOR FUNCTION SYMBOLS | |
| | STAND ALONE DEVICE, OPERATOR ACCESSIBLE |
| | LOCATED ON FRONT OF PANEL OR CONSOLE, OPERATOR ACCESSIBLE |
| | LOCATED IN REAR OF PANEL OR CONSOLE, OPERATOR INACCESSIBLE |
| | LOCATED IN FRONT OR REAR OF REMOTELY MOUNTED PANEL OR CONSOLE |

INSTRUMENTATION SYMBOLS

| | |
|--|---------------------------------------|
| | INTEGRAL INSTRUMENT |
| | CLOSE COUPLED INSTRUMENT |
| | SEPARATE OR REMOTE MOUNTED INSTRUMENT |
| | MULTI VARIABLE INSTRUMENT |
| | SEPARATE OR REMOTE MOUNTED INSTRUMENT |
| | SEPARATE OR REMOTE MOUNTED INSTRUMENT |
| | SEPARATE OR REMOTE MOUNTED INSTRUMENT |
| | SINGLE VARIABLE INSTRUMENT |
| | FLANGE OR ELEMENT TAPS |
| | PIPE TAPS |
| | COMBINATION TAPS |

GENERAL NOTES:

- THIS DRAWING IS GENERAL IN NATURE. SOME SYMBOLS AND IDENTIFICATIONS SHOWN HEREON MAY NOT BE USED ON THE CONTRACT DRAWINGS.
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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION INSTRUMENTATION LEGEND SHEET 2 OF 2



FILENAME | E003_Legend.dwg
SCALE | NTS

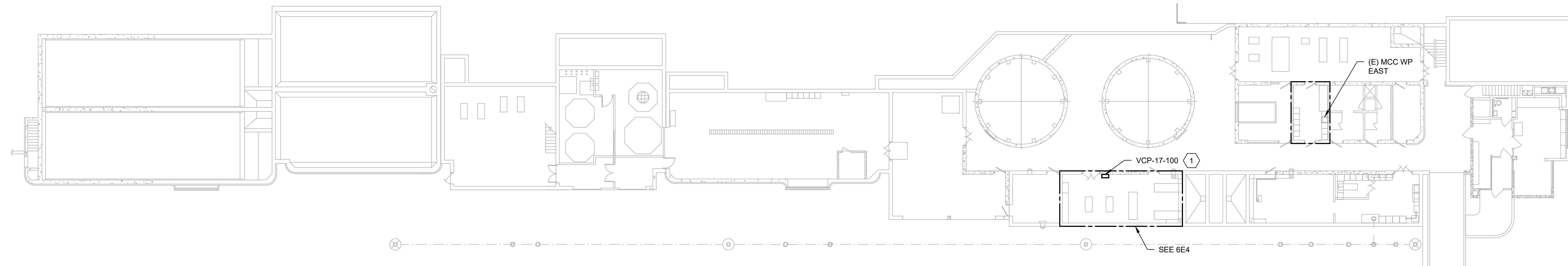
SHEET
E003

GENERAL NOTE:

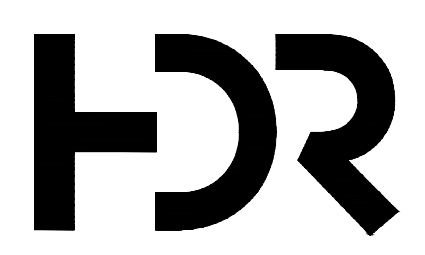
- 1. EQUIPMENT SHOWN IN LIGHT GREY IS EXISTING AND ELECTRICAL CONTRACT WORK IS SHOWN IN DARK LINES

SHEET KEYNOTE: #

- 1. WALL MOUNTED PANEL IN ELECTRICAL CONTRACT WORK



SITE PLAN
SCALE 1/16" = 1'-0"



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



DIGESTER CLEANING AND REHABILITATION ELECTRICAL SITE PLAN



FILENAME | E25 SitePlan.dwg
SCALE | 1/16" = 1'-0"

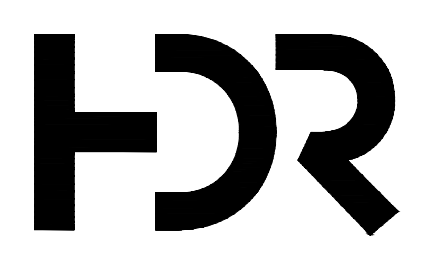
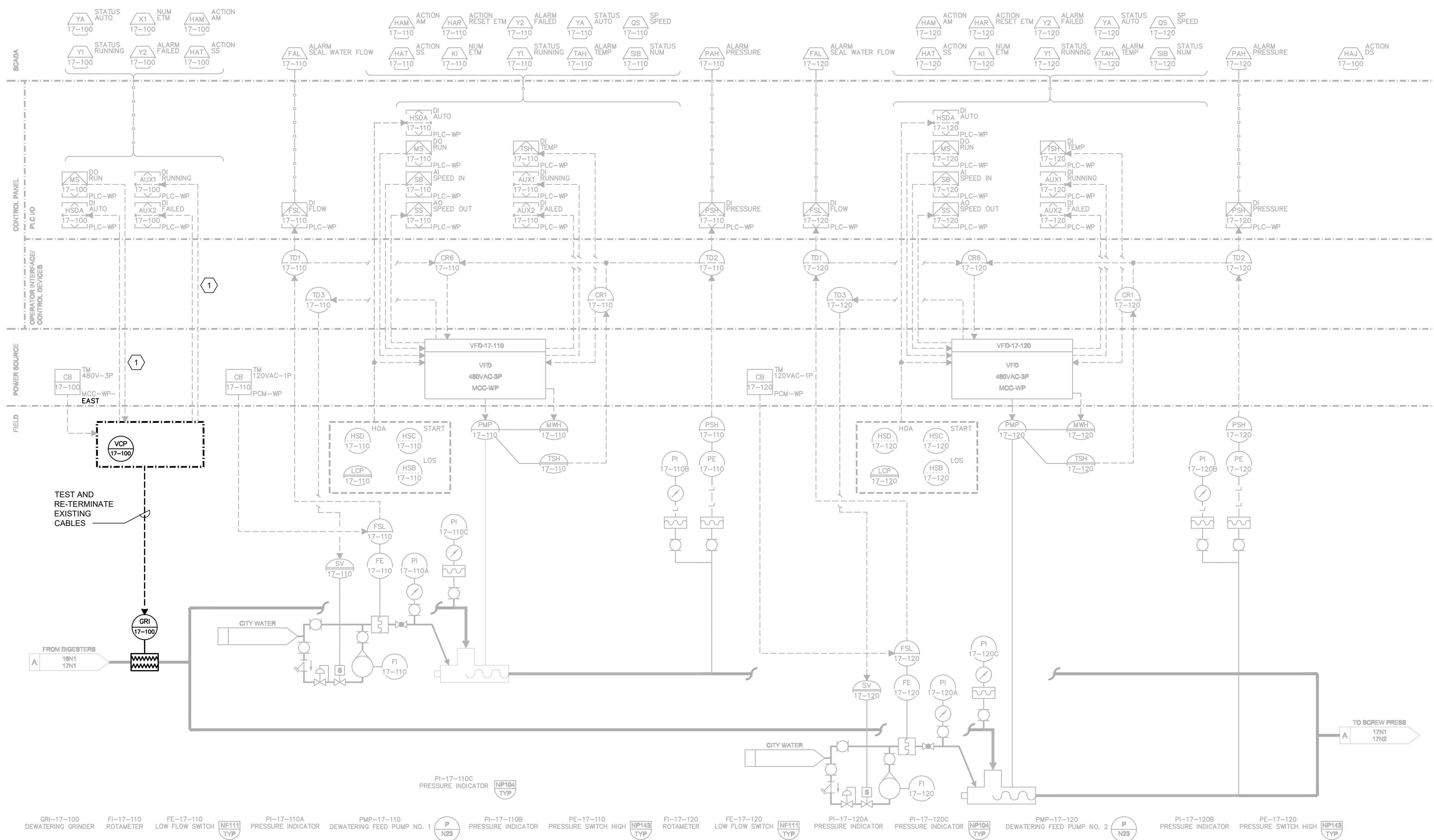
SHEET
E101

GENERAL NOTE:

- EQUIPMENT SHOWN IN LIGHT GREY IS EXISTING AND ELECTRICAL CONTRACT WORK IS SHOWN IN DARK LINES

SHEET KEYNOTE: #

- EXISTING CONTROL CABLES TO BE SAFELY ISOLATED AND DISCONNECTED, TESTED AND RE-TERMINATED WITHIN REPLACEMENT PANEL CONTROL SECTION. AFTER TERMINATION OF CONTROL CABLES SIGNAL AND FUNCTIONAL TEST TO BE CONDUCTED.



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
SLUDGE GRINDER P&ID**



FILENAME | E17N1 Wiring.dwg
SCALE | NTS

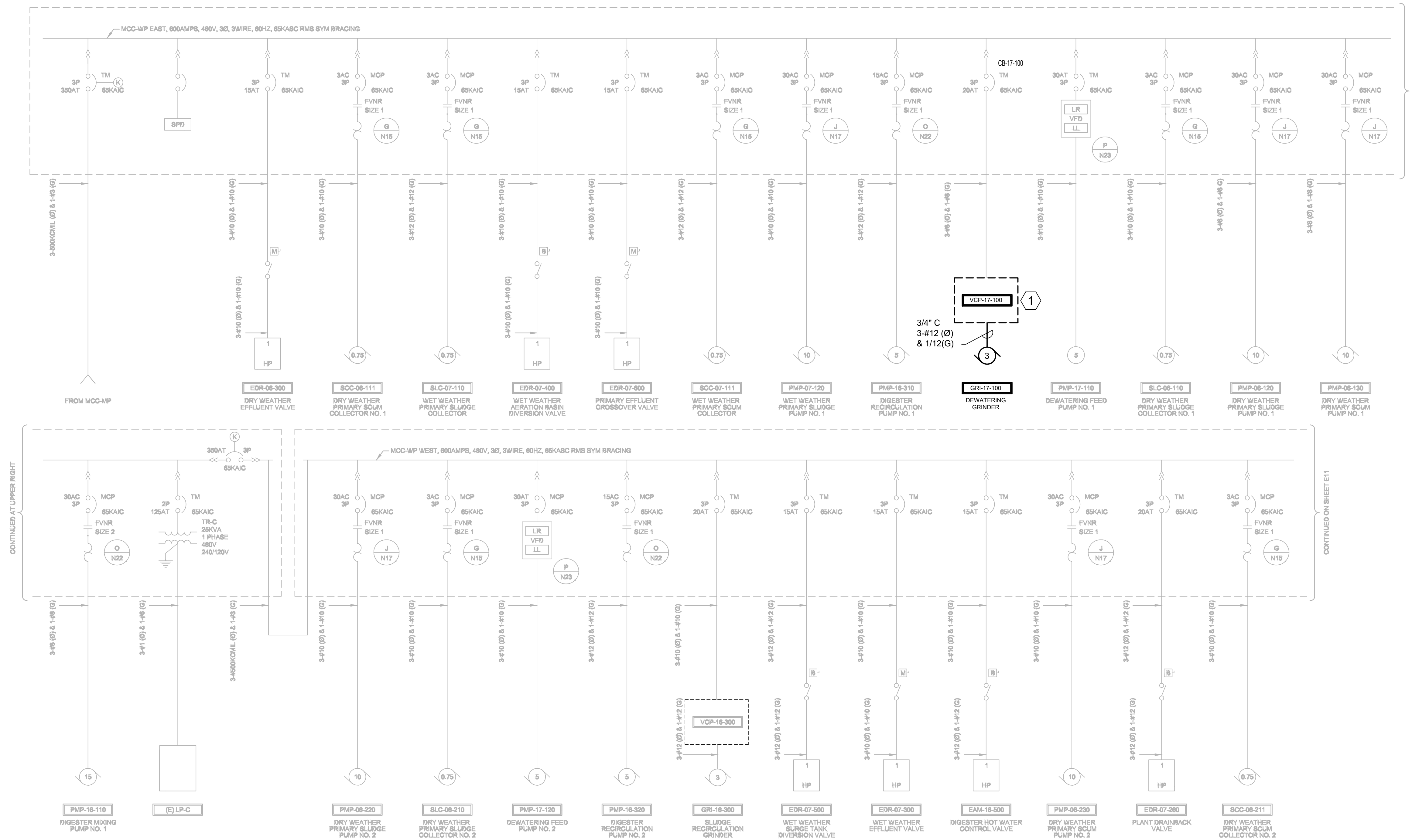
SHEET
E102

GENERAL NOTE:

- 1. EQUIPMENT SHOWN IN LIGHT GREY IS EXISTING AND ELECTRICAL CONTRACT WORK IS SHOWN IN DARK LINES

SHEET KEYNOTE: #

- 1. WALL MOUNTED PANEL IN ELECTRICAL CONTRACT WORK.

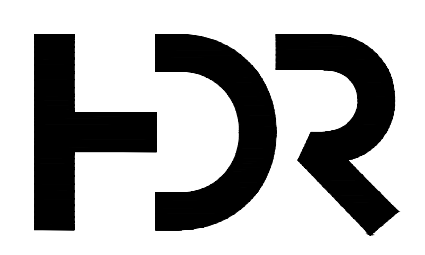


CONTINUED AT UPPER RIGHT

CONTINUED AT LOWER LEFT

CONTINUED ON SHEET E11

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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



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DIGESTER CLEANING AND REHABILITATION ONE LINE DIAGRAM

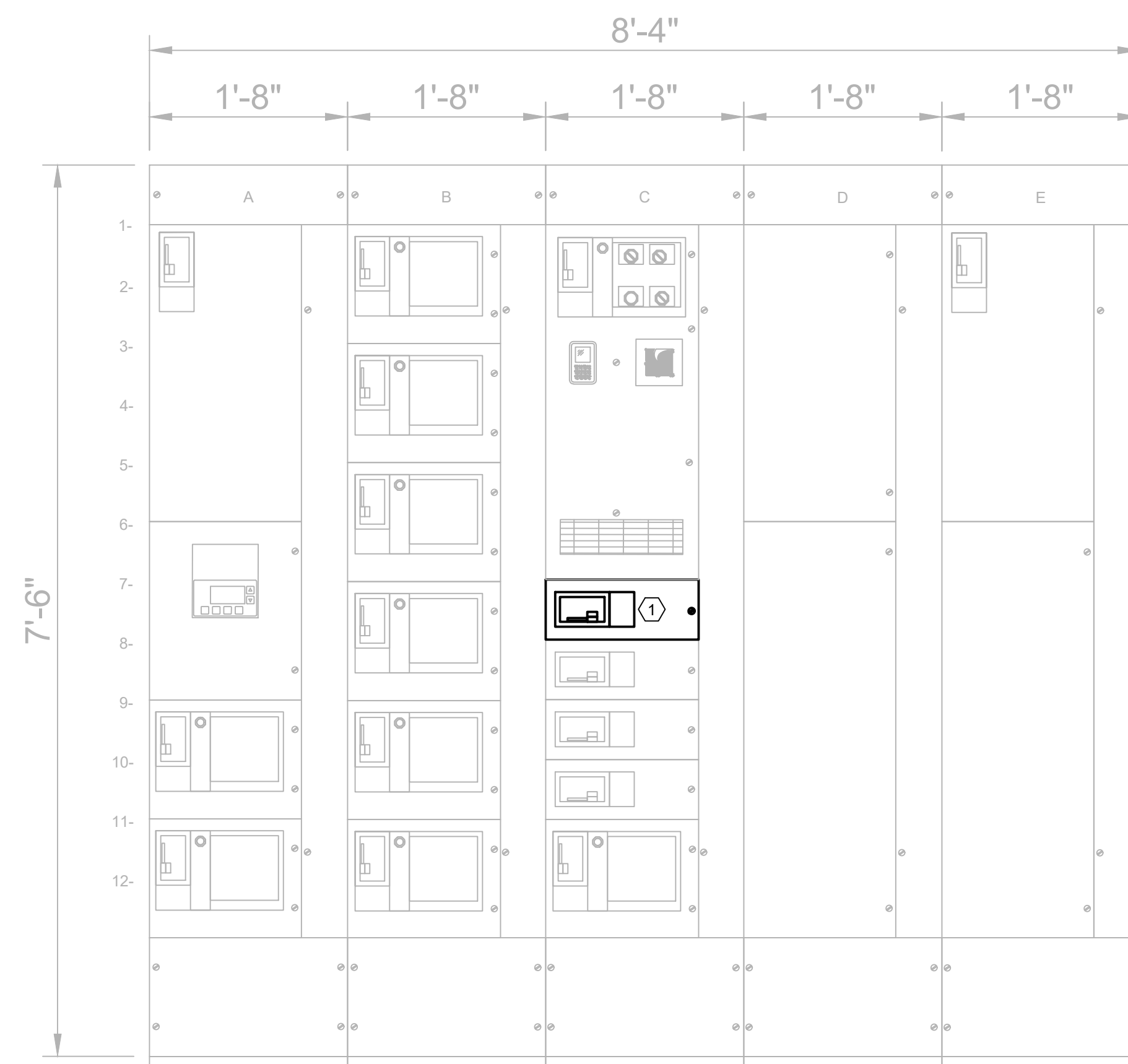


FILENAME | E10_Online.dwg
SCALE | NTS

SHEET
E103

SHEET KEYNOTE: #

- EXISTING BREAKER TO BE TESTED AND RE-USED
LOCATION OF DEWATERING GRINDER,
VCP-17-100 SHOWN FOR REFERENCE.
DISCONNECT DEWATERING GRINDER PRIOR TO
INSTALLATION.



MCC-WP EAST ELEVATION

| | | | | |
|--|--|---|----------------------|-----------------|
| A1- MAIN BREAKER | B1- DRY WEATHER PRIMARY SCUM COLLECTOR NO.1 SCC-06-111 | C1- DEWATERING FEED PUMP NO. 1 PMP-17-110 | D1- TRANSFORMER TR-C | E1- TIE BREAKER |
| A6- SPD | B3- DRY WEATHER PRIMARY SCUM COLLECTOR NO.1 SCC-06-110 | C7- DEWATERING GRINDER CB-17-100 | D6- SPACE | E6- SPACE |
| A9- WET WEATHER PRIMARY SCUM COLLECTOR SCC-07-111 | B5- DRY WEATHER PRIMARY SCUM PUMP NO.1 PMP-06-130 | C8- DRY WEATHER EFFLUENT VALVE EDR-06-300 | | |
| A11- WET WEATHER PRIMARY SLUDGE COLLECTOR SCC-07-111 | B7- DRY WEATHER PRIMARY SCUM PUMP NO.1 PMP-06-120 | C9- DRY WEATHER AERATION BASIN DIVERSION VALVE EDR-07-400 | | |
| | B9- DIGESTER RECIRCULATION PUMP NO. 1 PMP-16-130 | C10- PRIMARY EFFLUENT CROSSOVER VALVE EDR-07-700 | | |
| | B11- DIGESTER MIXING PUMP NO. 1 PMP-16-110 | C11- WET WEATHER PRIMARY SLUDGE COLLECTOR SLC-07-110 | | |



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| PROJECT MANAGER | MIKE FALK |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |

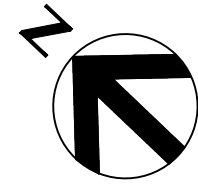


**DIGESTER CLEANING AND REHABILITATION
MCC WP EAST ELEVATION**

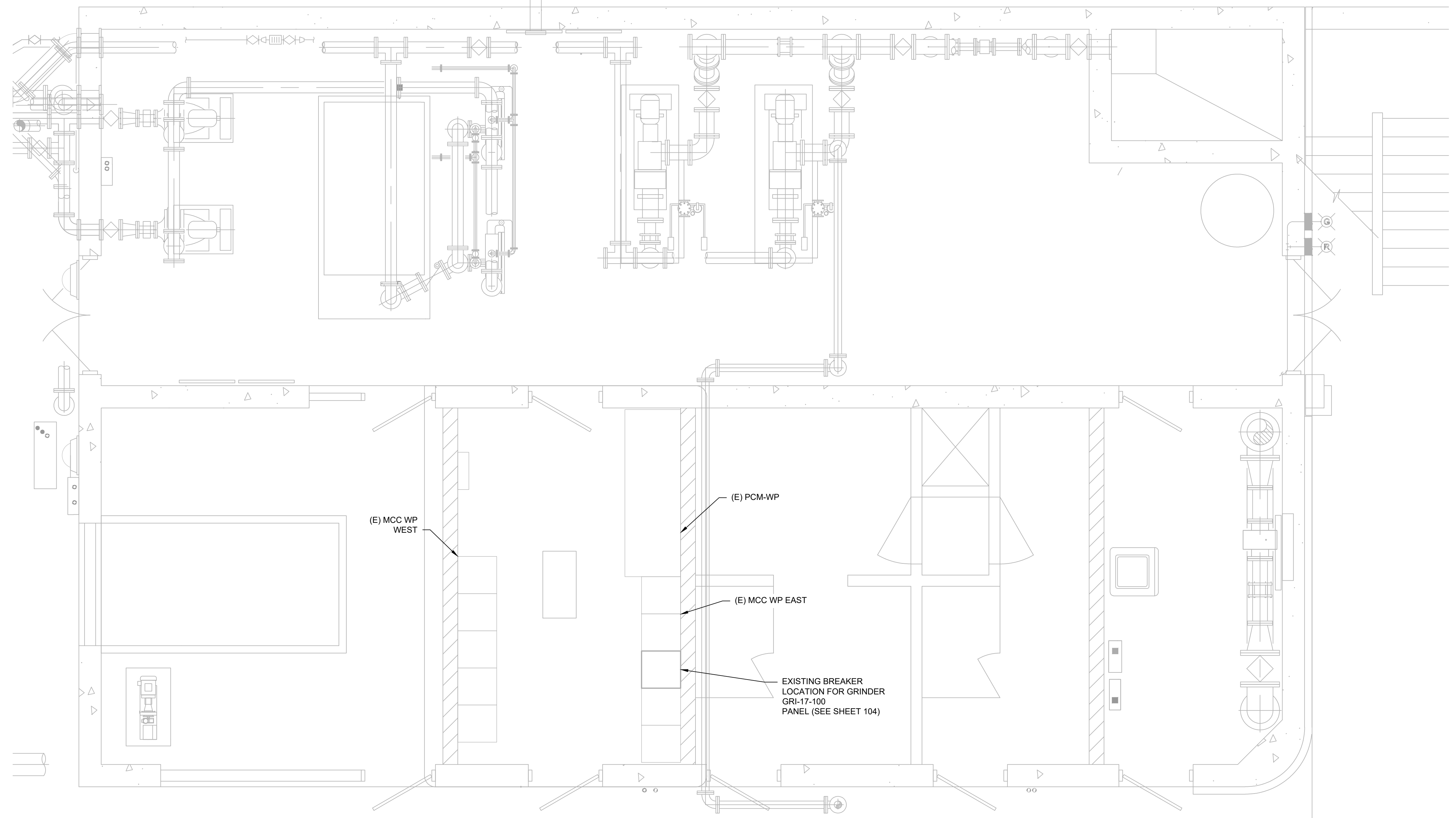


FILENAME | E9 Schedules.dwg
SCALE | NTS

SHEET
E104

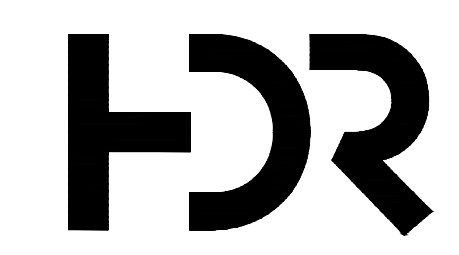


1 2 3 4 5 6 7 8



GENERAL NOTE:
1. EXISTING EQUIPMENT CONDUIT POWER AND CONTROL CABLES NOT SHOWN FOR CLARITY. REFER EXISTING DRGS FOR DETAILS

MCC ROOM PLAN
SCALE 3/4"=1'-0"



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |

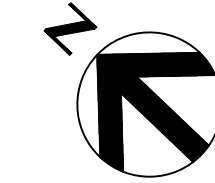


**DIGESTER CLEANING AND REHABILITATION
MCC ROOM
ELECTRICAL PLAN**



FILENAME | E7E2-Control.dwg
SCALE | 3/4" = 1'-0"

SHEET
E105



EXISTING CONDUIT AND CONDUCTORS TO (E) PCM-WP

EXISTING CONDUIT AND CONDUCTORS TO (E) MCC WP EAST

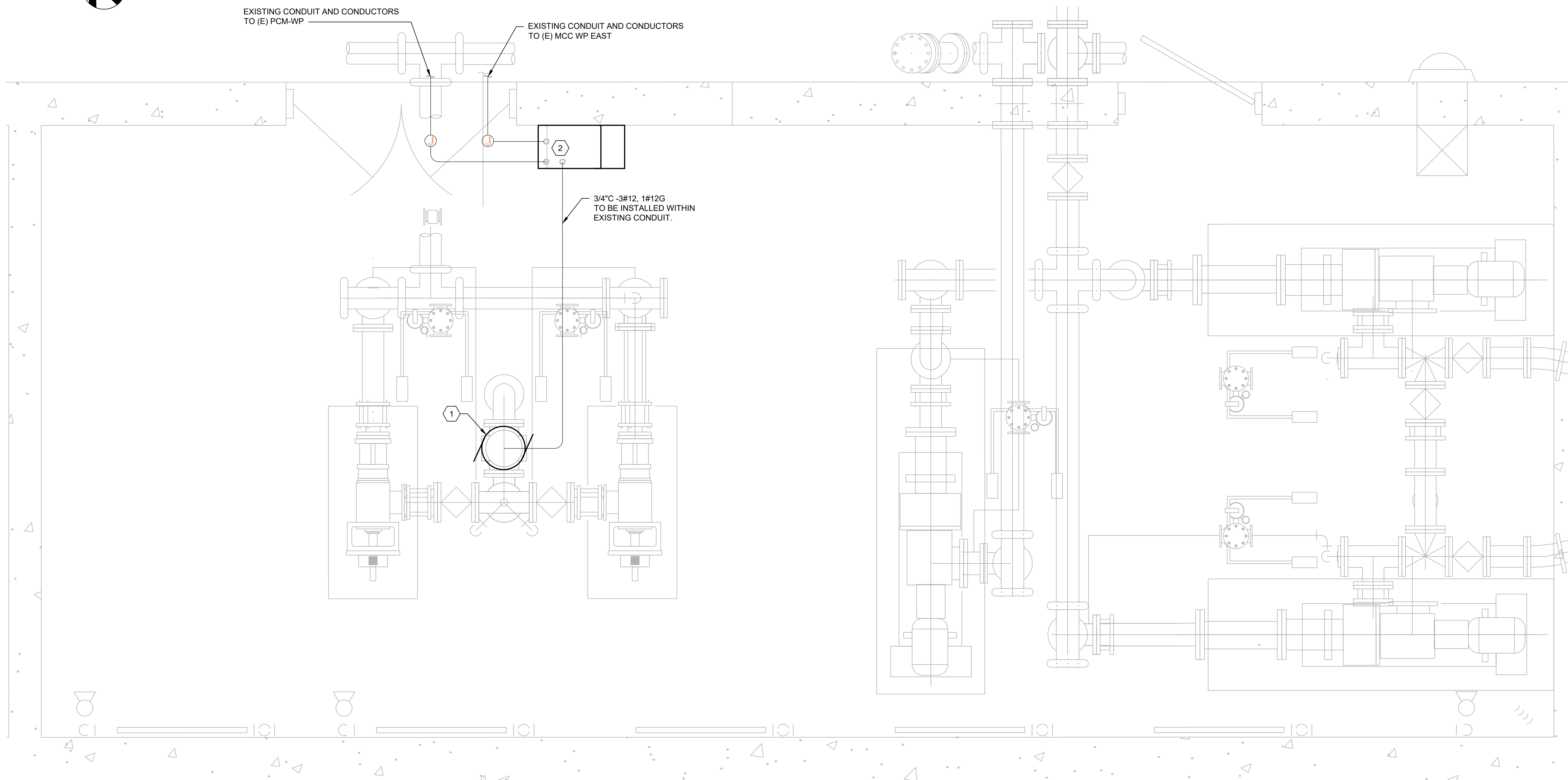
3/4" C - 3#12, 1#12G TO BE INSTALLED WITHIN EXISTING CONDUIT.

GENERAL NOTE:

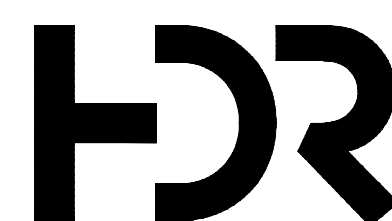
- 1. EQUIPMENT SHOWN IN LIGHT GREY IS EXISTING AND NEW EQUIPMENT SHOWN IN DARK LINES

SHEET KEYNOTE:

- 1. **GRI-17-100**
SAFELY ISOLATE AND DISCONNECT CONDUCTORS FROM (E) DEWATERING GRINDER MOTOR TERMINAL. RECONNECT TO REPLACEMENT GRINDER PUMP MOTOR.
DECOMMISSION AND REMOVE EXISTING GRINDER PUMP MOTOR GRI-17-100 AND REPLACE WITH ELECTRICAL CONTRACT WORK.
- 2. DISCONNECT EXISTING CONDUCTORS FROM (E) VCP-17-100 AND RECONNECT TO REPLACEMENT VCP-17-100
DECOMMISSION AND REMOVE EXISTING. INSTALL REPLACEMENT VCP-17-100 AND TEST THE EXISTING CABLE FOR INSULATION RESISTANCE AND RE-TERMINATE WITHIN NEW PANEL AND GRINDER PUMP MOTOR TERMINALS.



B POWER AND CONTROL PLAN - SLUDGE PUMP ROOM
SCALE: 3/4" = 1'-0"



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| PROJECT MANAGER MIKE FALK | |
| DESIGNER 1 | J. DELA-CRUZ |
| DESIGNER 2 | |
| CHECKED | B. ETTLICH |
| DRAWN | D. O'BRIEN |
| DATE | DECEMBER 2023 |
| PROJECT NUMBER | 10347063 |



**DIGESTER CLEANING AND REHABILITATION
SLUDGE PUMP ROOM
POWER AND CONTROL PLAN**



FILENAME | E6E4 PUMP ROOM.dwg
SCALE | 3/4" = 1'-0"

SHEET
E106



Sanitary District No. 5 of Marin County

Main Plant Digester Cleaning and Rehabilitation Project

Construction Documents Project Manual

100% Design

January 2024

HDR Project No. Project Number



00 01 07
SEALS AND SIGNATURES

Owner Name: Sanitary District No. 5 of Marin County
Facility or Site Name: Tiburon-Belvedere Wastewater Treatment Plant
Project Name: Main Plant Digester Cleaning and Rehabilitation Project
Engineer: HDR

| | |
|---|--|
| <p>Scott Joslyn, PE License No. C60929</p> | <p>The seal and signature to the left applies to the following Specifications divisions and sections of this project manual:</p> <ul style="list-style-type: none">• 02 41 00 - DEMOLITION.• 06 82 00 - FIBERGLASS REINFORCED PLASTIC FABRICATIONS.• 09 96 00 - HIGH PERFORMANCE INDUSTRIAL COATINGS.• 10 14 00 - IDENTIFICATION DEVICES.• 33 42 36 – STORMWATER TRENCH DRAINS.• 40 05 00 - PIPE AND PIPE FITTINGS - BASIC REQUIREMENTS.• 40 05 07 - PIPE SUPPORT SYSTEMS.• 40 05 19 - DUCTILE IRON PROCESS PIPE.• 40 05 51 - COMMON REQUIREMENTS FOR PROCESS AND UTILITY VALVES.• 40 05 62 - PLUG VALVES.• 40 10 15 - FIBERGLASS REINFORCED PLASTIC DUCT.• 46 01 73 - DIGESTER CLEANING.• 46 24 23 - SLUDGE GRINDERS. |
| <p>Crystal Starr, PE License No. C75661</p> | <p>The seal and signature to the left applies to the following Specifications divisions and sections of this project manual:</p> <ul style="list-style-type: none">• 03 00 05 - CONCRETE.• 03 01 30 - REPAIR AND REHABILITATION OF EXISTING CONSTRUCTION.• 03 15 19 - ANCHORAGE TO CONCRETE.• 03 64 23 - CRACK REPAIR AND INJECTION.• 05 50 00 - METAL FABRICATIONS.• 05 52 46 - MECHANICALLY FASTENED ALUMINUM RAILINGS. |

| | |
|---|--|
| <p>Joshua Dela Cruz, PE License No. [_____]</p> | <p>The seal and signature to the left applies to the following Specifications divisions and sections of this project manual:</p> <ul style="list-style-type: none"> • 26 05 00 - ELECTRICAL - BASIC REQUIREMENTS. • 26 05 19 – WIRE AND CABLE – 600 VOLT AND BELOW. • 26 08 13 - ACCEPTANCE TESTING. • 26 09 16 - CONTROL EQUIPMENT ACCESSORIES. |
|---|--|

Engineer's seal and signature does not apply to the documents that comprise Division 00, Bidding and Contracting Requirements.

It is a violation of applicable laws and regulations governing professional licensing and registration for any person, unless acting under the direction of the licensed and registered design professional(s) indicated above, to alter in any way the Specifications in this project manual.

END OF SEALS AND SIGNATURES

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- 00 01 07 - SEALS AND SIGNATURES
- 00 01 10 - TABLE OF CONTENTS
- 00 11 13 - ADVERTISEMENT FOR BIDS (EJCDC C-111-2018)
- 00 21 13 - INSTRUCTIONS TO BIDDERS (EJCDC C-200-2018)
- 00 41 13 - BID FORM (EJCDC C-410-2018)
- 00 45 13 - QUALIFICATIONS STATEMENT (EJCDC C-451-2018)
- 00 52 13 - AGREEMENT (EJCDC C-520-2018)
- 00 61 13.13 - PERFORMANCE BOND (EJCDC C-610-2018)
- 00 61 13.16 - PAYMENT BOND (EJCDC C-615-2018)
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- 01 14 16 - COORDINATION WITH OWNER'S OPERATIONS
- 01 22 00 - MEASUREMENT AND PAYMENT
- 01 23 00 - ALTERNATES
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DIVISION 00

PROCUREMENT AND CONTRACTING
REQUIREMENTS



ADVERTISEMENT FOR BIDS

Sanitary District No. 5 of Marin County Belvedere Tiburon, California Main Plant Digester Cleaning and Rehabilitation Project

General Notice

Sanitary District No. 5 of Marin County (Owner) is requesting Bids for the cleaning and construction of the following Project:

Tiburon-Belvedere Wastewater Treatment Plant
Main Plant Digester Cleaning and Rehabilitation Project

Bids for the construction of the Project will be received by the District Manager of the Sanitary District No. 5, at the District office, 2001 Paradise Drive, Tiburon CA 94920, until Monday, February 12, 2024, at 3:00 PM local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

- A. Empty, clean, and return to operation two anaerobic digesters in a sequence that allows one to be in operation at all times.
- B. Perform various digester structural improvements including crack repair.
- C. Remove, clean, coat, and reinstall both digester covers.
- D. Demolish and install various valves, pipes, and pipe supports.
- E. Clean, video and coat pipes.
- F. Replace sludge grinder and control panel.
- G. Perform various concrete improvements throughout the Site.
- H. Install various metal improvements, including handrails, grating, and guiderails.
- I. And related work shown on drawings and project manual.

Bids are requested for the following Contract: Main Plant Digester Cleaning and Rehabilitation Project

Obtaining the Bidding Documents

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

<https://www.publicpurchase.com/gems/browse/home>

Bidding Documents may be downloaded from the designated website. Prospective Bidders are urged to register with the designated website as a Bidding Documents holder, even if Bidding Documents are obtained from a third-party 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 Bidding Documents holders, reports on the Site, 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 mandatory pre-bid conference for the Project will be held on Monday, January 29th at 9:00 am at Sanitary District of Marin County No. 5, 2001 Paradise Dr, Belvedere Tiburon, CA 94920. Bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference.

Instructions to Bidders.

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

This Advertisement is issued by:

Owner: [Owner's Name]

By: [Name of individual authorized to issue legal notice]

Title: [Title of individual]

Date: [Date of initial publication of advertisement]

For questions, contact:

Maika Winkler, HDR Senior Project Coordinator
2379 Gateway Oaks Dr #200, Sacramento, CA 95833
+1 (916) 679-8866
maika.winkler@hdrinc.com

INSTRUCTIONS TO BIDDERS

FOR CONSTRUCTION CONTRACT

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ARTICLE 1—DEFINED TERMS

- 1.1 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

- 2.1 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.
- 2.2 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, nor does it grant or confer ownership or any property interest in the Bidding Documents and other documents distributed for the Project. Authorization to download documents, or other distribution, includes the right for Bidding Documents holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the Bidding Documents holder pays all costs associated with printing or reproduction. Paper or other types of printed documents may not be re-sold under any circumstances.
- 2.3 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a Bidding Documents 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 Bidding Documents holders will receive Addenda issued by Owner or Issuing Office.
- 2.4 *Electronic Documents*
- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to prospective Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by the latest version of Adobe Acrobat Reader Version. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor any bidder's or the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above, and observations of construction conditions reviewed during prebid conference. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.1 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. See Section 00 45 13 – Qualifications Statement.
 - 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.
- 3.2 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.3 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.4 Bidders shall be experienced in the kind of Work to be performed, shall have the or be able to obtain construction equipment necessary for the Work, and shall possess sufficient capital to properly perform the Work within the time allowed. Bids received from Bidders who have previously failed to complete work within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A Bid may be rejected if Bidder cannot show and document to Owner's satisfaction that Bidder has the necessary ability, facilities, equipment, and resources to commence the Work at the time prescribed and thereafter to prosecute and complete the Work at the rate or within the times specified. A Bid may be rejected if Bidder is already obligated for the performance of other work which would delay the commencement, prosecution or completion of the Work.

ARTICLE 4—PRE-BID CONFERENCE

- 4.1 A 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. Bids will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of

Bidders that attended the pre-bid conference and are, on that basis alone, eligible to submit a Bid for this Project, will be issued in an Addendum.

- 4.2 Information presented at the pre-bid conference does not alter the Bidding Documents. Owner or Issuing Office will issue Addenda to make any changes to the Bidding 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

5.1 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents, including in Specifications Section 01 11 00 – Summary of Work. 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.

5.2 *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 prospective 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.

5.3 *Other Site-Related Documents*

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

5.4 *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 mandatory pre-bid conference.
- C. Bidders visiting the Site are required to: (1) arrange their own transportation to the Site; and (2) each Bidder visiting the Site is responsible for providing and using its own personal protective equipment appropriate for the Site and conditions, and in accordance with posted requirements, if any. At minimum, each visitor to the Site should have an appropriate hardhat, steel-toed boots, eye and hearing protection (other than ordinary eyewear), and a high-visibility reflective safety vest. Comply with Paragraph 5.05 of these Instructions to Bidders.
- D. No access to the Site, other than during the scheduled Site visit after the pre-bid meeting, will be granted.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- F. 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.
- G. Bidder must comply with Laws and Regulations regarding excavation and location of utilities, obtain necessary 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.
- H. 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.

5.5 *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 indicated in the Supplementary Conditions. Where the Bidding Documents indicate an Owner's safety program, visitors to the Site during the bidding phase and at other times shall comply with Owner's safety programs.

5.6 *Other Work at the Site*

- A. Reference is made to Specifications Section 01 11 00 – Summary of Work, 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 potentially confidential matters), if any.

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.1 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will complete and 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, Successful Bidder (as Contractor) will make similar express representations and certifications when it signs the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.1 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.2 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing before one week prior to the bid due date listed in Section 00 11 13 – Advertisement for Bids. Contact information and submittal procedures for such questions are as follows:
 - A. Maika Winkler, Senior Project Coordinator, 2379 Gateway Oaks Dr #200, Sacramento, CA 95833, +1 (916) 679-8866, maika.winkler@hdrinc.com
- 7.3 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all Bidding Documents holders registered with the Issuing Office. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.4 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 Bidding Documents.
- 7.5 Addenda that engineer judges to have a material or significant effect on Bidders’ preparation of pricing and other requirement element of the Bid will be transmitted via Addendum for Bidders’ receipt not less than three days prior to the scheduled date for receipt of the Bids. Clarifications or modifications that Engineer deems will not have a material or substantial effect on the

preparation of Bids may be transmitted for Bidders' receipt later, for receipt prior to the deadline for receipt of Bids.

ARTICLE 8— BID SECURITY

8.1 *Required Form and Amount of Bid Security*

- A. 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.
- B. Such bid bond will be issued in the form included in the Bidding Documents.

8.2 *Bid Security of Successful Bidder*

- A. The Bid security of the apparent Successful Bidder will be retained until Owner awards the Contract to such Bidder, and such Bidder has signed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Successful Bidder's bid security will be released.
- B. If the Successful Bidder fails to sign and deliver the Contract and furnish the required Contract security within the number of days, indicated in Paragraph 20.01 of these Instructions to Bidders, 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.
- C. Upon Successful Bidder's default:
 - 1. When the bid security is a penal sum bid bond, the entire penal sum amount of the bid bond will be forfeit and due Owner.
 - 2. When the bid security is a damages form of bid bond, to the extent of Owner's damages will be forfeit and due Owner.
 - 3. If a type of bid security other than a bid bond is allowed and is furnished, the amount that will be forfeit and due Owner will be the same as for the form of bid bond included in the Bidding Documents. Owner will so notify the defaulting Bidder in writing of the annulment and the amount of the forfeiture, with documentation of the amount forfeited.
- D. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.3 *Bid Security of Bidders other than the Successful Bidder*

- A. 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 seven 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.
- B. Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the bid opening.
- C. Release of Bid Security: Owner may release any Bidder's bid security by returning such bid security to the associated Bidder. When bid security is in the form of a bid bond, Owner may

dispose of or destroy the bid bond and so advise the associated Bidder in writing that the bid bond has been released.

ARTICLE 9—CONTRACT TIMES

- 9.1 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any), are to be achieved are set forth in the Agreement.
- 9.2 Provisions for liquidated and special 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

- 10.1 The Contract for the Work, as awarded, will be on the basis of materials, equipment, and procedures specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items or procedures. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or “or-equal” item of material or equipment or procedure, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.2 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, and will perform the Work in accordance with procedures indicated in the Bidding Documents, as supplemented by Addenda, if 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

- 11.1 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so in the Specifications or elsewhere in the Bidding Documents. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should not submit a Bid.
- 11.2 The apparent Successful Bidder, and any other Bidder so requested by Owner or Engineer, must submit to Owner (with a copy to Engineer) a list of the Subcontractors and Suppliers over 2% of total base bid and at least as proposed for the following portions of the Work. Submittal must be within five days after the bid opening:
 - A. Electrical.
 - B. Digester Cleaning.
- 11.3 If requested by Owner or Engineer, 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 awarding the Contract.

- 11.4 If apparent Successful Bidder declines to make a requested substitution, Owner may award the Contract to another Bidder, consistent with the basis for evaluating the Bids for award as set forth in these Instructions to Bidders, 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 issuance 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

- 12.1 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.
- 12.2 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 8.5inch 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.
- 12.3 A Bid by a corporation must be signed 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.
- 12.4 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.
- 12.5 A Bid by a limited liability company must be signed 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.
- 12.6 A Bid by an individual must show the Bidder's name and official address.
- 12.7 A Bid by a joint venture must be signed 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.
- 12.8 All names must be printed in ink below the signatures.
- 12.9 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 indicated on the Bid Form.
- 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

13.1 *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 item 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. It is the intent to complete all alternates.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form.

13.2 *Unit Price*

- A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The “Bid Price” (sometimes referred to as the extended price) for each item of Unit Price Work will be the product of the “Estimated Quantity”, which Owner or its representative has set forth in the Bid Form, for the item and the corresponding “Bid Unit Price” offered by the Bidder. The total of all unit price bid items will be the sum of these “Bid Prices”; such total will be used by Owner for Bid comparison purposes. The final quantities and final Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 14—SUBMITTAL OF BID

- 14.1 The Bidding Documents include one separate, unbound copy of the Bid Form, and, where required, the Bid Bond Form and other supplements to the Bid Form. The unbound copy of the Bid Form and supplements (if any) is to be completed and submitted with the Bid security and the other documents required with the Bid by Article 2 of the Bid Form.
- 14.2 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, and 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 method, 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 or invitation to bid.

- 14.3 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. Owner accepts no responsibility for delays in returning Bids submitted or delivered to the incorrect location.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.1 An unopened Bid may be withdrawn by an appropriate document duly signed in the same manner that a Bid must be signed and delivered to the place where Bids are to be submitted, prior to the date and time established in the Bidding Documents for the receipt of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.2 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 of this Article and submit a new Bid prior to the date and time for established in the Bidding Documents the receipt of Bids.
- 15.3 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.

ARTICLE 16—OPENING OF BIDS

- 16.1 Bids will be opened at the time and place indicated in the Advertisement or invitation to bid and, unless obviously non-responsive, will be 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

- 17.1 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

- 18.1 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.
- 18.2 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. Owner may reject the Bid of any Bidder that fails to demonstrate

appropriate qualifications, experience, and resources for the Work, in accordance with Article 3 of these Instructions to Bidders.

18.3 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.

18.4 *Basis for Award of Contract*

A. If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest-priced, responsive Bid that has not otherwise been disqualified.

18.5 *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 elsewhere in the Bidding Documents, or prior to the Notice of Award.

B. *Base Bid with Alternates:* In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all Bidders, present at the opening of Bids, a “Base Bid plus alternates” budget after receiving all Bids, but prior to opening the Bids; Bidders not present for the opening of Bids may obtain the announced budget amount from Owner or Engineer. For comparison purposes, alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions to Bidders, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate bid prices for which Owner determines funds will be available at the time of award.

C. *Unit Price Work:* For the determination of the apparent low-price Bid when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price bid for that item, together with amount(s) of lump sum items (if any).

18.6 In evaluating whether a Bidder is responsible, Owner will consider the qualifications, experience, and resources of the Bidder and may consider the qualifications, experience, and resources 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.

18.7 Owner, with or without Engineer’s assistance, 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

19.1 Paragraph 2.01 and Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, set forth Owner’s requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the signed Agreement

to Owner (or Owner’s representative), it must be accompanied by required bonds and insurance documentation.

- 19.2 Article 8 (“Bid Security”) of these Instructions to Bidders addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.1 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unsigned 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 required bonds and insurance documentation (as required by the Contract Documents) to Owner. Within 10 days thereafter, Owner will deliver one fully signed 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

- 21.1 -Except as may be otherwise specifically provided herein, all sales and/or use taxes assessed by federal, state or local authorities on materials used or furnished by the Contractor in performing the work hereunder shall be paid by the Contractor.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

- 22.1 There are no direct purchase procurement contracts previously made by the Owner that the Contractor will be required to accept. Some materials (valves and fittings) for the construction work have already been purchased by the Owner and are on site for Contractor use. See Specification Section 01 64 00 – Owner-Furnished Products for more information.

ARTICLE 23—LAWS AND REGULATIONS

- 23.1 Contractor’s License Classification: In accordance with the provisions of California Business and Professions Code, Section 7028, Owner has determined that Contractor shall possess a valid Class A Contractor License at the time of Bid and for the duration of the contract. Failure to possess the specified license shall render the Bid as non-responsive and shall act as a bar to award of the contract to any Bidder not possessing said license at the time of Bid opening. The Contractors’ State License Board may be contacted at 9821 Business Park Drive, Sacramento, CA 95827; P.O. Box 26000, Sacramento CA 95826. (800) 321-2752.

ARTICLE 24—WORKERS' COMPENSATION REQUIREMENTS

- 24.1 As required by Section 1860 of the California Labor Code and in accordance with the provisions of Section 3700 of the Labor Code, every contractor will be required to secure the payment of workers’ compensation to its employees.
- 24.2 In accordance with Section 1861 of the California Labor Code, the contractor shall furnish the owner with a statement as follows: “I am aware of the provisions of 3700 of the Labor Code which requires every employer to be insured against liability for worker’s compensation or to undertake

self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.”

ARTICLE 25—REGISTRATION WITH DEPARTMENT OF INDUSTRIAL RELATIONS

- 25.1 This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. No contractor or subcontractor may be listed on a bid proposal for a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.5. No contractor or subcontractor may be awarded a contract for public work on a public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code Section 1725.

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

1.0 This Bid is submitted to:

Sanitary District No. 5 of Marin County

2001 Paradise Dr

Belvedere Tiburon, CA 94920

1.1 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

2.0 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; and

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

3.0 *Unit Price Bids*

A. Bidder will perform the following Work at the indicated unit prices. Unit Price Bid Items are defined in more detail in Specification Section 01 22 00 – Measurement and Payment:

| Item No. | Description | Unit | Estimated Quantity | Bid Unit Price | Bid Amount |
|----------|--------------|-----------|--------------------|----------------|------------|
| 1 | Dewatering | 1000 gal | 80 | | \$ |
| 2 | Nitrogen gas | Cubic ft | 51,000 | | \$ |
| 3 | Crack Repair | Linear ft | 90 | | \$ |

| | |
|-----------------------------------|----|
| Total of All Unit Price Bid Items | \$ |
|-----------------------------------|----|

B. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and
2. the estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

3.1 *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 3.0. Bid Alternates are defined in Specification Section 01 23 00 – Alternates:

1. Lump Sum Price (Base Bid and Alternates)

| | |
|--|----|
| Base Bid: Digester Cleaning & Improvements (not including unit costs listed above) | \$ |
| Alternate 1: Grinder Replacement | \$ |
| Alternate 2: Dewatering Building Improvements | \$ |
| Alternate 3: Screw Press Room Improvements | \$ |

3.2 *Total Bid Price (Unit Prices and Lump Sums)*

| | |
|---|----|
| Total Bid Price (Total of all Unit Price and Lump Sum Price Bids) | \$ |
|---|----|

ARTICLE 4—TIME OF COMPLETION

4.0 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of days indicated in the Agreement.

4.1 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.0 *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.

5.1 *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.

5.2 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

| Addendum Number | Addendum Date |
|-----------------|---------------|
| | |
| | |
| | |

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.0 *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, attended the mandatory pre-bid meeting, 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.

6.1 *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)

Bidder's Address for giving notices:

Bidder's Contact Person:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

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

QUALIFICATIONS STATEMENT

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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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 Completed | | |
| 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

| | | | |
|--|--|---------------------------------------|-----------------------------------|
| Project Manager | | | |
| 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 | |
| Project Superintendent | | | |
| 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 | |
|-----------------------------|--|-----------------------------|--|

| | | | |
|--|--|---------------------------------------|-----------------------------------|
| Safety Manager | | | |
| 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 | |
| Quality Control Manager | | | |
| 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 | |
|-----------------------------|--|-----------------------------|--|

AGREEMENT

BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between Sanitary District No. 5 of Marin County (“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:

- A. Empty, clean, and return to operation two anaerobic digesters in a sequence that allows one to be in operation at all times.
- B. Perform various digester structural improvements including crack repair.
- C. Remove, clean, coat, and reinstall both digester covers.
- D. Demolish and install various valves, pipes, and pipe supports.
- E. Clean, video and coat pipes.
- F. Replace sludge grinder and control panel.
- G. Perform various concrete improvements throughout the Site.
- H. Install various metal improvements, including handrails, grating, and guiderails.
- I. And related work shown on drawings and project manual.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: Marin County Sanitary District No. 5 Digester Cleaning and Rehabilitation Project.

ARTICLE 3—ENGINEER

3.01 The Owner has retained HDR Engineering, 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: Dates*

A. Not applicable.

4.03 *Contract Times: Days*

A. The Work will be substantially complete within 180 working 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 200 working 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 \$2,000 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 \$[number] 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.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

A. Contractor shall reimburse Owner (1) for fines and penalties (if any) imposed on Owner as a direct result of Contractor's failure to attain Substantial Completion according to the Contract Times, (2) for fines and penalties (if any) imposed on Owner by an authority having jurisdiction for actions or inaction of Contractor arising from Contractor's performance of the Work (regardless of whether such event was connected with any delay in compliance with the Contract Times), and (3) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.

- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.
- C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

4.07 Owner reserves the right to withhold from payments due Contractor under the Contract amounts for liquidated damages (if any), special damages (if any), and performance damages (if any) in accordance with the Contract.

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 \$_____.

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).

| Unit Price Work | | | | | |
|---|--------------|-----------|--------------------|------------|----------------|
| Item No. | Description | Unit | Estimated Quantity | Unit Price | Extended Price |
| 1 | Dewatering | 1,000 gal | 80 | \$ | \$ |
| 2 | Nitrogen Gas | Cubic ft | 51,000 | \$ | \$ |
| 3 | Crack Repair | Linear ft | 90 | \$ | \$ |
| Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities) | | | | | \$ |

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) \$_____.
- 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 on or about the 1st day of 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.

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. Wage Determination Schedule.
 6. Statutory and Funding-Financing Entity Requirements.
 7. Specifications as listed in the table of contents of the project manual (copy of list attached).
 8. Drawings (not attached but incorporated by reference) consisting of [number] sheets with each sheet bearing the following general title: [title on Drawings].
 9. Drawings listed on the attached sheet index.
 10. Addenda (numbers _____ to _____, inclusive).
 11. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages _____ to _____, inclusive).
 12. 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 _____ (which is the Effective Date of the Contract).

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: _____

PERFORMANCE BOND

| | |
|---|--|
| <p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p> | <p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p> |
| <p>Owner</p> <p>Name: [Full formal name of Owner]</p> <p>Mailing address (<i>principal place of business</i>): [Address of Owner's principal place of business]</p> | <p>Contract</p> <p>Description (<i>name and location</i>): [Owner's project/contract name, and location of the project]</p> <p>Contract Price: [Amount from Contract]</p> <p>Effective Date of Contract: [Date from Contract]</p> |
| <p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p> | |
| <p>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.</p> | |
| Contractor as Principal | Surety |
| _____ <i>(Full formal name of Contractor)</i> | _____ <i>(Full formal name of Surety) (corporate seal)</i> |
| By: _____ <i>(Signature)</i> | By: _____ <i>(Signature)(Attach Power of Attorney)</i> |
| Name: _____ <i>(Printed or typed)</i> | Name: _____ <i>(Printed or typed)</i> |
| Title: _____ | Title: _____ |
| Attest: _____ <i>(Signature)</i> | Attest: _____ <i>(Signature)</i> |
| Name: _____ <i>(Printed or typed)</i> | Name: _____ <i>(Printed or typed)</i> |
| Title: _____ | Title: _____ |
| <p><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></p> | |

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 there 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.
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: None

PAYMENT BOND

| | |
|---|--|
| <p>Contractor</p> <p>Name: [Full formal name of Contractor]</p> <p>Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p> | <p>Surety</p> <p>Name: [Full formal name of Surety]</p> <p>Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p> |
| <p>Owner</p> <p>Name: [Full formal name of Owner]</p> <p>Mailing address (<i>principal place of business</i>): [Address of Owner's principal place of business]</p> | <p>Contract</p> <p>Description (<i>name and location</i>): [Owner's project/contract name, and location of the project]</p> <p>Contract Price: [Amount, from Contract]</p> <p>Effective Date of Contract: [Date, from Contract]</p> |
| <p>Bond</p> <p>Bond Amount: [Amount]</p> <p>Date of Bond: [Date]</p> <p><i>(Date of Bond cannot be earlier than Effective Date of Contract)</i></p> <p>Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p> | |
| <p>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.</p> | |
| Contractor as Principal | Surety |
| <i>(Full formal name of Contractor)</i> | <i>(Full formal name of Surety) (corporate seal)</i> |
| By: _____ <i>(Signature)</i> | By: _____ <i>(Signature)(Attach Power of Attorney)</i> |
| Name: _____ <i>(Printed or typed)</i> | Name: _____ <i>(Printed or typed)</i> |
| Title: _____ | Title: _____ |
| Attest: _____ <i>(Signature)</i> | Attest: _____ <i>(Signature)</i> |
| Name: _____ <i>(Printed or typed)</i> | Name: _____ <i>(Printed or typed)</i> |
| Title: _____ | Title: _____ |
| <p><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></p> | |

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: None.

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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SUPPLEMENTARY CONDITIONS

OF THE CONSTRUCTION CONTRACT

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, if any, used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The paragraph address system used in these Supplementary Conditions is the same as the paragraph address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.16 Add the following to Paragraph 1.01.A.16:

When the Project is to be constructed under multiple direct Contracts awarded by the Owner, the term "Contractor" shall mean the appropriate prime contractor. Whenever a specific prime Contractor is referred to, terms such as "General Contractor", "Electrical Contractor", "Plumbing Contractor", "HVAC Contractor", or other appropriate Contract-indicating term will be used.

SC-1.01.A.40 Add the following to Paragraph 1.01.A.40:

Trucking, shipping, delivery firms, consultants, and entities performing testing or inspection retained by Contractor or any Subcontractor are considered to be Subcontractors.

SC-1.01.A.45 Add the following to Paragraph 1.01.A.45:

Entities that rent construction equipment or machinery, but are not incorporated into the Work, are considered to be Suppliers. If such rental entity furnishes both equipment and one or more personnel to operate and maintain the equipment, such entity is a Subcontractor.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *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.

2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A to read as follows:

Owner shall furnish to Contractor two paper copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

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 two paper copies of conformed Contract Documents incorporating and integrating all Addenda and amendments, if any, 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 paper copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2.06 *Electronic Transmittals*

SC-2.06 Delete in its entirety Paragraph 2.06.B and replace with the following new paragraph:

- B. *Electronic Document Protocol*: Comply with Specifications Section 01 31 26 – Electronic Communication Protocols.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01 Delete Paragraph 3.01.C in its entirety.

SC-3.01 Add the following new paragraphs immediately after Paragraph 3.01.E:

- F. The Specifications and other verbal components of the Contract Documents may vary in form, format, and style. Some Specification sections are written in varying degrees of streamlined or declarative style and some Specifications sections may, in comparison, employ a more-narrative style. Omissions of such words and phrases as "Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined language in the Contract Documents. Omitted words and phrases are incorporated by inference. Similar types of provisions may appear in various parts of a Specifications section or elsewhere in the Contract Documents. Contractor shall not attempt to take advantage of any variation of form, format or style in Change Proposal(s) and Claim(s).
- G. Cross referencing of Specification sections in a Specifications section's heading "Related Sections includes, but are not necessarily limited to: "and elsewhere within each Specifications section is provided as an aid and convenience to Contractor. Contractor shall not rely on cross referencing indicated and is responsible for coordinating the entire Work and providing a complete Project whether or not cross referencing is provided in each Specifications section or whether or not cross referencing is complete.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor's Progress*

SC-4.05.C 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 on the critical path at the time of the delay.
- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
 - 1) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in Table SC-4.05-C-1—Foreseeable Bad Weather Days.
 - 2) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in Table SC-4.05.C-1—Foreseeable Bad Weather Days, will be considered as “abnormal weather conditions.” The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.

Table SC-4.05.C-1—Foreseeable Bad Weather Days

| Month | Number of Foreseeable Bad Weather Days in Month Based on Historical Precipitation |
|--------------|--|
| January | 6 |
| February | 4 |
| March | 4 |
| April | 0 |
| May | 0 |
| June | 0 |
| July | 0 |
| August | 0 |
| September | 0 |
| October | 0 |
| November | 1 |
| December | 6 |

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. There are no existing reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
- F. The following table lists the 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 specifically identifies the Technical Data upon which Contractor may rely:

| Drawings Title | Date of Drawings | Technical Data |
|--|------------------|---|
| Record Drawings: Main Plant Rehabilitation Project | June 2014 | Record drawings may or may not represent existing conditions. |

- G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents at 2001 Paradise Dr, Belvedere Tiburon, CA 94920 during regular business hours, or may request copies from Engineer.

SC-5.04.A Add the following new paragraph immediately after Paragraph 5.04.A.4:

- 5. Contractor encounters human remains, recognizes the existence of burial markers, archaeological sites, historical sites, artifacts of potential archaeological or historical interest, or wetlands not shown or indicated in the Contract Documents, Contractor shall immediately cease operations that may disturb such area(s) and secure the adjacent Work; and Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations (Contractor shall continue to suspend such operations until otherwise instructed by Owner but shall continue with all other operations that do not affect those remains or features);

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

- 4. There are no existing reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site.
- 5. There are no existing drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site.
- 6. Contractor will be working with methane, hydrogen sulfide, and nitrogen gases. Submittals need to document how work will proceed to mitigate risks.

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

| Workers’ Compensation and Related Policies | Policy limits of not less than: |
|---|--|
| Workers’ Compensation | |
| State | Statutory |
| Applicable Federal (e.g., Longshoreman’s) | Statutory |
| Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable | Statutory |
| Jones Act (if applicable) | |
| Bodily injury by accident—each accident | \$ |
| Bodily injury by disease—aggregate | \$ |
| Employer’s Liability | |
| Each accident | \$ |
| Each employee | \$ |
| Policy limit | \$ |

| Workers' Compensation and Related Policies | Policy limits of not less than: |
|---|--|
| Stop-gap Liability Coverage | |
| For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of: | \$ |

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
2. Any exclusion for water intrusion or water damage.
3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
4. Any exclusion of coverage relating to earth subsidence or movement.
5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
6. Any limitation or exclusion based on the nature of Contractor’s work.
7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

I. **Commercial General Liability— Minimum Policy Limits**

| Commercial General Liability | Policy limits of not less than: |
|---|--|
| General Aggregate | \$ |
| Products— Completed Operations Aggregate | \$ |
| Personal and Advertising Injury | \$ |
| Bodily Injury and Property Damage — Each Occurrence | \$ |

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

| Automobile Liability | Policy limits of not less than: |
|---|--|
| Bodily Injury | |
| Each Person | \$ |
| Each Accident | \$ |
| Property Damage | |
| Each Accident | \$ |
| [or] | |
| Combined Single Limit | |
| Combined Single Limit (Bodily Injury and Property Damage) | \$ |

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

| Excess or Umbrella Liability | Policy limits of not less than: |
|-------------------------------------|--|
| Each Occurrence | \$ |
| General Aggregate | \$ |

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer’s liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy’s policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$[specify amount] after accounting for partial attribution of its limits to underlying policies, as allowed above.
- M. *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after final completion.

| Contractor’s Pollution Liability | Policy limits of not less than: |
|---|--|
| Each Occurrence/Claim | \$ |
| 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.

| Contractor’s Professional Liability | Policy limits of not less than: |
|--|--|
| Each Claim | \$ |
| Annual Aggregate | \$ |

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Supplement Paragraph 6.04 with the following provisions:

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

1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).
 - a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).
4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].
5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].
6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include performance/hot testing and start-up, if applicable.
9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
10. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:
 - a. 36 plug valves per 40 05 62 – Plug Valves.
 - b. flexible connection per [spec section].

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

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

ARTICLE 7— CONTRACTOR'S RESPONSIBILITIES

7.02 *Supervision and Superintendence*

SC-7.02 Add the following to Paragraph 7.02, following Paragraph 7.02.B:

- C. Unless Owner otherwise agrees in writing, the superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

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 am to 5 pm (noise ordinance from 9 am to 5 pm) from Monday to Friday.
2. Owner's legal holidays are:
 - New Year's Day (January 1).
 - Memorial Day (Last Monday in May).
 - Independence Day (July 4).
 - Thanksgiving Day (Fourth Thursday in November).
 - Day after Thanksgiving (Fourth Friday in November).
 - Christmas Day (December 25).
 - Day after Christmas (December 26).

SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state “...all Work at the Site must be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday without Owner’s written permission.” The balance of Paragraph 7.03.C remains unchanged except for the foregoing.

- --- -7.14 *Hazard Communication Programs*

SC-7.14 Add the following new paragraph immediately after Paragraph 7.14.A:

- B *Single Prime Contract:* Contractor shall be responsible for coordinating exchange of 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 and Regulations. Contractor shall provide a centralized location for the maintenance of the safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of employers on the Site.

ARTICLE 8—OTHER WORK AT THE SITE

No Supplementary Conditions in this Article.

ARTICLE 9—OWNER’S RESPONSIBILITIES

No Supplementary Conditions in this Article.

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. This does not impose on either RPR or Engineer any obligation to find all, or any specific element of, defective Work, for which Contractor remains solely responsible.
 - b. 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 (1) code-required tests and special inspections, and (2) those performed by public or other agencies having jurisdiction over the Work.
 - b. Observe specific tests, inspections, and other field quality control required by the Contract Documents and performed by Contractor, Subcontractor, Supplier, or by testing or laboratories retained by any of them.
 - c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
6. *Payment Requests:* Review Applications for Payment with Contractor and advise Contractor regarding quantities or extent of the Work eligible for payment.
7. *Completion*
- a. Participate in Engineer's visits regarding inspection for Substantial Completion.
 - b. Assist in the augmenting or amending the punch list of items to be completed or corrected prior to final inspection.
 - c. *Final Inspection:* 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 (if any) of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
 - d. *Record Documents:* Periodically during the Work, review with Contractor the status of Contractor's record documents required by the Contract Documents and advise Contractor on whether such record documents appear to comply with the Contract's requirements for record documents. Review final record documents submitted by Contractor.

D. The RPR will not:

1. Authorize any deviation from the Contract Documents or substitution of materials, equipment (including “or-equal” items), or procedures or sequences indicated in the Contract Documents.
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 or responsibility over any aspect of the means, methods, techniques, sequences or procedures of construction.
5. Advise on, issue directions regarding, or assume control over security protection, 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 Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No Supplementary Conditions in this Article.

ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

13.01 *Cost of the Work*

SC-13.01.B.5.c.(1) Supplement Paragraph 13.01.B.5.c.(1) by adding the following subparagraphs:

- a) Prior to commencing Work at the Site, submit to Owner, through Engineer, copies of the equipment rental agreements for Owner’s approval.
- b) Should Contractor perform Work using rented construction equipment or machinery without Owner’s written approval of the associated rental agreement and the parties subsequently disagree on the applicable rental rates, use of such construction equipment and machinery will be compensated on the basis of the rental rate book indicated in Paragraph SC-13.01.B.5.c.(2).
- c) When the rental rate book is used basis for determining compensation for construction equipment and machinery leased from a rental firm, the hourly rate for such equipment shall be determined in accordance with Paragraph 13.01.B.5.(2) of the General Conditions.

SC-13.01.B.5.c.(2) Supplement Paragraph 13.01.B.5.c.(2) by adding the following sentence:

The equipment rental rate book that governs the included costs for the rental of machinery and equipment owned by Contractor (or a related entity) under the Cost of the Work provisions of this Contract is the most current edition of California Department of

Transportation (“Caltrans”) “Labor Surcharge and Equipment Rental Rates Manual (Cost of Equipment Ownership)”.

SC-13.01.B.5.c Supplement Paragraph 13.01.B.5.c by adding the following subparagraphs:

- 4) *Inactive Equipment and Machinery*: Rental of construction equipment and machinery shall cease when the use thereof is no longer necessary for the Work. Periods of inactivity for such construction equipment or machinery will not be compensable unless agreed upon in writing by Owner, unless the costs of disassembly, removal, transportation, reassembly, and remobilization, as submitted to and accepted by Owner (with advice of Engineer) would exceed the cost of continuing to rent the item(s) during the period(s) of inactivity. Contractor is responsible for obtaining Owner’s written approval for compensation for construction equipment and machinery for periods of inactivity. Owner is not responsible for retroactively approving such inactivity. “Period of inactivity” for such items includes periods when the construction equipment or machinery is not used or necessary for the logical and efficient progression of the Work, or when other, available equipment or machinery is suitable for performing the given task.
- 5) *Condition of Equipment and Machinery*: Construction equipment and machinery will be compensable only for serviceable construction equipment and machinery capable of efficiently performing its intended function at the Site. Construction equipment and machinery not in compliance with this Paragraph SC-13.01.B.5.c.5) is not eligible for compensation.
- 6) *Capped Compensation*: Compensation paid Contractor for a given item of Contractor-owned construction equipment or machinery will be capped at, and shall not exceed, the comparable purchase price of such item of equal or comparable capacity and capability.

SC-13.01.C.2 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

a. For purposes of this paragraph, “small tools and hand tools” means items in one or more of the following categories: (1) Items that are ordinarily required for the performing worker’s job function, including but not limited to equipment which ordinarily has no associated licensing, insurance, or substantive storage costs; such as hammers, wrenches, socket tools, manual saws, power saws, chainsaws, common power tools, impact drills, threaders, benders, transits and theodolites and related equipment, and other tools transportable by hand, regardless of ownership of such items; (2) Items such as gang-boxes, ladders, hand carts and similar wheeled items manually operated by workers, extension cords, and similar items; (3) common testing equipment such as insulation testers (megger-testing equipment), amp meters, gas detectors, pressure gauges, and similar items; (4) A purchase price (if purchased new, at retail) of \$500, although such limit is not absolute, and certain items may be deemed by Owner or Engineer as “small tools or hand tools” (and not eligible for compensation) even though such item may have a purchase price greater than the amount indicated in this Paragraph 13.01.C.2.

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

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 extended price of a particular item of Unit Price Work amounts to five percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 20 percent 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

No Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.03 Substantial Completion

SC-15.03.B Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined by Engineer not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer or other entity retained by Owner, 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 Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

17.02 Arbitration

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

SC-17.02 Arbitration

- A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of \$100,000 or less will be settled in accordance with the American Arbitration Association's supplemental rules for

Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.

- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be concurrently sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 17, or, if no specified time is applicable, within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.
- C. The arbitration will be held in the same municipality as the Owner's principal office location, or other, as directed by the Owner.
- D. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrator(s) will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.
- E. The Arbitrator(s) will have the authority to allocate the costs of the arbitration process among the parties, but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.
- F. The award of the arbitrator(s) must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.
- G. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.
- H. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
 - 0. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;
 - 1. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;
 - 2. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and

3. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.
- I. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- J. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

17.03 *Attorneys' Fees*

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02.

SC-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

SC-18.11 Add a new paragraph immediately after Paragraph 18.10:

SC-18.11 *Confidential Information*

- A. All Drawings, Specifications, technical data, and other information furnished to Contractor either by Owner or Engineer or developed by Contractor or others in connection with the Work are, and will remain, the property of Owner or Engineer, and shall not be copied or otherwise reproduced or used in any way except in connection with the Work, or disclosed to third parties or used in any manner detrimental to the interests of Owner or Engineer.
- B. The following information is not subject to the above confidentiality requirements:
 1. information in the public domain through no action of Contractor in breach of the Contract Documents; or
 2. information lawfully possessed by Contractor before receipt from Owner or Engineer; or
 3. information required to be disclosed by Laws or Regulations, or by a court or agency of competent jurisdiction. However, in the event Contractor shall be so required to disclose such information, Contractor shall, prior to disclosure, provide reasonable notice to Owner and Engineer, who shall have the right to interpose all objections Owner may have to the disclosure of such information.

SC-18.12 Add a new paragraph immediately after Paragraph 18.11, to read as follows:

SC-18.12 *Publicity*

- A. Contractor shall not disclose to any third party the nature of its Work on the Project, nor engage in publicity or public media disclosures with respect to the Project without the prior written consent of Owner.

SC-19 Add new article immediately after Article 18, to read as follows:

ARTICLE 19—CALIFORNIA STATE REQUIREMENTS

SC-19.01 *Registration with the California Department of Industrial Relations*

- A. This project is a “public works” project as defined in California Labor Code Section 1720 through 1743. In accordance with California Labor Code Article 1725.5, Contractor and all subcontractors are required to be registered with the California Department of Industrial Relations (DIR) in order to bid or be listed on a bid and/or work on a public works project.

SC-19.02 *Antitrust Claim Settlement*

- A. In entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

SC-19.03 *Utilities*

- A. Contractor shall be responsible for marking all excavations and notifying Underground Service Alert (USA) at least 48 hours before digging and follow all other provisions of California Government Code Sections 4216 through 4216.9. Contractor shall maintain an active USA ticket number for the entire duration of the excavation.

Unless otherwise indicated in the Contract Documents, all utility lines, conduits, wires, or structures shall be maintained by the Contractor and shall not be disturbed, disconnected, or damaged by him during the progress of the Work, provided, that should the Contractor in the performance of the Work disturb, disconnect, or damage any of the above, all expenses arising from such disturbance or in the replacement or repair thereof shall be borne by the Contractor. However, in accordance with Section 4215 of the California Government Code, the Contractor shall be compensated for all costs of locating and repairing damage to main or trunkline utility facilities located on the work site and for costs of operating equipment on the work site necessarily idled during such work where the Contractor has exercised reasonable care in removing or relocating utility facilities which are inaccurately indicated in the Contract Document.



DIVISION 01

GENERAL REQUIREMENTS



SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Location and description of Work and prior uses of the Site.
 - 2. Construction Contracts for this Project.
 - 3. Others retained by Owner for the Project.
 - 4. Work by Owner.
 - 5. Sequence and progress of Work.
 - 6. Contractor's use of the Site.
 - 7. Easements and Rights-of-Way
 - 8. Partial utilization by Owner.
- B. Related Requirements:
 - 1. Include, but are not limited to, the following:
 - a. Section 01 71 33 - Protection of the Work and Property

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at the Sanitary District No.5 of Marin County, 2001 Paradise Dr, Belvedere Tiburon, CA 94920.
- B. The Project includes constructing the Work broadly described below, in accordance with the Contract Documents, with all related appurtenances. Work shown on the Drawings, or indicated in the Specifications, or indicated elsewhere in the Contract Documents is part of the Work, regardless of whether indicated below. The Work includes, but is not limited to, the following:
 - 1. Mobilization/demobilization.
 - 2. Erect scaffolding to provide a safe platform for construction work and inspection, as needed. When required, support Owner's or Engineer's access to facilities within and complying with Contractor's safety program.
 - 3. Digester exterior rehabilitation as shown in contract drawings, including:
 - a. Digester cover cleaning, inspected, preparation, and coating.
 - b. Raising architectural wall of digester to contain process foam. Cut top of wall for foam to drain to digester overflow box.
 - c. Valve removal and replacement in kind, with owner supplied valves.
 - d. Replacement of some pipe, bends, fittings, appurtenances, and pipe supports.
 - e. Inspection and unclogging of blocked pipelines.
 - f. Concrete work on structural beam at cake solids load out bay in Dewatering Building. Guiderails for dewatered sludge hopper and associated concrete deck work.
 - g. New handrails, grating, stairs for dewatering screw press.
 - h. New foul air ductwork, pipe supports, and connection to process equipment in screw press room.
 - i. Demolition and replacement of sludge grinder and associated appurtenances.
 - j. Process pipes exterior coatings and replace pipe insulation.
 - k. Add valve tags, pipe process labels and flow direction arrows.
 - 4. Construction sequencing and safety documents for performing work in Class 1 Div 1 NFPA area, including all items outlined in Part 1.3 of this section.

5. Sequencing of the digesters for cleaning, valve replacement and clearing blocked pipelines. This includes the efforts needed to purge the digesters with inert gas to put it out of service and then bring both back into service after the cleaning and according to the sequencing.
 6. Various concrete work and patching as shown on contract drawings.
- C. Contracting Method: The Project will be constructed under a single prime construction Contract.
- D. Hazardous Environmental Conditions:
1. To the best of Owner's knowledge, information, and belief, the prior use of the Site was always a wastewater treatment plant. Existing buildings at the Site were constructed in the 1960s. Plant received rehabilitation and upgrades in 1981 and 2012. Areas scheduled for work were completed in 1981 and 2012. Contractor shall sample representative areas scheduled for work for hazardous materials and define a change of condition if hazards are identified.

1.3 SAFETY REQUIREMENTS

- A. Contractor shall be advised that digesters are classified as Class 1, Division 1, Hazardous Areas both inside and to a distance of ten (10) feet beyond all exterior walls and roof, and to a distance of ten (10) feet beyond all existing gas handling equipment. There shall be no smoking, flames, sparks, or ignition sources within 50 feet of digesters and gas handling equipment.
- B. Contractor shall take all necessary safety precautions and shall furnish and install all equipment, labor, materials, appurtenances, gas detectors, explosion proof ventilation equipment, and all services required (e.g., confined space rescue) to meet all safety requirements for work in areas as designated above, at no additional cost to the Owner.
- C. All Contractor employees shall wear hard hats, safety glasses and appropriate protective equipment while within the defined Work Zone as set up by the Contractor. Provide all necessary safety and gas monitoring systems and equipment required for confined space entry as identified by OSHA. Allow Owner and Owners Representative authorized access to the work zone. The Contractor shall securely block access to the empty digester during the cleaning project (including off-hours when no work is being performed) to prevent unauthorized entry and minimize risk.
- D. Contractor shall be responsible for every aspect of health and safety on the worksite, including the health and safety of subcontractors, suppliers, and other persons on the worksite.
- E. Digesters are classified as confined spaces. Provide the Owner notification for work within confined spaces, submittal of confined space work procedures and rescue plan, compliance with Entry Permit procedures, participation in a hazard assessment review of planned precautions and a debriefing upon completion of the confined space operation. Compliance with the federal and State regulations remains the Contractor's responsibility. Owner review is for general compliance and coordination only.
- F. Carry and use a gas detector at all times when inside the digester. Gas detectors shall detect carbon monoxide, oxygen, hydrogen sulfide, and lower explosive limits. It is solely the responsibility of the Contractor to provide their gas detection equipment which complies with OSHA standards.
- G. Due to the health and fire hazardous conditions of the work area inside the digester and potential presence of harmful gases in the confined digester spaces, provide and follow all necessary safety measures and procedures to ensure that the cleaning process is performed in a very safe manner. Provide the following prior to starting the digester cleaning process:
 1. Site Health and Safety Plan.
 2. Confined Space Entry Policy/Procedure.

3. Site safety plan for confined space entry including a rescue procedure.
4. List of safety equipment and safety training of project work force.
5. Spill prevention, control and clean-up plan.

1.4 CONSTRUCTION CONTRACTS FOR THIS PROJECT

- A. Single Prime Construction Contract: The Contract requires all the Work for the Project not expressly allocated to Owner or others in the Contract Documents.

1.5 OTHERS RETAINED BY OWNER FOR THE PROJECT

- A. Engineer:
1. Engineer is identified in the Agreement.
 2. Engineer's responsibilities for the Project, relative to Contractor, are indicated throughout the Contract Documents.
 3. Whether the Engineer will furnish the services of a Resident Project Representative (RPR) for the Project is indicated in the Supplementary Conditions.
- B. Non-Professional Services Contracted by Owner: Owner will retain services of a NACE inspector to perform the services indicated relative to the Project. Contractor shall coordinate and schedule the Work with, and cooperate with, the entities performing services for Owner.

1.6 SUBMITTALS

- A. Informational Submittals: Submit the following:
1. Shutdown Planning Submittals:
 - a. Multiple process and subprocess shutdowns may be required for in-kind valve replacements listed on sheets G901 and G902. A subprocess shutdown may occur during a digester shutdown. Each subprocess shutdown is limited to one working day before the subprocess must be returned to service to maintain the online digester. A digester may be shutdown longer than a subprocess for cleaning and rehabilitation.
 - b. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - c. For each process and subprocess shutdown, include inventory of labor, materials, and equipment required to perform work required during that process or subprocess shutdown, including pipe replacement, pipe cleaning, owner-furnished valve replacement, and final valve orientation.
 - d. Furnish submittal to Engineer not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning Submittal.
 - e. After Engineer's acceptance of shutdown planning Submittal and prior to starting the shutdown, submit written notification to Owner and Engineer of date and time each shutdown is to start. Submit notification not less than 72 hours in advance of each shutdown.
 - f. In general, Owner can only allow two sub-process shutdown requests per week (separated by 2 days) to allow for recovery after each shutdown. More may be requested but not assumed. Owner reserves the right to alter shutdown requests to accommodate plant operations.
- B. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Site plan showing proposed location of field offices, storage trailers, staging and laydown areas, temporary sanitary facilities, fuel and oil storage, fueling location, bottle gas storage facilities, and other areas Contractor proposes to occupy.

1.7 WORK BY OWNER

- A. Owner will perform the following in connection with the Work:
 - 1. Operate all existing valves, flow-control gates, pumps, equipment, and appurtenances that will affect Owner's operations or facility processes, unless otherwise specified or indicated. Startup, operate and shutdown supplied equipment with permission from the contractor after startup by the contractor to the extent required to maintain the process and transfer of materials from tank to tank.
 - 2. Participate in Contractor LOTO to establish safe work areas. Confined space entry monitoring, attendants, rescue staff, and reclassification shall be provided by the contractor for their staff, plant staff, and engineers that may require entry into the work areas.

1.8 GENERAL CONSTRAINTS

- A. Unless otherwise shown or indicated in the Contract Documents, Contractor shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas. Owner will assist Contractor in dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Contractor to maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
- B. Contractor shall remove liquids and solids and dispose of them at appropriate location at the Site as directed by Engineer or haul off site to another WWTP according to contract. Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred using hoses, temporary piping, temporary pumps, and other means provided by Contractor. Discharge of fluids across floors is not allowed.
- C. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by Engineer. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
- D. Spillage shall be brought to Engineer's attention immediately, both orally and in writing, and reported in accordance with Laws and Regulations. Contractor shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by Engineer, Contractor shall remove spillage by other means, such as vactor truck, sorbents, or other method acceptable to Engineer.
- E. Engineer will consider proposals for substitute procedures after the Effective Date of the Contract. All Bids shall be based on the requirements of the Contract Documents, including this section. When deviation from specified sequence or procedures is proposed, Contractor's proposal shall explain in detail the proposed sequence and procedures and associated effects, including evidence that Owner's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule.

1.9 CONTRACTOR'S USE OF SITE

- A. Limit use of premises at the Site to work areas shown or indicated on the Drawings. Do not disturb portions of the Site beyond areas of the Work.
 - 1. Limits:
 - a. Confine construction operations to the following areas:
 - 1) Digester Area.
 - 2) Sludge Pump Room.
 - 3) Boiler Feed Pump Room.

- 4) Dewatering Building.
 - 5) Screw Press Room.
2. Storage:
- a. Contractor's gang boxes and storage containers for tools in active use in the Work may be kept in reasonable quantity in the work areas as long as such items do not obstruct access to the facilities by Owner or occupants. Buildings are locked at night, but owner is not responsible for lost or stolen equipment.
 - b. Relocate stored materials and equipment that interfere with operations of Owner, other contractors, and others performing work for Owner.
 - c. Do not store items of any sort, whether temporarily or otherwise, in stairways and ramps, whether existing or under construction.
3. Prohibitions:
- a. Do not use the Site for the following:
 - 1) Conducting Contractor's business not related to the Project or other work for Owner.
 - 2) Overnight lodging or other, non-work use of the Site by workers or others for whom Contractor is responsible, whether housed in recreational vehicles, other vehicles, tents, quarters in field offices or Contractor-furnished temporary structures, or in work areas, is unacceptable.
- B. Contractors shall share use of the Site with other contractors and others specified in Articles 1.4 through 1.5 (inclusive) of this Section.
- C. Owner will occupy the Site jointly with Contractor during construction for performance of Owner's typical operations. Coordinate with Owner in all construction operations to minimize conflicts between Contractor and Owner's employees and others under Owner's control. Owner will have Owner's suppliers for deliveries of chemicals and other items accessing the Site from time to time, possibly on a daily basis.
- D. Promptly repair damage to premises, including existing structures, finishes, equipment, and other features, caused by construction operations. Upon completion of the Work, restore premises to specified condition; if condition is not specified, restore to pre-construction condition.

1.10 EASEMENTS AND RIGHTS-OF-WAY

- A. Easements and Rights-of-Way - General:
- 1. Easements and rights-of-way required for the permanent improvements included in the Work will be provided by Owner in accordance with the General Conditions and Supplementary Conditions.
 - 2. Confine construction operations within Owner's property, public rights-of-way, easements obtained by Owner, and limits shown, and property for which Contractor has made arrangements directly with property owner(s).
 - 3. Use care in placing construction tools, machinery, and equipment, excavated materials, and materials and equipment to be incorporated into the Work to avoid damaging property and interfering with traffic.
 - 4. Do not enter private property outside the construction limits without permission from the owner of the property.

1.11 PARTIAL UTILIZATION BY OWNER

- A. Prior to Substantial Completion of the entire Work under the Contract, substantially complete the Work as follows:
- 1. Work indicted for Milestones:
 - a. Clean Secondary Digester and restore to working order as indicated by the first day of transferring sludge back into the digester.
 - b. Clean Primary Digester and restore to working order as indicated by the first day of transferring sludge back into the digester.

- c. Install new sludge grinder and complete all necessary concrete work in the sludge pump room.
 - d. Remove and replace valves, piping, and fittings as shown in the contract drawings.
2. Substantial Completion is after all the work is complete. No partial use of occupancy certifications will be given. Processes will be allowed to startup to facilitate the next step of the project, and deficiencies noted promptly, but no partials.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SEQUENCE AND PROGRESS OF WORK REQUIREMENTS

- A. One digester is required to be online for continuous operation. The sequence below repairs Secondary Digester first (Phase 1), then repairs Primary Digester (Phase 2).
- B. Incorporate sequencing of the Work and lead times for any equipment into the Progress Schedule.
- C. All volumes, rates, levels, elevations, and other calculated numbers need to be confirmed and supplied by the Contractor and the calculations need to be submitted to Engineer for approval. Estimated volumes in this section do not have safety factors applied to them and should be considered accurate to +/- 50%.
- D. Proposed sequence of work is provided to the contractor for consideration. Alternate, more efficient or cost-effective methods may be proposed such as contract dewatering or more/less liquid hauling. Contractor's sequencing of work must be submitted to Engineer and Owner for review and approval regardless if it deviates from the proposed sequencing below or not.

3.2 PROPOSED SEQUENCE OF WORK AND RESPONSIBLE PARTY(S):

- A. Phase 1 – Cleaning Secondary Digester:
 - 1. Transition digester feed to Primary Digester along with heating and process controls. (Owner, allow 2 weeks, could be before mobilization)
 - 2. Gas purge and dewater Secondary Digester (Contractor and Owner):
 - a. Establish new lower Primary Digester operating level at least 30 in below lowest overflow elevation (Owner, lower level through existing dewatering operations).
 - b. Lock out/tag out all valves to the Secondary Digester as shown in the Contract Drawings (Contractor and Owner).
 - c. Plug unvalved overflow pipe from Primary Digester to Secondary Digester and LOTO tag (Contractor).
 - d. Establish 24/7 ventilation (intrinsically safe) in Primary Digester overflow box (Contractor).
 - e. Purge Secondary Digester, using nitrogen, to a methane concentration of less than 11%. Supply regulated nitrogen (5,000 cubic ft) to digester and operations will draw down tank through dewatering process to create dilution. Contractor to supply 50% more nitrogen than calculated required nitrogen volume to account for losses during gas purge (Contractor and Owner).
 - 1) Dewater Secondary Digester from upper water level (elevation of 36.50 ft) to lower water level (elevation of 32.50 ft). Remove approximately 14,680 gallons of sludge (Owner, allow 3 days).

- f. Dewater Secondary Digester from lower water level (elevation of 32.50 ft) halfway to 23.5 ft. Remove approximately 33,000 gallons of sludge (Owner, allow 7 days). Owner will dewater as much sludge as possible without damaging process equipment, then Contractor finishes removing difficult material with temporary pumping for truck hauling.
 - g. Open hatch and ventilate (intrinsically safe) when level in Secondary Digester is below the invert of hatch (Contractor).
 - h. Truck/dewater remaining sludge off site from 23.5 ft elevation to top of cone (elevation 14.5 ft) to dewater secondary digester (Contractor). Budget for 40,000 gallons of temporary pumping, trucking and disposal with up to twice this volume at the same unit price (Contractor).
 - i. Contractor may remove cover for rehabilitation during or after digester cleaning.
 - 3. Clean and repair Secondary Digester (Contractor).
 - a. Clean floor and walls of Secondary Digester to sound concrete and coordinate with Engineer for inspection (Contractor and more trucking).
 - b. Clean the following pipes and video document inside of clean pipe. Submit video to Engineer before request to start up subprocess (Contractor):
 - 1) Inlet from Primary Digester box and replace pipes.
 - 2) Two bottom pipes to overflow box.
 - 3) Suction and discharge to sludge mixing pump.
 - 4) Suction and discharge to sludge recirculation pump.
 - c. Repair cracks on the interior and exterior of Secondary Digester that are marked to be repaired by Engineer after inspection (Contractor).
 - d. Clean Secondary Digester cover and coordinate with Engineer for inspection. Sandblast and recoat per 09 96 00 and Engineer's instruction. Replace all elastomeric components and gaskets on cover (Contractor).
 - e. Perform all work shown on the Contract Documents for Phase 1 (Contractor).
 - 1) Replace valves and pipes shown on contract drawings. Coordinate with Owner for specific shutdowns of sub-processes to replace valves associated with those processes that need to remain in service for the other digester. Valves supplied by owner.
 - 2) Replace grinder if Alternate 1 – Grinder Replacement was awarded. Coordinate with Owner for any shutdowns needed.
 - 4. Purge Secondary Digester and return to service (Contractor and Owner).
 - a. Contractor to reinstall finished digester cover.
 - b. Water test Secondary Digester. Contractor to supply 53,000 gallons water from owner source, Owner to operate equipment, allow 1 week.
 - c. Test mixing and heating functions and heat tank to 2°F above operating temperature of Primary Digester (Owner, allow 1 week).
 - d. Gas purge Secondary Digester with displacement purge by reducing the oxygen concentration to 7.2% (Contractor). Supply regulated nitrogen (3,000 ft³) to digester and operations will draw down tank through drain. Total nitrogen available for project is 50% higher than calculated required volume to account for losses during gas purge.
 - e. Turn off heating and mixing to allow tank to stratify. Allow 2 days (Owner).
- B. Phase 2 – Cleaning Primary Digester:
- 1. Purge Primary Digester and transfer sludge to Secondary Digester (Contractor and Owner).
 - a. Gas purge Primary Digester with a displacement purge until methane concentration is below 11% (Contractor, allow 2 days). Supply regulated nitrogen (13,000 cubic ft) to digester and operations/contractor will start pumping from Primary Digester through sludge screen and thickening then the digested sludge will go to secondary digester.

- b. Transfer seed sludge from Primary to Secondary Digester until sludge elevation is 20 ft or lower (Contractor and Owner, allow 4 days concurrent). All transferred sludge to be pumped through sludge screen. Contractor to pump 66,000 gallons through RDT to thicken to 6%TS to TWAS hopper and let 33,000 gallons bypass directly to the TWAS hopper. Secondary digester heating and mixing is off so that thickened sludge can be placed gently in the bottom of the secondary digester and clear water overflowed to the front of the plant for additional treatment. Owner will dewater as much sludge as possible without damaging process equipment, then Contractor can finish removing difficult material for truck hauling.
 - c. Open hatch and ventilate (intrinsically safe) when level in digester is below invert of hatch. (Contractor).
 - d. Truck/dewater remaining sludge off site to dewater Primary Digester (Contractor). Budget for 40,000 gallons of trucking and disposal with up to twice this volume at the same unit price.
 - e. Contractor may remove cover for rehabilitation during or after digester cleaning.
 - f. Contractor to maintain pump and sludge screening equipment with connections to thickening process during duration of primary digester cleaning so operators can maintain recuperative thickening process as needed for process requirements.
2. Start up and Monitor Secondary Digester (Contractor and Owner).
 - a. Restart Secondary Digester heating and mixing (Owner).
 - b. Run recuperative thickening until Secondary Digester has at least a 3% TS concentration (Contractor). This may require sludge screen to be left on site with a pump out of Secondary Digester through sludge screen and then into RDT to thicken to 6%TS to TWAS hopper (which is pumped back to digester). Owner to use this process to maintain digester 3%TS during Primary Digester work.
 - c. Dewater Secondary Digester to maintain digester elevation between 32.5 and 36.5 ft (Owner).
 - d. Transition all feed from Primary Digester to Secondary Digester (Owner).
 - e. Perform lab testing of Volatile Acids (VAs) and Alkalinity 3 times per week and pH twice a day (once in the morning and once in the afternoon) for 7 days. Submit the daily report results to Engineer (Owner).
 3. Clean and repair Primary Digester (Contractor).
 - a. Clean floor and walls of Primary Digester to sound concrete and coordinate with Engineer for inspection (Contractor).
 - b. Clean the following pipes and video document inside of clean pipe. Submit video to Engineer before request to start up subprocess (Contractor):
 - 1) Two bottom pipes to overflow box.
 - 2) Suction to sludge mixing pump, discharge from sludge mixing pump.
 - c. Repair cracks on the interior and exterior of Primary Digester that are marked to be repaired by Engineer after inspection (Contractor).
 - d. Clean Primary Digester cover and coordinate with Engineer for inspection. Sandblast and recoat per 09 96 00 and Engineer's instruction. Replace all elastomeric components and gaskets on cover (Contractor).
 - e. Perform all work shown on the Contract Documents for Phase 2 (Contractor).
 - 1) Replace valves and pipes that are indicated for work anytime during this phase and coordinate with Owner for specific shutdowns of sub-processes to replace valves associated with those processes that need to remain in service for the other digester. Valves supplied by owner.
 4. Purge Primary Digester and return to service (Contractor).
 - a. Contractor to reinstall finished digester cover.
 - b. Water test Primary Digester. Contractor to supply 130,000 gallons water from owner source, Owner to operate equipment, allow 1 week.

- c. Test mixing and heating functions and heat tank to 2°F above operating temperature of Primary Digester (Owner, allow 1 week).
 - d. Gas purge Primary Digester. Reduce the oxygen concentration to 7.2% (Contractor). Supply regulated nitrogen (13,000 ft³) to digester and operations will draw down tank through drain. Total nitrogen available for project use shall be 50% higher than calculated required volume to account for losses during gas purge.
 - e. Transfer sludge from Secondary to Primary Digester (Contractor/Owner, allow several 10,000-gallon pumping cycles for up to 4 weeks). Contractor to leave temporary pumping in place until operation is complete with required sludge transfer.
5. Start up and Monitor Primary Digester (Owner).
- a. Restart Primary Digester heating and mixing.
 - b. Perform lab testing of Volatile Acids (VAs) and Alkalinity 3 times per week and pH twice a day (once in the morning and once in the afternoon) for 3 months. Submit the daily report results to Engineer.
- C. During the 4-week shutdown of dewatering while primary digester is returned to normal service, perform work for Alternate 2 – Dewatering Building Improvements if alternate was awarded (dewatering area concrete deck, dewatering area structural beam repair, and drainpipe improvements).
- D. If Alternate 3 – Screw Press Room Improvements was awarded, work may be performed at any time in sequence.

END OF SECTION

SECTION 01 14 16
COORDINATION WITH OWNER'S OPERATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for coordinating with Owner's operations during the Project.
2. Requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Specifications section.

B. Scope:

1. This project requires the coordination and cooperation of work by the Contractor and Owner. Section 01 11 00 – Summary of Work outlines the relationships and expected time lines. Contractor shall cooperate with owner for the setup and operation of equipment and the duration of work required to allow next steps of project to proceed.
2. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with Owner's operations during the Work in accordance with this Specifications section.
3. Except for shutdowns specified in this Specifications section, perform the Work such that Owner's facilities remain in continuous, satisfactory operation during the Project. Schedule and perform the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, does not affect the public health, safety, welfare, and convenience, and does not adversely affect the environment resulting in violation of Laws or Regulations.
4. Work not specifically addressed in this Specifications section or in referenced sections may, in general, be performed, to be completed within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this section.

C. Related Requirements: Include but are not necessarily limited to:

1. Section 01 11 00 - Summary of Work.
2. Section 01 52 53 - Temporary Pumping.

1.2 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Specifications section have the meaning indicated below:
 - a. The term "Owner" is used throughout this section. When the facility is operated or managed by an entity other than Owner, references in this section to "Owner" as the operator or manager of the facility will be interpreted as referring to the facility manager.
 - b. A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, conduit (including piping and ducting), has to be temporarily suspended or taken out of service to perform the Work.
 - c. A "tie-in" is a connection of new Work to existing facilities, including connecting to existing conduits (including piping and ducting), electrical systems, structural

elements, process/mechanical elements, and other physical connections. Some tie-ins may require that the tie-in be made without an associated shutdown.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work indicated in this Section.

B. Sequencing and Scheduling:

1. Refer to this Specifications sections articles on sequencing, tie-ins, and shutdowns.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor, materials, and equipment required to safely perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to Engineer not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning Submittal.
2. Shutdown Notification:
 - a. After Engineer's acceptance of shutdown planning Submittal and prior to starting the shutdown, submit written notification to Owner and Engineer of date and time each shutdown is to start. Submit notification not less than 72 hours in advance of each shutdown. Shutdowns may need to be delayed if weather report indicates enough rain to create high plant flows.

1.5 GENERAL CONSTRAINTS

A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials and equipment may be used by Owner after the specified field quality control activities are successfully completed and the materials or equipment are substantially complete in accordance with the Contract Documents.

B. The following constraints apply to coordination with Owner's operations:

1. Operational Access: Owner's personnel shall have access to equipment and areas of the facility that remain in operation.
2. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, or holidays without prior approval of Owner, unless specifically indicated otherwise in the Contract Documents.
3. Dead End Valves or Conduits:
 - a. Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting.
 - b. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as necessary or as required by Engineer.

- c. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.
- 4. Owner will assist Contractor in dewatering process tanks, basins, conduits, digesters and other work areas to be dewatered for shutdowns. Maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
- 5. Draining and Cleaning of Conduits, Tanks, Digesters and Basins:
 - a. Unless otherwise shown or indicated in the Contract Documents, Contractor shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas.
 - b. Contractor may remove some liquids and solids and dispose of them at appropriate locations at the Site as directed by Engineer or Owner and Section 01 11 00 - Summary of Work.
 - 1) Pumping remaining contents after Owner dewatering from Secondary Digester to sludge hauling trucks for hauling and disposal in municipal wastewater treatment plant (WWTP). Pumping conditions will be as required to fill trucks and roughly the same elevation as bottom of digester. Include disposal at another WWTP in contract.
 - 2) Pumping contents of Primary Digester up to sludge screening equipment for cleaning of material to be discharged into TWAS hopper and rotary drum thickener for recuperative thickening process during startup of Secondary Digester. Contractor to assist in the phase of Owner dewatering with setup of Contractor-supplied rental equipment. Pumping conditions will be as required to discharge to sludge screen roughly 50 feet above bottom of digester at a rate not to exceed sludge screening equipment or ability of process to accommodate transfer of sludge.
 - 3) Pumping remaining contents after owner dewatering from Primary Digester to sludge hauling trucks for hauling and disposal in municipal wastewater treatment plant. Pumping conditions will be as required to fill trucks and roughly the same elevation as bottom of digester.
 - 4) Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred to existing process tanks or conduits at the Site with capacity sufficient to accept such discharges, using hoses, temporary piping, temporary pumps, and other means provided by Contractor. Discharge of fluids across floors is not allowed.
 - c. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by Engineer. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
 - d. Spillage shall be brought to Engineer's attention immediately, both orally and in writing, and reported in accordance with Laws and Regulations. Contractor shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by Engineer, Contractor shall remove spillage by other means, such as vacuum truck, sorbents, or other method acceptable to Engineer.

1.6 SEQUENCE OF WORK

- A. Sequence of Work is included in 01 11 00 – Summary of Work.

1.7 SHUTDOWNS

- A. Shutdowns shall be in accordance with Tables 01 14 16-A and 01 14 16-B of this Specifications section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
- B. Work that may interrupt normal operations shall be accomplished at times convenient to Owner unless otherwise indicated in the Contract Documents.
- C. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
- D. Fines and Penalties Imposed by Authorities Having Jurisdiction:
 - 1. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.
 - 2. Owner or Engineer may deduct as set-offs such amounts from payments due Contractor.
- E. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems may not be included in Table 01 14 16-A/B. Coordinate requirements for such shutdowns with Engineer and Owner. Where necessary, obtain Engineer's interpretation or clarification before proceeding.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SUBSTITUTE PROCEDURES

- A. Proposal of Substitute Sequencing, Shutdowns, and Tie-Ins:
 - 1. As a substitute to the procedures indicated in this Specifications section, Contractor may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.
 - 2. Engineer will consider proposals for substitute procedures after the Effective Date of the Contract. All Bids shall be based on the requirements of the Contract Documents, including this section.
 - 3. Substitution Requests:
 - a. When deviation from specified sequence or procedures is proposed, Contractor's proposal shall explain in detail the proposed sequence and procedures and associated effects, including evidence that Owner's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule.

3.2 GENERAL PROVISIONS FOR COORDINATING WITH OWNER'S OPERATIONS

- A. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on Owner's operations and processes.

- B. Operation of Existing Systems and Equipment during the Work:
 1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by Engineer in writing.
 2. Operation of existing systems and equipment will be by Owner unless otherwise specified or indicated.
 3. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both.
 4. Provide temporary watertight plugs, bulkheads, and line stops as necessary and as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.
- C. Bypassing:
 1. Diversion of flows around treatment processes is not allowed.
- D. Requirements for temporary pumping are in Section 01 52 53 - Temporary Pumping. Requirements for temporary pumping associated with specific shutdowns are indicated in this Section.
- E. Performing the Work of this section constitutes Contractor's approval of underlying work and field conditions prevailing at the time of the Work.

3.3 PREPARATION

- A. Shutdowns - General Preparation:
 1. Coordinate shutdowns with Owner and Engineer.
 2. Submit shutdown planning Submittals and shutdown notification Submittals in accordance with this Specifications section's "Submittals" Article.
 3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with such requirements before commencing the shutdown.
 4. Engineer shall have no duty to Contractor to advise Contractor of inadequate preparations by Contractor; Contractor is solely responsible for the means, methods, procedures, techniques, and sequences of construction.
 5. 24-48 hours ahead of shutdown of process or sub-process, Contractor to pre-position equipment and materials close to works areas and host a walkthrough of shutdown with operators to demonstrate readiness.
- B. Shutdowns of Electrical Systems:
 1. Comply with Laws and Regulations, including the National Electric Code.
 2. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before starting other Work associated with the shutdown.
 3. Upon completion of shutdown Work, remove the locks and tags and advise Engineer or Resident Project Representative (RPR) that facilities are available for use.

3.4 DETAILED SHUTDOWN REQUIREMENTS

- A. Shutdown A: Secondary Digester Out of Service for Cleaning
 1. General:

- a. Affected Equipment Operating Prior to Shutdown: Secondary Digester Heating and Mixing, and overflow pipe to Digester. Dewatering feed process.
 - b. Equipment Operating During Shutdown: In accordance with Table 01 14 16-A of this Specifications section.
 - c. Equipment Out of Service During Shutdown: In accordance with Table 01 14 16-A of this section.
 - d. Impact on Other Equipment and Processes: Primary Digester will need to directly feed dewatering.
 - e. Procedure: Gas purge Secondary Digester and pump contents to dewatering process. Pump remaining sludge to trucks for transport to other municipal wastewater treatment plant. .
 - f. Dates: Shutdown shall be accomplished within 2 months.
2. Temporary Pumping: Provide temporary pumping system, including controls, as follows:
 - a. Purpose: Pump discharge with local controls to hauling trucks.
 - b. System Capacity: Contractor discretion, 500 GPM at similar elevation.
 - c. Fluid Pumped: Digested sludge with rags and plastic contamination. Ammonia odor, pH 6.8-7.2, total solids between 1% and 3% depending on water added by Contractor. Digested sludge can produce methane gas that can accumulate in pipes and tanks.
 - d. Controls: to start and stop pump while in communication with truck driver to prevent overfilling and spills.
 - e. Suction Location: pipe connected to bottom of digester.
 - f. Discharge Location: waiting truck under contract by Contractor.
 - g. Flow Meter: Totalizer of material pumped to trucks.
 3. Prior to Shutdown:
 - a. Obtain Engineer's acceptance of proposed shutdown planning Submittal and shutdown notification Submittal.
 - b. Bring necessary piping, couplings, valves, equipment, and appurtenances to the work areas.
 - c. Assist Owner in preparing to take equipment, tanks, basins, and conduits (including piping and ducting) temporarily out of service.
 - d. Coordinate other tie-ins to be performed simultaneously.
 - e. Install, check, and test the temporary pumping system.
 4. During Shutdown:
 - a. Place temporary pumping system into operation.
 - b. Dewater the Secondary Digester.
 - c. Remove existing solid and liquid material as required.
 - d. Coordinate sub-process shutdowns of no longer than one working day duration each to replace valves listed in the drawing set.
 - e. With Owner, return equipment and system to operation.
 5. Following Shutdown:
 - a. Verify functionality of equipment and systems.
 - b. Verify operation of new equipment and systems and verify that joints in conduits (including piping and ducting) are watertight or gastight as applicable.
 - c. Repair joints that are not watertight or gastight, as applicable.
 - d. Remove temporary pumping system and appurtenances.

B. Shutdown B: Primary Digester Out of Service for Cleaning

1. General:
 - a. Affected Equipment Operating Prior to Shutdown: Primary Digester Heating and Mixing, and overflow pipe to Digester. Dewatering feed process. Secondary Digester Startup.
 - b. Equipment Operating During Shutdown: In accordance with Table 01 14 16-B of this Specifications section.
 - c. Equipment Out of Service During Shutdown: In accordance with Table 01 14 16-B of this section.
 - d. Impact on Other Equipment and Processes: Secondary Digester will need to received feed directly, have heating and mixing systems working properly, and have recuperative thickening, and directly feed dewatering.
 - e. Procedure: Bring Secondary Digester into service and gas purge out of service Primary Digester and pump contents to dewatering process and temporary screening. Pump remaining sludge to trucks for transport to other municipal wastewater treatment plant.
 - f. Maintain temporary screen for recuperative thickening while Primary Digester is out of service.
 - g. Dates: Shutdown shall be accomplished within 1 month.
2. Temporary Pumping: Provide temporary pumping system, including controls, as follows:
 - a. Purpose: Pump discharge of Primary Digester to temporary screening. Pump discharge with local controls of Primary Digester to hauling trucks. Pump discharge of Secondary Digester to temporary screen and thickening process.
 - b. System Capacity: Contractor discretion, 200 GPM at 50 ft elevation gain. 500 GPM at similar elevation.
 - c. Fluid Pumped: Digested sludge with rags and plastic contamination. Ammonia odor, pH 6.8-7.2, total solids between 1% and 3% depending on water added by Contractor. Digested sludge can produce methane gas that can accumulate in pipes and tanks.
 - d. Controls: to start and stop pump while in communication with truck driver to prevent overfilling and spills.
 - e. Suction Location: pipe connected to bottom of digester.
 - f. Discharge Location: waiting truck under contract by Contractor or sludge screening process under contract by Contractor.
 - g. Flow Meter: Totalizer of material pumped to trucks.
3. Prior to Shutdown:
 - a. Obtain Engineer's acceptance of proposed shutdown planning Submittal and shutdown notification Submittal.
 - b. Bring necessary piping, couplings, valves, equipment, and appurtenances to the work areas.
 - c. Assist Owner in preparing to take equipment, tanks, basins, and conduits (including piping and ducting) temporarily out of service.
 - d. Make connection for screened sludge into RDT thickening process.
 - e. Coordinate other tie-ins to be performed simultaneously.
 - f. Install, check, and test the temporary pumping system.
4. During Shutdown:
 - a. Place a temporary pumping system into operation.

- b. Dewater the Primary Digester and pump to solids screening equipment to seed and support the startup of the Secondary Digester.
 - c. Remove existing solid and liquid material as required.
 - d. Supply rented screening equipment to clean sludge prior to thickening with existing plant process.
 - e. Coordinate sub-process shutdowns of no longer than one working day duration each to replace valves listed in the drawing set.
 - f. With Owner, return equipment and system to operation.
5. Following Shutdown:
- a. Verify functionality of equipment and systems.
 - b. Verify operation of new equipment and systems and verify that joints in conduits (including piping and ducting) are watertight or gastight as applicable.
 - c. Repair joints that are not watertight or gastight, as applicable.
 - d. Remove temporary pumping system and appurtenances.

3.5 ATTACHMENTS

- A. The following, bound after this Specifications Section's "End of Section" designation, are part of this Specifications Section:
- 1. Tables:
 - a. Table 01 14 16-A, Schedule of Shutdowns During Secondary Digester Cleaning (1 page).
 - b. Table 01 14 16-B, Schedule of Shutdowns During Primary Digester Cleaning (1 page).

END OF SECTION

| Table 01 14 16-A | | | | |
|---|---|---|---|----------------------------|
| Schedule of Shutdowns During Phase 1 – Cleaning Secondary Digester | | | | |
| Shutdown No. | Process Equipment and Service Lines Out-of-Service During Shutdown | Process Equipment In Operation During Shutdown | Tie-In Nos. | Maximum Duration |
| A | Shutdown Secondary Digester for cleaning | Facilities required for Primary Digester | Seven valves while digester is out of service | 2 months, including below |
| A.1 | Sub-process shutdown of feed and heating shutdown | | Five valves, demolish two | During one-day shutdown(s) |
| A.2 | Sub-process shutdown of dewatering | | Four valves | During one-day shutdown(s) |
| A.3 | Sub-process shutdown of digester mixing | | One valve | During one day shutdown |

| Table 01 14 16-B | | | | |
|---|---|---|---|----------------------------|
| Schedule of Shutdowns During Phase 2 – Cleaning Primary Digester | | | | |
| Shutdown No. | Process Equipment and Service Lines Out-of-Service During Shutdown | Process Equipment In Operation During Shutdown | Tie-In Nos. | Maximum Duration |
| B | Shutdown Primary Digester for cleaning | Facilities required for Secondary Digester | Twelve valves and one flexible expansion joint while digester is out of service | 1 months, including below |
| B.1 | Sub-process shutdown of feed and heating shutdown | | One valve | During one-day shutdown(s) |

SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General requirements applicable to all bid/pay items.
 2. General provisions on unit prices and quantities.
 3. General provisions on lump sums.
 4. Listing of the various bid/pay items in the Project, together with criteria for measuring Unit Price Work for payment.
- B. Related Requirements:
1. Include but are not necessarily limited to:
 - a. Section 01 23 00 - Alternates.
 - b. Section 01 26 00 - Contract Modification Procedures.
 - c. Section 01 29 73 - Schedule of Values.
 - d. Section 01 29 76 - Progress Payment Procedures.

1.2 REQUIREMENTS APPLICABLE TO ALL BID/PAY ITEMS

- A. In this Section and elsewhere in the Contract Documents, the terms “bid item”, “pay item”, “bid/pay item”, “Item” followed by a number designation, “this item”, and the like all have the same meaning, and refer to one or more specific elements of the Contract, established for pricing and payment, as indicated in the Bid Form and in the Agreement (or exhibit to the Agreement) at the time the Contract was signed by the parties.
- B. This Article applies to all bid/pay items in the Contract.
- C. Prices – General:
1. The bid/pay items listed starting with Article 1.5 of this Section refer to and are the same bid items listed in the Bid Form and included in the Contract, and constitute all bid/pay items for the Work at the time the Contract was signed by the parties.
 2. No direct or separate payment will be made, outside of the bid/pay items in the Contract, for the following: providing miscellaneous temporary or accessory materials or equipment, temporary works, temporary construction facilities, Contractor’s project management, superintendence, and similar costs for Subcontractors or Suppliers; bonds and insurance; schedules and schedule updates; coordination (with: Owner’s operations (including, but not limited to, lockout/tag-out procedures), other contractors, utility owners, owners of transportation facilities, adjacent property owners and occupants, authorities having jurisdiction, Subcontractors and Suppliers, and others with whom Contractor is to coordinate the Work); information technology systems required by the Contract Documents; Submittals; photographic documentation; Project meetings; Contractor’s hazard communication program; Contractor’s compliance with environmental procedures for Constituents of Concern (including spill control and countermeasures plans and implementation); professional services (required for Contractor’s means and methods of construction, and for delegated designs required by the Contract Documents); obtaining and complying with permits and licenses; temporary utilities (including electric power, water supply and disposal, fuel, and communications); temporary lighting; temporary fire protection; temporary enclosures and HVAC; temporary sanitary facilities; temporary first-aid facilities and services; ; Contractor’s field offices and sheds, Engineer’s field offices (when required elsewhere in the Contract Documents); temporary vehicular access and parking (including access to the Site, temporary access roads and parking, onsite traffic controls for construction traffic, and offsite haul routes); traffic control of non-construction vehicular and pedestrian traffic; temporary controls (including temporary erosion and sediment controls, noise control, control of storm water, surface water, and groundwater,

pollution controls (including solid waste control, water pollution control, and control of atmospheric pollution), dust control, pest and rodent controls, odor controls, and other temporary controls required by the Contract Documents); temporary security for the Work; temporary barriers; Project signage (when required elsewhere in the Contract Documents); delivering, handling, and storing materials and equipment to be incorporated into the Work; layouts and surveys for the Work; construction equipment, machinery, tools, and vehicles; safety and protection; Site maintenance during construction; cleaning and removal and disposal of waste and debris; checkout and startup; testing and other quality control activities required by the Contract Documents; record documents, operation and maintenance data; warranties; spare parts and extra materials required by the Contract Documents; instruction of facility personnel as required by the Contract Documents; commissioning (when required elsewhere in the Contract Documents); Contractor's correction period, Contractor's general warranty and guarantee; Contractor's indemnification obligations; other labor, cost, or effort required by the General Conditions and Supplementary Conditions, Division 01 Specifications, and other requirements of the Contract Documents.

3. Price Escalation:

- a. Unless expressly indicated otherwise in the Contract Documents, Owner is not obligated to change the stipulated prices (including lump sums, unit prices, and allowances) that are all or part of the Contract Price because of escalation of costs when there is no corresponding change in the Contract Times.
 - b. Changes in the Contract Times do not necessarily entitle Contractor to a change in Contract Price due to escalation.
 - c. Should Contractor claim a change in Contract Price for one or more stipulated price pay items without a corresponding change in scope, extent, or quality in the associated Work, prior to receiving any such change in Contract Price, Contractor shall submit with Contractor's associated Change Proposal, documentation satisfactory to Engineer supporting and documenting that Contractor's costs have increased because of delays beyond Contractor's control within the associated change in Contract Times included in such Change Proposal.
4. Compensation for all services, labor, materials, and equipment shall be included in prices stipulated for the lump sum and unit price bid/pay items in the Contract.
 5. Each lump sum and unit price in the Contract shall include an amount considered by Contractor as sufficient for all overhead and profit for each separately identified bid/pay item.

D. Contract Price, Payment Procedures, and Related Matters:

1. Contract Price: The Contract Price, as apportioned among bid/pay items in the Contract, is indicated in the Agreement and any associated exhibits thereto and may be modified by Change Order.
2. Payments to Contractor: Refer to the General Conditions (as may be modified by the Supplementary Conditions), the Agreement (including provisions on retainage, if any), and Section 01 29 76 - Progress Payment Procedures, among other applicable Contract Documents.
3. Schedule of Values: Refer to the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 29 73 - Schedule of Values.
4. Procedures for Changes in Contract Price: Refer to the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 26 00 - Contract Modification Procedures.
5. Alternates: The scope and limits of alternates, when contemplated for or included in the Contract, may be addressed, in whole or in part, in Section 01 23 00 - Alternates.
6. Defective Work is not eligible for payment.

1.3 GENERAL PROVISIONS ON UNIT PRICES AND QUANTITIES

A. Quantities:

1. Quantities of Unit Price Work indicated in the Bid Form and in the Contract (at the time the Agreement was signed by the parties) are estimates for purposes of pricing and comparison of Bids.
 2. Owner does not represent, either expressly or by implication, or agree that the nature of materials encountered below ground surface or in concealed areas, or actual quantities of Unit Price Work required, will correspond with the quantities in the Contract at the time the Agreement was signed by the parties. Owner reserves the right to increase or decrease quantities, and to eliminate quantities, as Owner may deem necessary or as may be necessary due to Site conditions encountered.
 3. Adjustment of Unit Prices Due to Variation in Quantities:
 - a. Provisions, if any, regarding adjustment of unit prices due to variations in actual quantities (eligible for payment) from the estimated quantities in the Contract (including quantities at the time the Agreement was signed by the parties and as subsequently modified by Change Order) are in the General Conditions, as may be modified by the Supplementary Conditions.
 - 1) Engineer's review for possible unit price adjustment, when provision for such adjustment is expressly indicated in the Contract, will be at a time Engineer deems reasonable and proper.
 - 2) When the Supplementary Conditions establish that, to be eligible for an adjustment in the unit price, a pay item of Unit Price Work must have a total computed, extended price (at the time the Agreement was signed by the parties) equal to or greater than a specified percentage (stipulated in the Supplementary Conditions) of the total Contract Price (at the time the Agreement was signed by the parties), and the total extended price of such pay item does not exceed the stipulated percentage of the Contract Price, then the associated pay item will be paid at the unit price in the Contract without adjustment for variations in actual quantity.
 4. Quantities eligible for payment will be actual quantities furnished and installed (as applicable) in accordance with the Contract Documents, within the pay limits shown or indicated, as measured by Engineer (or other entity so empowered in the Contract Documents), and recommended for payment by Engineer.
 5. At Contractor's expense, Contractor may independently verify quantities measured by Engineer for payment. Should Contractor disagree with quantities measured and recommended for payment by Engineer, submit appropriate Change Proposal (appealing Engineer's measurements) indicating the specific reasons for Contractor's appeal, with detailed reasons therefor and associated calculations and estimates, in accordance with the Contract Documents.
 6. Quantity OVERRUNS:
 - a. When the quantity of a pay item of Unit Price Work eligible for payment exceeds the pay item's quantity included in the Contract, Owner will pay for quantities that exceed those in the Contract only while the estimated total payments to Contractor under the Contract will not exceed the Contract Price. Otherwise, a Change Order is required to modify the associated quantity in the Contract, thus changing the Contract Price.
 7. Except as may be established elsewhere in the Contract Documents, make no claim for anticipated profit, loss of profit, damages, or additional compensation arising from difference between quantities of Unit Price Work eligible for payment and the estimated quantities in the Contract.
- B. Measuring for Payment:
1. At Engineer's option, Engineer may delegate to Resident Project Representative (RPR) (if any), some or all of Engineer's responsibilities for measuring Unit Price Work eligible for payment.
 2. Unless expressly indicated otherwise in the Contract Documents, measurements will be in United States standard measurements.
 3. Unless indicated otherwise elsewhere in the Contract Documents, quantities of Unit Price Work eligible for payment will be rounded to the nearest whole number.
 4. In the event of conflict between this Section and the measurement criteria in the Specifications of Divisions 02-49, the measurement criteria in this Section will govern.

Typical intent when measurement criteria are in both this Section and the associated Division 02-49 Specifications section, is for the criteria to be interpreted together.

5. Assistance with Measurements:
 - a. Assist Engineer and Resident Project Representative (RPR) (if any), by providing measuring equipment, labor, and survey personnel necessary to measure quantities eligible for payment.
6. Quantities eligible for payment can be adjusted by Engineer to correct quantities included in Contractor's prior payment requests, and for incomplete or defective Unit Price Work. Such corrections are at Engineer's sole discretion.

1.4 GENERAL PROVISIONS ON LUMP SUM ITEMS

- A. Progress payments for Work paid on a lump sum basis will be based on Engineer's estimate of the Work (in accordance with the Contract Documents) performed through the end of the associated pay period, based on the Schedule of Values accepted by Engineer in accordance with the Contract Documents.
- B. At its sole discretion, Engineer may correct amounts of lump sum Work included in prior payment requests based on improved data or information available to Engineer, or Engineer's knowledge or reasonable belief that Work is incomplete or defective.

1.5 BID/PAY ITEMS – GENERAL CONTRACT

- A. Base Bid – Digester Cleaning & Improvements:
 1. Measurement: As indicated in the Agreement and in Section 01 11 00 – Summary of Work, the Contract includes in this item a stipulated amount available as reserve for sole use by Owner, for costs authorized by Owner during construction, for Work not included under other bid/pay items.
 2. Payment: Payment for Work authorized and performed under this item will be full compensation for providing all Work authorized under this allowance, complete as shown, indicated, or directed by Engineer in accordance with the associated allowance authorizations.
- B. Alternate 1 – Grinder Replacement:
 1. Measurement: As indicated in the Agreement and in Section 01 23 00 – Alternates, the Contract includes in this item a stipulated amount available as reserve for sole use by Owner, for costs authorized by Owner during construction, for Work not included under other bid/pay items.
 2. Payment: Payment for Work authorized and performed under this item will be full compensation for providing all Work authorized under this allowance, complete as shown, indicated, or directed by Engineer in accordance with the associated allowance authorizations.
- C. Alternate 2 – Dewatering Building Improvements:
 1. Measurement: As indicated in the Agreement and in Section 01 23 00 – Alternates, the Contract includes in this item a stipulated amount available as reserve for sole use by Owner, for costs authorized by Owner during construction, for Work not included under other bid/pay items.
 2. Payment: Payment for Work authorized, and performed under this item will be full compensation for providing all Work authorized under this allowance, complete as shown, indicated, or directed by Engineer in accordance with the associated allowance authorizations.
- D. Alternate 3 – Screw Press Room Improvements:
 1. Measurement: As indicated in the Agreement and in Section 01 23 00 – Alternates, the Contract includes in this item a stipulated amount available as reserve for sole use by Owner, for costs authorized by Owner during construction, for Work not included under other bid/pay items.
 2. Payment: Payment for Work authorized and performed under this item will be full compensation for providing all Work authorized under this allowance, complete as shown,

indicated, or directed by Engineer in accordance with the associated allowance authorizations.

E. Unit Price Bid Item 1 – Dewatering:

1. Measurement:
 - a. Dewatering sludge that will be paid under this item will be measured per thousand gallons of sludge removed from digester.
2. Item Includes (all in accordance with the Contract Documents):
 - a. Pumping, hauling, and dumping sludge at a nearby WWTP.
3. Not included in this bid/pay item:
 - a. Any fees or fines from spilling or dripping sludge during pumping, hauling, or dumping.
 - b. Disposing of hose water for cleaning.
 - c. Prices to haul sludge to excessively far dump sites or to haul excessively empty trucks.

F. Unit Price Bid Item 2 – Nitrogen Gas:

1. Measurement:
 - a. Nitrogen that will be paid under this item will be measured either per cubic foot pumped out of truck or per cubic foot of nitrogen cannister supplied to Site. Nitrogen volume is estimated to be at least 34,000 cubic feet and could go up to 51,000 cubic feet total.
 - b. Nitrogen can be supplied via trucks or cannisters.
2. Item Includes (all in accordance with the Contract Documents):
 - a. Purchasing and pumping nitrogen.
3. Not included in this bid/pay item:
 - a. Mobilization or demobilization of nitrogen supplier.
 - b. Heat exchanger necessary to bring nitrogen to above freezing temperature. Hoses and fitting to deliver nitrogen to process.
 - c. Any excess nitrogen left in truck if supplying nitrogen by truck.
 - d. Any unused/unopened nitrogen cannisters if supplying nitrogen by cannisters (do not open a new cannister if there is an existing, opened cannister with nitrogen still in it).

G. Unit Price Bid Item 3 – Crack Repair:

1. Measurement:
 - a. Crack repair that will be paid under this item will be measured per linear foot of crack repaired on the Digester. Confirm with Engineer which cracks to repair prior to work.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 23 00 ALTERNATES

1.1 SUMMARY

A. Section Includes:

1. Section identifies each alternate and describes the basic changes that shall be incorporated into the Work when that alternate is made part of the Work.

B. Scope:

1. When alternate item(s) are included in the Work as awarded by Owner, the Contractor shall provide all labor, materials, equipment, tools, and incidentals required to provide the Work included under the alternate(s) so awarded.

1.2 ADMINISTRATIVE PROCEDURES

A. Coordination:

1. Contractor shall coordinate related Work as required to complete the Work under each alternate included in the Work. Include as part of each alternate miscellaneous devices, accessories, and similar items incidental to or required for a complete installation whether or not shown or indicated as part of the alternate.
2. Notification: Immediately following award of the Contract, notify in writing each Subcontractor and Supplier involved of the status of each alternate item. In such notice, indicate which alternate items have been accepted, rejected, or deferred for later consideration, and include complete description of negotiated modifications to alternates.

1.3 DESCRIPTION OF ALTERNATES

A. Alternate No. 1 – Grinder Replacement:

1. Description: All work shown on Drawings X103, D103, and E101-106, including:
 - a. Demolish existing and install new in-line sludge grinder, piping, valve, associated concrete, and vendor control panel.
2. Refer to Section 46 24 23 – Sludge Grinder and Section 26 09 16 – Control Equipment Accessories.

B. Alternate No. 2 – Dewatering Building Improvements:

1. Description: All work shown on Drawings X104, D104, and S102, including:
 - a. Demolish concrete shown on Drawings.
 - b. Install 4" wide trench drain and 12"x12" drain box. Connect trench drain to drain box and then to existing drain box as shown in Drawings.
 - c. Install SST guiderails for dewatered sludge hopper/dumpster.
 - d. Pour, form and grind concrete as specified in Drawings.
 - e. Repair concrete structural beam.
2. Refer to Section 03 00 05 – Concrete and Section 05 50 00 – Metal Fabrications.

C. Alternate No. 3 – Screw Press Room Improvements:

1. Description: All work shown on Drawings X105, D105, and S103, including:
 - a. Contact FKC to replace panel 2 of screw press.
 - b. Install foul air duct and connect to existing. Design and install pipe support system. Install rigid foul air duct drop legs as specified in Drawings.
 - c. Demolish elbow under screw press and replace with tee.
 - d. Install guardrails around screw press.
 - e. Design and install replacement FRP grating and support.

2. Refer to Section 06 82 00 – Fiberglass Reinforced Plastic Fabrications, Section 40 05 07 – Pipe Support Systems, and Section 05 52 46 – Mechanically Fastened Aluminum Railings.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements applicable to all substitution requests.
 2. Provisions specific to Contractor's substitution requests for:
 - a. Materials and equipment to be incorporated into the Work.
 - b. Methods, procedures, and sequences indicated in the Contract Documents.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals, and pay all costs associated with requests for approval of substitutes.
 2. Where the Contract Documents expressly indicate that substitutes are not allowed, are unacceptable, or time-barred, do not submit substitution requests for such items or procedures.
 3. Requirements for Contractor's proposal of "or-equals", where allowed by the Contract, are in Section 01 62 00 - Product Options, and the General Conditions, as may be modified by the Supplementary Conditions.
- C. Related Requirements:
1. Include, but are not necessarily limited to:
 - a. Section 01 26 00 - Contract Modification Procedures.
 - b. Section 01 62 00 - Product Options.

1.2 REFERENCES

- A. Terminology:
1. The following terminology, although not indicated with initial capital letters, has the following meaning in this Section:
 - a. "Or-equal" and "or equal" each means material or equipment items to be incorporated into the completed Work as a functioning whole, or method, procedure, or sequence that, in Engineer's sole opinion, are equivalent to that shown or indicated in the Contract Documents.
 - b. "Substitute" means a proposed materials or equipment to be incorporated into the completed Work as a functioning whole, or a proposed construction method, procedure, or sequence that is not, in Engineer's sole opinion, equivalent to the associated, similar material or equipment item or method, procedure, or sequence shown or indicated in the Contract Documents, but accomplishes the same or similar purpose. Unless expressly indicated otherwise in the Contract Documents, Contractor's proposals for "value engineering" (and similar terms) are substitutes.
 - c. "Substitution request" means Contractor's written request for Engineer's approval of a proposed substitute, in accordance with this Section. Substitution requests are separate from Shop drawings and other Submittals required by the Contract Documents.

1.3 SUBSTITUTES - GENERAL

- A. This Article applies to all substitutes and substitution requests, whether for substitute materials or equipment, or for substitute methods, procedures, or sequences.

- B. This Section expands on the provisions on substitutes in the General Conditions, as may be modified by the Supplementary Conditions.
- C. Time Limits for Submitting Substitution Requests:
1. Where the Contract allows Contractor's substitution requests, such proposals will be considered by Engineer only during a period of 30 days after the date the Contract Times start to run, unless otherwise indicated.
 2. Substitution requests will be accepted for consideration by Engineer after the time limit indicated in the paragraph above this, when materials or equipment shown or indicated, and all associated "or-equals", are either:
 - a. Unavailable; or
 - b. Despite Contractor's due diligence, are unavailable in time for the Work to be completed within the Contract Times.
 3. The foregoing notwithstanding, substitutes will not be approved when received by Engineer after Contractor has commenced the associated Work at the Site, where approval of the substitute would require rework or removing Work already installed.
- D. Design Professional:
1. Engineer is responsible for design of the completed Project as a functioning whole and has responsible charge of the Project except for Work for which design responsibility is expressly delegated by the Contract Documents.
 2. Do not retain services of any third-party design professional to prepare modifications of Engineer's design of the completed Project as a functioning whole without Engineer's express, written consent via an appropriate Contract modification setting forth appropriate performance and design criteria for delegating the design of the substitute.
- E. Contractor's Representations:
1. In submitting each substitution request, Contractor represents that:
 - a. Contractor has read and understands the Contract's provisions on substitutes, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, this Section, and elsewhere in the Contract Documents.
 - b. Substitution request is complete and includes all documents and information required by the Contract Documents.
 - c. Contractor certifications required by the General Conditions, as may be modified by the Supplementary Conditions, and this Section are valid and made with Contractor's full knowledge, information, and belief.
 - d. Contractor will provide the same or better guarantees and warranties for substitute as for the specified materials, equipment, methods, procedures, and sequences (as applicable).
 - e. Contractor waives all rights for increasing the Contract Price or extending the Contract Times, related to the substitute, that subsequently may become apparent to Contractor after issuance of the associated Contract modification instrument approving such substitute, except for those associated with differing subsurface or physical conditions or discovery of a previously unforeseen Hazardous Environmental Condition associated with the Work involving the approved substitute.
- F. Submittal of Substitution Requests - General:
1. Substitution requests must be submitted by Contractor. Engineer will not accept or review substitution requests from prospective or bona-fide Subcontractors or Suppliers.
 2. Submit separate substitution request for each proposed substitute.

3. Submit substitution requests in accordance with requirements for Shop Drawings and other Submittals, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, Section 01 33 00 - Submittal Procedures, and Section 01 31 26 - Electronic Communication Protocols.
 4. Do not submit substitution requests as any of the following (such substitution requests will be returned by Engineer without review):
 - a. Shop Drawing, Sample, or other Submittal.
 - b. Request for approval of an "or-equal".
 - c. Request for interpretation (RFI) or clarification.
 - d. Change Proposal without all other, required substitution request elements indicated below.
 - e. Other oral or written communication not in accordance with this Section.
 5. Each substitution request shall include:
 - a. Transmittal letter (one per substitution request) expressly indicating the communication is a substitution request.
 - b. Completed substitution request form, on the form attached to this Section.
 - c. Change Proposal, submitted in accordance with the Contract Documents, including Section 01 26 00 - Contract Modification Procedures. Clearly indicate the proposed changes in Contract Price and Contract Times if substitute is approved; if none, clearly so indicate on the Change Proposal.
 - d. Certifications and written representations required by the Contract Documents to accompany substitution requests.
 - e. Other information: (1) required elsewhere in this Section and in other elements of the Contract Documents, and (2) deemed appropriate by Contractor to support Contractor's substitution request.
 6. When Engineer requires additional information to evaluate a substitution request, furnish such information within five days of receipt of Engineer's request, unless additional time is granted by Engineer, in writing.
 7. Engineer and Owner have the right to rely upon the completeness and accuracy of information, documents, certifications, and representations in Contractor's substitution request. Contractor accepts full responsibility for completeness and accuracy of substitution requests (except for Engineer's professional liability).
- G. Engineer's Review of Substitution Requests:
1. Engineer has no obligation to approve any substitute.
 2. Substitutes will not be approved unless all of the following are satisfied for the associated substitute:
 - a. The Contract supports submittal of such substitution request; and
 - b. Substitute is reasonably consistent with Engineer's design intent for the Project as a completed, functioning whole; and
 - c. As indicated in Paragraph 1.3.A.3 of this Section.
 - d. Substitute will not have an adverse effect on the work of other contractors, or existing or proposed construction; and
 - e. Substitution request is complete in accordance with the Contract Documents and Engineer's requests, and
 - f. Owner agrees to the substitute; and
 - g. Associated changes in Contract Price and Contract Times, if any, are acceptable to Owner.
 3. Engineer is not obligated to approve any substitute where such approval is conditioned on an increase in the Contract Price, the Contract Times, or both.
 4. Timeliness of Engineer's Review:

- a. Allow not less than 14 days for Engineer's review of each substitute. Allow longer for larger, more-complex substitutes.
 - b. Engineer will endeavor to perform timely review of substitution requests. However, Contractor is responsible for complying with the Contract Times, regardless of whether the substitute is approved.
 - c. Where approval of a substitute would necessitate other changes to the Project's design, additional time, beyond that indicated above, will be necessary for Engineer's preparation of revisions to the design.
5. When Design Changes are Required with Approval of Substitute:
- a. Engineer will advise Contractor promptly following Engineer's review (and Owner's comment, if any) on substitution request to indicate whether the substitute will be acceptable. Engineer's advisory to Contractor will indicate whether changes in Engineer's design are necessary and include a preliminary estimate of Engineer's fee and time required for modifying the design and preparing an associated Proposal Request to Contractor.
 - b. Engineer's preliminary estimates of fee and time for design modifications will be prepared in good faith, but are not binding on Owner or Engineer.
 - c. Contractor shall reimburse Owner for costs incurred by Owner for design modifications necessitated by approval of substitute. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor under the Contract.
 - d. Upon Contractor's receipt of Engineer's estimate of fee and time for design modifications, contractor shall advise Engineer, in writing, within three days whether Contractor will continue pursuing approval of the substitute.
 - e. Request to Contractor.
 - f. Engineer may reject a substitute that would require substantial changes in the Project's design.

H. Approval of Substitutes:

- 1. Substitutes are approved only via issuance of an appropriate Field Order or Change Order in accordance with Section 01 26 00 - Contract Modification procedures, and the General Conditions, as may be modified by the Supplementary Conditions.
- 2. Approval of a substitute does not relieve Contractor from obligation to comply with the Contract Documents, including submitting Shop Drawings, Samples, and other Submittals in accordance with the Contract Documents.

1.4 SUBSTITUTE MATERIALS AND EQUIPMENT

A. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute materials or equipment shall include:

- 1. Manufacturer and Location:
 - a. Name and address of manufacturer of the proposed substitute. Indicate country where manufacturer is incorporated and owned.
 - b. Companies and brands owned by or affiliated with manufacturer.
 - c. Name of manufacturers of principal component items, such as motors, bearings, and similar items.
 - d. Location where the items would be manufactured, including country and address. Indicate the total percentage of the items' value that will be manufactured outside of the United States and its territories.
 - e. Name, address, and driving distance from the Site of:
 - 1) Manufacturer's sales representative.
 - 2) Nearest service center offering full array of service capabilities.

- 3) Warehouse or other location where spare parts for the proposed substitute are available.
- f. Number of years that manufacturer has actively participated the North American market.
- 2. Proposed Materials and Equipment:
 - a. Model designation and quantity of each proposed for the Work.
 - b. Manufacturer's literature for proposed substitute, with description of the materials and equipment.
 - c. Performance information and representative test data.
 - d. Indication of reference standards with which materials and equipment comply.
 - e. Preliminary process and instrumentation diagrams (P&ID), where applicable.
 - f. Identification of hazardous materials, including Constituents of Concern, used in the materials and equipment, and associated permitting or licensing required.
 - g. Manufacturer's standard warranty and applicable, proposed special or extended warranties, including indication of specific entities that will be beneficiary of such warranties.
 - h. Complete list of proposed deviations from requirements of the Contract Documents.
 - i. Itemized comparison of specified materials and equipment and proposed substitute, indicating:
 - 1) Size (physical dimensions) when: item is in use, when not in use, and space required for routine and major maintenance.
 - 2) Weight and loading at supports, when item is full and empty.
- 3. Operation requirements, including:
 - a. Anticipated consumption of each item of: Electricity, other energy sources, water, chemicals (indicate each), and other needs for operation at the Site.
 - b. Typical labor required for operation and associated skill level.
 - c. Description of remote monitoring and control capabilities, as applicable.
- 4. Maintenance requirements, including:
 - a. Anticipated life in the service and environment required.
 - b. Frequency and general scope of routine and major maintenance typically necessary.
 - c. Typical labor requirements and general qualifications of personnel performing routine maintenance.
 - d. Major, associated equipment necessary for routing and major maintenance, including hoisting equipment type and capacity (when applicable).
 - e. Availability, scope, cost, and general conditions of service and maintenance contracts, if any.
- 5. References for similar projects on which the materials and equipment were used. Indicate for each:
 - a. Project owner name, name of facility where installed, and name of project.
 - b. City, state, and country of installation.
 - c. Model number/size and quantity furnished and installed.
 - d. Year of installation.
 - e. Contact information for owner and design professional, including telephone numbers.
- 6. Other information required by the Contract Documents.
- 7. Other information reasonably requested by Engineer.

1.5 SUBSTITUTE CONSTRUCTION METHODS, PROCEDURES, OR SEQUENCES

- A. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding substitutes of materials and equipment are hereby extended to apply to substitute methods, procedures, and sequences as shown or indicated in the Contract Documents.
- B. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute methods, procedures, or sequences shall include:
 - 1. Clear identification of the method, procedure, or sequence shown or indicated in the Contract Documents for which substitute is requested.
 - 2. Detailed description of proposed substitute method, procedure, sequence, or combination thereof.
 - 3. Reasons why substitute is proposed and benefits to the Project should the substitute be approved.
 - 4. Detailed list of how the proposed substitute deviates from associated method, procedure, or sequence shown or indicated in the Contract Documents.
 - 5. Impact of the substitute, if approved, on Owner's or facility manager's operations, when the Work is at an existing facility.
 - 6. Effect on other contractors working at the Site, if substitute is approved.
 - 7. Description of temporary equipment and temporary facilities needed, should the substitute be approved, including quantity of items, capacities, performance characteristics, permitting and approvals required by authorities having jurisdiction, and proposed location at the Site.
 - 8. Written evaluation of how substitute method, procedure, or sequence complies with Laws and Regulations.
 - 9. Drawings illustrating method, procedure, or sequence.
 - 10. Materials to be used that contain Constituents of Concern or that have potential to cause or exacerbate a Hazardous Environmental Condition.
 - 11. Other information and data required by the Contract Documents.
 - 12. Other information reasonably required by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Exhibit A - Substitution Request Form (one page).

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Specifications section expands upon provisions of the General Conditions, as may be modified by the Supplementary Conditions, and includes:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Minor changes in the Work and Field Orders.
 - d. Work Change Directives.
 - e. Proposal Requests.
 - f. Change Proposals.
 - g. Change Orders.

1.2 GENERAL – APPLICABLE TO ALL PROVISIONS OF THIS SECTION

- A. Submit Contract modification documents to Engineer, addressed to the contact person and contact information indicated in Section 01 33 00 - Submittal Procedures, and in accordance with Section 01 31 26 - Electronic Communication Protocols.
- B. Retain at Contractor's office and at the Site complete copy of each Contract modification document, all interpretations and clarifications, related documents, and Engineer's response.

1.3 REQUESTS FOR INTERPRETATION

A. General.

1. Transmit written requests for interpretation to Engineer. Contractor and Owner may prepare and transmit requests for interpretation.
2. Prepare and transmit request for interpretation to obtain clarifications or interpretations of the Contract Documents. Report conflicts, errors, ambiguities, and discrepancies in the Contract Documents by requesting an interpretation.
3. Do not transmit request for interpretation when other form of communication is appropriate, such as Submittals, requests for approvals of substitutes, notices, ordinary correspondence, or other form of communication. Improperly prepared or inappropriate requests for interpretation will be returned without response or action by Engineer.
4. Do not submit request for interpretation or clarification when:
 - a. answer may be obtained by observations at the Site; or.
 - b. required information is clearly indicated in the Contract Documents; or.
 - c. required information is included in industry standards referenced in the Contract Documents or Supplier's instructions that are consistent with the Contract Documents; or.
 - d. are reasonably inferable from any of foregoing.
5. Engineer will return requests for interpretation without response for any of the following reasons:
 - a. Request is regarding one of the items addressed in Paragraphs 1.3.A.3 and 4 of this Specifications section.
 - b. Request is unclear or incomplete.
 - c. Request was answered in Engineer's response to a prior request for interpretation.
 - d. Request is related to construction means, methods, techniques, procedures, or sequences of construction that are not required by the Contract Documents.

- e. Request is related to safety and protection matters that are solely Contractor's responsibility.
 - f. Request resulted in whole or in part to lack of adequate coordination by Contractor, including coordination of Subcontractors and Suppliers.
 - g. Requests that are otherwise frivolous or unnecessary.
6. Should requests be categorized by Engineer as within the limits of Paragraphs 1.3.A.3, 4, or 5 of this Specifications Section, Engineer may recommend and Owner may withhold from payments due Contractor under the Contract set-off(s) sufficient to cover Owner's costs of Contractor's submittal of invalid, frivolous, unnecessary, or inappropriate requests for interpretation or clarification..
7. Contractor shall have sole financial responsibility for Contractor's costs for requests for interpretation or clarification that are submitted late, out of sequence, or that are unnecessary.

B. Procedure.

1. Transmit requests for interpretation in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Include with each request for interpretation a separate letter of transmittal.
2. If Engineer requests additional information to make an interpretation, entity requesting the interpretation shall transmit the information requested within 10 days, unless Engineer allows additional time, via correspondence referring to request for interpretation number.
3. Engineer will review and respond to requests for interpretation with reasonable promptness. Allow sufficient time for review and response.
4. Engineer will maintain a log of requests for interpretation. Upon request, a copy of the log will be transmitted to the requestor.
5. Engineer's response to requests for interpretation will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each response to a request for interpretation will include a separate letter of transmittal.
6. Engineer's response to each request for interpretation will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
7. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
8. Interpretations that One or Both Parties Believes Entails a Change to the Contract:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's interpretation, so advise Engineer in writing before proceeding with the Work associated with the request for interpretation.
 - b. If, after this initial communication, either Owner or Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.

C. Preparation of Requests for Interpretation:

1. Prepare each request for interpretation on the "Request for Interpretation" form included with this Specifications section, or other form acceptable to Engineer.
2. Number each request for interpretation as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract WWTP09" would be, "RFI No. WWTP09-GC-001".

3. In the space provided on the form, describe the interpretation requested. Provide additional sheets as necessary. Include text and sketches as required in sufficient detail to describe the need for interpretation.
4. When applicable, request for interpretation shall include Contractor's recommended resolution.

1.4 WRITTEN CLARIFICATIONS

A. General:

1. Written clarifications, when required, will be initiated and issued by Engineer.
2. Written clarifications do not change the Contract Price or Contract Times, and do not alter the Contract Documents.
3. Written clarifications will be issued as correspondence or using clarification notice form acceptable to Engineer, with additional information as required.

B. Procedure.

1. Engineer's written clarifications will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section.
2. Each written clarification will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
4. Written Clarifications that One or Both Parties Believes Entails a Change to the Contract:
 - a. If Contractor or Owner believe that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's written clarification, so advise Engineer in writing before proceeding with the Work associated with the written clarification.
 - b. If, after this initial communication, either Owner or Contractor believes that change in the Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
5. If Engineer's written clarification is unclear, prepare and transmit a request for interpretation in accordance with the Contract Documents.

1.5 MINOR CHANGES IN THE WORK AND FIELD ORDERS

A. General:

1. Field Orders, when required, will be initiated and issued by Engineer.
2. Field Orders authorize minor changes in the Work but do not change the Contract Price or Contract Times.
3. Field Orders will be in the form of Engineers Joint Contract Documents Committee document EJCDC C-942, "Field Order".
4. Engineer will maintain a log of Field Orders issued. A copy of Engineer's log of Field Orders will be transmitted to Contractor or Owner upon request.

B. Procedure:

1. Field Orders will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Field Order will include a separate letter of transmittal.
2. Each Field Order will be distributed to the following:
 - a. Contractor.
 - b. Owner.

- c. Resident Project Representative (RPR).
- d. Engineer.
- 3. Field Orders that One or Both Parties Believes Entails a Change to the Contract Price or Contract Times:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of a Field Order, so advise Engineer in writing before proceeding with the Work associated with the Field Order.
 - b. If, after this initial communication, Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
- 4. If the Field Order is unclear, submit request for interpretation.
- 5. If Owner disagrees with the Field Order, Engineer may issue a revised or amended Field Order, or a Change Order or Work Change Directive may be issued.

1.6 WORK CHANGE DIRECTIVES

A. General:

- 1. Work Change Directives, when issued, order additions, deletions, or revisions to the Work. When issued, Contractor shall promptly implement the changes ordered in the associated Work Change Directive.
- 2. Work Change Directives do not change the Contract Price or Contract Times but are evidence that the parties to the Contract expect that the change ordered or documented by the Work Change Directive will be incorporated in subsequently issued Change Order following agreement by the parties as to the Work Change Directive's effect, if any, on the Contract Price, Contract Times, or both.
- 3. Work Change Directives will be in the form of EJCDC C-940, "Work Change Directive".

B. Procedure.

- 1. Work Change Directives signed by Owner and Engineer will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Work Change Directive will include a separate letter of transmittal. Signed Work Change Directives will be transmitted to:
 - a. Contractor.
 - b. Owner.
 - c. Engineer.
 - d. Resident Project Representative.
 - e. Contractor: One original.
 - f. Owner: One original.
 - g. Engineer: One original.
 - h. Resident Project Representative (RPR): One copy.
- 2. Documentation of Costs:
 - a. Promptly following receipt of the Work Change Directive:
 - 1) Advise Engineer and Owner in writing of the anticipated quantity and types of construction equipment and machinery required or anticipated for the associated Work.
 - 2) Advise Engineer and Owner in writing of which construction equipment and machinery is owned by the Contractor or Subcontractor and which is, or will be, rented from an equipment rental firm.
 - 3) When construction equipment and machinery is rented from a rental firm, transmit to Engineer and Owner copy of the associated rental agreement(s) pertinent to the Work ordered by the Work Change Directive.
 - 4) For all construction equipment and machinery, indicate to Engineer and Owner whether each item is required only for the Work ordered by the Work Change

Directive and whether each item is being, or will be, used for other Work on the Project or other projects for Owner.

- 5) Advise Engineer and Owner in writing of information on anticipated temporary materials (including items such as temporary support of excavations, scaffolding, temporary barriers, temporary plates covering excavations, and other temporary materials) to the same extent as that required for construction equipment and machinery.
 - b. When basis of payment for Work ordered under a Work Change Directive will be paid as Cost of the Work plus a fee, or when otherwise required by Engineer, document for the Work performed under each separate Work Change Directive, for each day, the following:
 - 1) Number and labor classifications of workers employed and hours worked each day on the Work ordered via the Work Change Directive.
 - 2) Construction equipment used, including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used each day for the Work under the Work Change Directive. Indicate where the equipment was used for other Work under the Contract and idle time.
 - 3) Temporary materials; furnish the same information as required for construction equipment and machinery. Where rental costs of such items approaches the purchase cost of such item, or when otherwise requested by Engineer, furnish evidence, satisfactory to Engineer, of the purchase price of such temporary materials.
 - 4) Consumables and similar materials used.
 - 5) Suppliers' receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 6) Invoices and labor and equipment breakdowns for Subcontractors.
 - 7) Other information required by Owner or Engineer.
 - 8) Transmit such documentation as a Change Proposal promptly after such documentation is available to Contractor. Actively pursue Subcontractors and Suppliers for required documentation to promptly furnish required documentation to Engineer.
 - c. Separately track and document Work performed in accordance with each Work Change Directive and Work performed under stipulated price methods of compensation (including lump sums and Unit Price Work).
 - d. Submit such information in a format acceptable to Engineer.
3. Documentation of Time:
- a. General:
 - 1) Contractor will be entitled to change of Contract Times Work ordered by a Work Change Directive in accordance with the requirements of the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Contractor will be entitled to a change in Contract Times only when the Work ordered by the Work Change Directive is implemented promptly and affects the Contractor's ability to comply with the Contract Times.
 - b. Requirement Documentation: Submit the following as part of the Change Proposal documenting price-related impact of the Work ordered by the Work Change Directive:
 - 1) Statement on whether the subject Work affected Contractor's ability to comply with the Contract Times.
 - 2) If Contractor's ability to comply with the Contract Times was so affected, indicate the effect on each of the relevant Contract Times.
 - 3) Document that Contractor acted promptly and properly upon receipt of the Work Change Directive to promptly implement the Work ordered thereby.
 - 4) Time impact analysis for the affected Work, in accordance with Section 01 32 16 - Construction Progress Schedule.
 - 5) Other time-related documentation required by Engineer.

1.7 PROPOSAL REQUESTS

A. General:

1. Proposal Requests may be initiated by Engineer or Owner.
2. Proposal Requests are for requesting the effect on the Contract Price and the Contract Times and other information relative to contemplated changes in the Work. Proposal Requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.
3. Proposal Requests will be furnished using the "Proposal Request" form included with this Specifications section.

B. Procedure:

1. Proposal Requests will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Section. Each Proposal Requests will include a separate letter of transmittal.
2. Each signed Proposal Request will be transmitted to the following:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. Transmit request for interpretation to obtain clarification of conflicts, errors, ambiguities, and discrepancies in Proposal Request.
4. Upon receipt of Proposal Request, Contractor shall prepare and transmit to Engineer a Change Proposal, in accordance with the Contract Documents, for the proposed Work described in the Proposal Request.

1.8 CHANGE PROPOSALS

A. General:

1. Prepare and transmit written Change Proposal to Engineer in response to each Proposal Request; or when Contractor believes a change in the Contract Price, Contract Times, both, or other change to the terms of the Contract is required; or to appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract.

B. Procedure:

1. Prepare and transmit Change Proposals within time limits indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Submit only one Change Proposal for each change issue, unless Engineer requires additional information or clarification. Do not submit repeated Change Proposals for the same change issue. Rather, when Contractor is dissatisfied with Engineer's decision on a Change Proposal, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions, and elsewhere in this Article.
3. Transmit Change Proposals in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Include with each Change Proposal all required supporting documentation and a separate letter of transmittal.
4. Engineer's Review and Requests for Additional Information:
 - a. Engineer will review and act on each Change Proposal in accordance with, and within the time limits indicated in, the General Conditions, as may be modified by the Supplementary Conditions.
 - b. When, Engineer requests additional information to render a decision, submit required information within five days of receipt of Engineer's request, unless Engineer allows more time. Submit the required information via correspondence that refers to the specific Change Proposal number.

- c. Owner shall transmit to Engineer such comments, if any, that Owner has on the Change Proposal, within 10 days of Owner's receipt of the Change Proposal.
 - d. Engineer will render a written decision on the Change Proposal or take other action in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - e. Engineer's response to Change Proposals will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section, the General Conditions, and the Supplementary Conditions.
5. Engineer's response to each Change Proposal will be distributed to:
- a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
6. If Change Proposal is recommended for approval by Engineer and is approved by Owner, a Change Order will be issued or, when applicable, an appropriate use of an allowance (already included in the Contract Price) will be authorized by Owner.
7. If parties do not agree on terms for the change, Owner or Contractor may file a Claim against the other, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
- C. Preparation of Change Proposals:
- 1. Each Change Proposal shall be submitted on the "Change Proposal" form included with this Specifications section, or other form acceptable to Engineer.
 - 2. Number each Change Proposal as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First Change Proposal for the general contract for project named "Contract No. 8" would be, "Change Proposal No. 8-GC-001".
 - 3. In space provided on Change Proposal form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for Engineer's review and response. If a change item is submitted in response to Proposal Request, write in as scope, "In accordance with Proposal Request No." followed by the Proposal Request number. Submit written clarifications, if any, to scope of change.
 - b. Submit justification for each proposed change. If change is in response to proposal request, write in as justification, "In accordance with Proposal Request No." followed by the Proposal Request number.
 - c. Indicate the total change in the Contract Price and Contract Times for each separate change item included in the Change Proposal.
 - 4. Proposed Effect on Contract Price: Unless otherwise directed by Engineer, attach to the Change Proposal detailed breakdowns of pricing (Contractor's cost and Contractor's fee) including:
 - a. List of Work tasks to accomplish the change.
 - b. For each task, labor cost breakdown including labor classification, total hours per labor classification, and hourly cost rate for each labor classification. Where overtime is included, indicate the overtime hours, labor classifications, and associated overhead rates.
 - c. Construction equipment and machinery to be used, including manufacturer, model, and year of manufacture, and number of hours for each. Indicate whether the construction equipment or machinery is owned by Contractor, Subcontractor, or leased from a rental firm; if leased, include with the Change Proposal a copy of the rental agreement. Indicate whether the construction equipment and machinery is already onsite and used for other activities, or whether it is required solely for the Work in the contemplated change. Indicate overtime hours budgeted, if any, and the associated cost rate for overtime compared with the straight-time rate.

- d. Indicate temporary materials required, including description of extent, scope, and quality, and associated cost. Temporary materials include items such as temporary sheeting for support of excavations, scaffolding, temporary plates to cover open excavations, temporary barriers, and other temporary items. Indicate ownership or source of such items. Include copy of rental agreement if rented from a third-party rental firm in which neither Contractor nor any Subcontractor has a financial interest. Indicate intended duration of use for such items and purchase cost of such items.
 - e. Detailed breakdown of cost of materials and equipment to be incorporated into the Work, including quantities, unit costs, and total cost, with Supplier's written quotations. When requested by Engineer, submit quotes by multiple prospective Suppliers.
 - f. Breakdowns of each Subcontractors' pricing, including labor, construction equipment and machinery, temporary materials, and materials and equipment incorporated into the Work, other costs, and Subcontractor fees (e.g., overhead and profit). Breakdown of Subcontractors' pricing shall be the same level of detail as that for Contractor.
 - g. Breakdown of other costs eligible, in accordance with the General Conditions and the Supplementary Conditions under "Cost of the Work" provisions.
 - h. Other information required by Engineer.
 - i. Contractor's fees (overhead and profit) applied to eligible Contractor costs and eligible Subcontractor costs.
5. Proposed Effect on Contract Times: Unless otherwise directed by Engineer, attach to the Change Proposal detailed information substantiating the proposed change in Contract Times, including:
- a. Time impact analysis required by Section 01 32 16 - Construction Progress Schedule.
 - b. Indication of whether the Work associated with the contemplated change will affect Contractor's ability to comply with the Contract Times.
 - c. Other time-related information requested by Engineer.

1.9 CHANGE ORDERS

A. General:

1. Change Orders will be recommended by Engineer (when required by the General Conditions) and will be signed by Owner and Contractor (subject to the General Conditions related to a party withholding its signature from a contractually-required Change Order), to authorize additions, deletions, or revisions to the Work, changes to the Contract Price, changes in the or Contract Times, changes to the terms of the Contract, or a combination thereof.
2. Change Orders will be in the form of EJCDC C-941, "Change Order".

B. Procedure.

1. Change Orders for signature by Contractor will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Change Order will include a separate letter of transmittal. Contractor shall print three originals of Change Order for Contractor's signature.
2. Contractor shall promptly sign each original Change Order and, within five days of receipt, deliver all originals to Engineer.
3. Engineer will sign each original Change Order and forward them to Owner.
4. After approval and signature by Owner, original Change Orders will be distributed as indicated below.
5. Original, signed Change Orders will be distributed as follows:
 - a. Contractor: One original.
 - b. Owner: One original.
 - c. Engineer: One original.
 - d. Resident Project Representative (RPR): One copy.

6. Upon Contractor's receipt of the fully-signed Change Order, promptly perform the Work ordered thereby in accordance with the Contract Documents and the Progress Schedule accepted by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below and bound following this Specifications section's "End of Section" designation, are part of this Specifications section:
 1. Request for Interpretation form (one page).
 2. Proposal Request form (one page).
 3. Change Proposal form (one page).

END OF SECTION

REQUEST FOR INTERPRETATION

Owner: _____

Project Name: _____

Contractor: _____ RFI No. [_____]

Date Transmitted: _____ Date Received: [_____]

Date Response Requested: _____ Date Response Transmitted: [_____]

Subject: _____ [_____]

Specification Section and Paragraph: _____

Drawing References: _____

INTERPRETATION REQUESTED:

Signature: _____

Date: [_____]

ENGINEER'S RESPONSE:

Signature: _____

Date: [_____]

PROPOSAL REQUEST

Owner: _____

Project Name: _____

Proposal Request No.: _____ Date: [_____]

Contract Name and No.: _____

Contractor: _____

Other Contracts Involved in Proposed Change: _____

TO CONTRACTOR: Please submit a complete Change Proposal for the proposed modifications described below. If the associated Change Proposal is approved, a Change Order or allowance authorization will be issued to authorize adjustment so the Contract. This Proposal Request is not a Change Order, Work Change Directive, Field Order, or an authorization to proceed with the proposed Work described below.

SCOPE OF PROPOSED CHANGE(S) IN THE WORK:

1. [Title 1]:
2. [Title 2]:
3. [Title 3]:

Attachments to this Proposal Request:

1. [None].

Proposal requested by: _____

HDR (Engineer)

Signature of Requestor: _____

CHANGE PROPOSAL

Owner: _____

Project Name: _____

Change Proposal No.: _____ Date: [_____]

Submitted in Response to Proposal No.: _____

Contractor Name and No.: _____

Contractor: _____

Subject: _____

The following changes to the Contract are proposed:

SCOPE OF PROPOSED CHANGE TO CONTRACT: *(attach supporting information as required)*

1. [Title 1]:
2. [Title 2]:

JUSTIFICATION:

1. [Title 1]:
2. [Title 2]:

PROPOSED CHANGES IN CONTRACT PRICE AND CONTRACT TIMES:

We propose that the Contract Price and Contract Times be changed as follows:

For Contract Price, attach detailed cost breakdowns for Contractor and Subcontractors, Supplier quotations, and other information required.

For the Contract Times, state increase, decrease, or no change to Contract Times for Substantial Completion, readiness for final payment, and Milestones, if any. If increase or decrease, state specific number of days for changes to the Contract Times. Submit supporting data, including time impact analysis for the Progress Schedule.

| Description | Amount | Contract Times (days) | |
|-----------------------------------|---------------|-----------------------|----------|
| | | Substantial | Final |
| 1. [Title 1] | \$0.00 | 0 | 0 |
| 2. [Title 2] | \$0.00 | 0 | 0 |
| Total This Change Proposal | \$0.00 | 0 | 0 |

Changes to Milestones, if any: [____][_____]

Contractor represents that supporting data attached to this Change Proposal are accurate and complete. The requested time or price adjustment indicated in this Change Proposal is the entire adjustment to which Contractor believes it is entitled as a result of the proposed change(s) indicated herein.

Change Proposal by: _____

Signature of Proposer: _____

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the Schedule of values, including:
 - a. Applicability.
 - b. General provisions for Schedules of Values.
 - c. Format, organization, and content of Schedule of Values.
- B. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 01 22 00 - Measurement and Payment.
 - 2. Section 01 29 76 - Progress Payment Procedures.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Schedule of Values and Payment – General:
 - 1. Contractor shall prepare and submit to Engineer for acceptance Schedule of Values that presents (as applicable): (a) an appropriate, detailed breakdown of the price of lump sum bid/pay items, and (b) an appropriate, detailed breakdown of the price of Work compensated on the basis of Cost of the Work plus a fee, and (c) lists bid/pay items of Unit Price Work. The total of all Work among the various bid/pay items shall equal the Contract Price.
 - 2. For each item of lump sum Work and Work compensated on the basis of Cost of the Work plus a fee, the Schedule of Values shall, establish in detail the portion of the Contract Price allocated to each component of such Work.
 - 3. Upon request of Engineer, promptly furnish data and information that substantiates and supports the amounts indicated in the Schedule of Values.
 - 4. Submit preliminary Schedule of Values to Engineer for initial review. Contractor shall incorporate Engineer's comments into the Schedule of Values and resubmit to Engineer. Engineer may require corrections and re-submittals until Schedule of Values is acceptable.
 - 5. Schedule of Values may be used, where appropriate, as a basis for negotiating price of changes, if any, in the Work.
- B. Applicability:
 - 1. Lump Sum Work:
 - a. For Work paid on a lump sum basis, progress payments will be on the basis of Work performed in accordance with the Contract Documents, for each line item in the Schedule of Values, as recommended to Owner by Engineer.
 - 2. Work Compensated on the Basis of Cost of the Work Plus a Fee:
 - a. Such Work will be paid, based on Engineer's recommendation to Owner, based on documentation of eligible costs submitted by Contractor with progress payment requests, in accordance with the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 29 76 - Progress Payment Procedures.
 - b. Schedule of Values accepted by Engineer will be used by Engineer in evaluating reasonableness of Contractor's progress payment requests.
 - c. While the actual Cost of the Work plus applicable fee for a given line item in the Schedule of Values may vary somewhat from the scheduled amount of such line item, where actual Cost of the Work (plus fee) for such line item differs substantially from the scheduled amount of such line item indicated in the Schedule of Values, Engineer may refuse to recommend further payment for such line item, in accordance with the Contract Documents.

- d. Nothing in the Schedule of Values accepted by Engineer changes the Guaranteed Maximum Price, if any.
3. Unit Price Work:
 - a. Breakdown of unit prices (whether in a Schedule of Values or elsewhere) into detailed cost or price components is not required.
 - b. Unit Price Work will be measured for payment in accordance with the Contract Documents, including Section 01 22 00 - Measurement and Payment.

1.3 ADMINISTRATIVE PROCEDURES

- A. General Provisions for Schedules of Values:
 1. This Section augments requirements for the Schedule of Values, indicated in the General Conditions, as may be augmented by the Supplementary Conditions.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:
 1. Submit to Engineer the Schedule of Values in the form and quantity required in Section 01 33 00 - Submittals, and in accordance with Section 01 31 26 - Electronic Communication Protocols.
 2. Content of Schedule of Values Submittals shall be in accordance with this Section.
 3. Timing of Submittals:
 - a. Preliminary Schedule of Values:
 - 1) Submit preliminary Schedule of Values within time limit indicated in the General Conditions.
 - b. Initial Acceptable Schedule of Values:
 - 1) Revise the preliminary Schedule of Values in accordance with Engineer's comments.
 - 2) Contractor will not be eligible for progress payment until acceptable Schedule of Values is submitted in accordance with the Contract Documents.
 - 3) Submit the Schedule of Values acceptable to Engineer in accordance with the General Conditions.
 - c. Updates: Submit updated Schedule of Values when:
 - 1) The Contract Price has changed.
 - 2) Requested by Engineer

1.5 FORMAT, ORGANIZATION, AND CONTENT OF SCHEDULE OF VALUES

- A. Organization and Major Elements of Schedule of Values.
 1. Prepare Schedule of Values on the "progress estimate" or "continuation sheets", as applicable, of the Application for Payment form indicated in Section 01 29 76 - Progress Payment Procedures.
 2. Include in Schedule of Values itemized list of Work for each major work area included in the Work, for each lump sum payment item included in the Contract.
 3. In addition, list either in the Schedule of Values or on a separate worksheet included with Applications for Payment all Unit Price Work bid/pay items in the Contract. The balance of this Article applies to lump sum Work and Work compensated on the basis of Cost of the Work plus a fee.
 4. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major materials, equipment, or systems, as appropriate or when requested by Engineer.

- B. Requirements for both the preliminary Schedule of Values Submittal and the Schedule of Values Submittal for Engineer's acceptance are:
1. Subcontracted Work:
 - a. Schedule of Values shall indicate division of Work between Contractor and each Subcontractor.
 - b. Line items for Work to be performed by each Subcontractor shall include the word, "(SUBCONTRACTED)" and the name of the Subcontractor once the associated subcontract is signed and effective.
 2. Apportionment between Materials and Equipment, and Installation: Schedule of Values shall include separate apportionment of costs for:
 - a. Cost of materials and equipment to be incorporated into the completed construction.
 - b. Cost of delivery, handling, and storage of materials and equipment to be incorporated into the completed construction.
 - c. Cost of temporary materials (such as excavation supports, scaffolding, and other temporary materials), and their associated delivery, handling, and storage costs, if any.
 - d. Cost of rentals of construction equipment and machinery, whether owned by Contractor or Subcontractor or leased from a third-party equipment rental entity.
 - e. Cost of installing materials and equipment.
 - f. Travel and subsistence costs, if any.
 - g. Other costs used in preparing the Bid by Contractor and each Subcontractor.
 3. Sum of individual line item amounts indicated on the Schedule of Values shall equal the total of associated bid/pay item. Sum of bid/pay item totals in the Schedule of Values, plus the sum of any separate listing of Unit Price Work items, shall equal the total Contract Price.
 4. Overhead and Profit:
 - a. Include in each line item a directly proportional amount of Contractor's overhead and profit in the Contract Price.
 - b. Do not include overhead and profit as separate line item(s).
 5. Unit Price Work: Separately indicate items of Unit Price Work in the overall Schedule of Values. Where the required form (in accordance with Section 01 29 76 - Progress Payment Procedures) includes a separate worksheet or page for Unit Price Work, indicate all items of Unit Price Work on such worksheet or page of the form.
 6. Bonds and Insurance Costs:
 - a. When Contractor has furnished performance and payment bonds and evidence of insurance acceptable to Owner and in accordance with the Contract Documents, amount for bonds and insurance may be applied for in the first Application for Payment up to 1.5 percent of the total contract price maximum.
 7. Construction Support, Project Management, and Administrative Cost Elements:
 - a. Costs under this category are sometimes informally referred to as "field overhead", but are Project costs rather than costs related to Contractor's general business operations.
 - b. Include in the Schedule of Values relevant line items and amounts for work and services required by the General Conditions and specific Division 01 Specifications sections, such as:
 - 1) Project management costs.
 - 2) Onsite superintendence and supervision costs.
 - 3) Itemized list of Work by work area, as applicable, for costs associated with coordination with the Owner's operations, including required sequencing, as set forth in the Contract Documents.
 - 4) Updating the construction Progress Schedule, preparing time impact analyses, and preparing recovery schedules. Preparation of preliminary Progress Schedule and the initial ("baseline") Progress Schedule acceptable to Engineer are part of mobilization.

- 5) Construction progress photographic documentation. Preconstruction photographic documentation and final photographic documentation are, respectively, part of mobilization and demobilization.
 - 6) Updates of the Schedule of Submittals.
 - 7) Contractor's safety representative and ongoing implementation of Contractor's Site-specific health and safety plan (SSHASP). Establishing the SSHASP is part of mobilization.
 - 8) Ongoing compliance with permits (when applicable). Contractor's securing of required work permits is part of mobilization.
 - 9) Ongoing cost for temporary utilities and temporary facilities. Establishing such services and facilities is part of mobilization.
 - 10) Field offices (monthly rental and maintenance) and storage facilities (excluding costs of establishment and removal, which are part of mobilization and demobilization).
 - 11) Ongoing site maintenance, such as temporary controls (dust, air pollution, water pollution, solid waste control, pest and rodent control, temporary erosion and sediment controls, and others), snow and ice removal, and similar activities.
 - 12) Field engineering and surveying.
 - 13) Progress cleaning and cleaning for Substantial Completion.
 - 14) Record documents (preparation, maintenance, and submittal).
 - a) If adequate record documents are maintained, up to 50 percent of the value of the record documents line item will be eligible for payment, spread evenly over those progress payments in which construction at the Site is performed.
 - b) Remainder of Project record documents line item will be eligible for payment when complete record documents are submitted in accordance with the Contract Documents.
 - c) If record documents submitted are unsatisfactory to Engineer, amount may be reduced via set-offs in accordance with the Contract Documents.
 - 15) Other items required by Engineer.
- c. Include such items in Applications for Payment on payment schedule acceptable to Engineer.
 - d. Such line items in the Schedule of Values shall exclude any and all costs associated with Contractor's permanent place(s) of business, personnel stationed at permanent office(s), salaries and bonuses of executive and administrative personnel not directly performing work on the Project, and general business expenses, all of which are part of Contractor's overhead costs.
8. Mobilization and Demobilization: Include all associated costs in the separate bid/pay item for mobilization and demobilization. The scope of such bid/pay item is indicated in Section 01 22 00 – Measurement and Payment.
 9. Costs for Submittals, field quality control activities, and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by Engineer:
 - a. Submittals: Up to 8.0 percent of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated therewith, may be allocated to preparation of Shop Drawings, Samples, and other Submittals required for release for purchase, fabrication, or delivery (as applicable) and may be included in the Application for Payment following Engineer's approval of Shop Drawings (and acceptance of other Submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Field Quality Control: Up to 3.0 percent of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to specified or required field quality control activities (including required testing and inspections) and included in the Application for Payment following Engineer's acceptance of the associated written field quality control report Submittal(s).
 - c. O&M Manual Submittals and Training: Up to a total of 4.0 percent of equipment cost (including all associated overhead and profit), exclusive of transportation and

installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for the associated item.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for Contractor's progress payments.

B. Scope:

1. Contractor's requests for payment shall be in accordance with the Agreement, General Conditions and Supplementary Conditions, and the Specifications.
2. Form: Applications for Payment shall be the Engineers Joint Contract Documents Committee (EJCDC) document EJCDC C-620, "Contractor's Application for Payment" (2018 edition or later) or other form acceptable to the Owner and Engineer.

1.2 CONTENT AND PROCEDURE FOR REQUESTING PROGRESS PAYMENTS

A. Procedure:

1. Review with Resident Project Representative (RPR) quantities and the Work proposed for inclusion in each progress payment request. Application for Payment shall cover only the Work and quantities recommended by the RPR.
2. Contractor will review with Engineer or RPR the status of Project record documents, in connection with Engineer's review of each Application for Payment. Failure to maintain record document current will be cause for Engineer to recommend a reduction in payment for record documents in accordance with Section 01 29 73 - Schedule of Values, and will entitle Owner to set-offs in accordance with the Contract Documents.
3. Submit to Engineer one printed originals, each with Contractor's signature, of each complete Application for Payment and other documents to accompany the Application for Payment.
4. Engineer will act on request for payment in accordance with the General Conditions and Supplementary Conditions.

B. Content: Each request for payment shall include:

1. Completed Application for Payment form, including summary/signature page, progress estimate sheets, and stored materials summary. Progress estimate sheets shall have the same level of detail as the Schedule of Values.
2. Documentation for Stored Materials and Equipment:
 - a. For materials and equipment not incorporated in the Work but suitably stored, submit documentation in accordance with the General Conditions and Supplementary Conditions.
 - b. UCC-1 Financial Statement:
 - 1) For each lot or delivery of stored materials and equipment for which payment is requested prior to installation of the item(s) at the Site, complete UCC-1, "Financial Statement" form. On UCC-1 form, indicate Owner as "security party"; indicate Supplier as "debtor" when stored item(s) are in Supplier's custody, and indicate Contractor as "debtor" when stored item(s) are in Contractor's custody; and clearly indicate in detail all stored item(s) included in the filing as "collateral" on the form. Include attachments to the form when necessary to clearly and fully indicate in detail the associated "collateral".

- 2) File completed UCC-1 form with the secretary of state in the state where the subject item(s) are stored.
 - 3) Include with Application for Payment the completed UCC-1 form together with evidence of filing with the required state(s). Submit UCC-1 form and related documentation once for each lot or delivery of stored items.
 - c. Submit photographs of the stored items at the storage location, in accordance with requirements for progress photographs in Section 01 32 33 - Photographic Documentation. Submit photographs sufficient to clearly indicate each stored item, clearly showing marking of Owner's property in accordance with Paragraph 1.3.C of this section. Such photographs do not count as photographs required under Section 01 32 33 - Photographic Documentation. For each month that such item(s) are stored, take and submit monthly new photographs of each stored item, with date-stamp on each photograph.
 - d. Legibly indicate on invoice or bill of sale the specific stored materials or equipment included in the payment request and corresponding bid/payment item number for each and the Supplier price for each item.
3. For Payment on the Basis of Cost of the Work plus a Fee:
 - a. When Work included in an Application for Payment will be compensated on the basis of Cost of the Work plus a fee, whether when the entire Contract is compensated on the basis of Cost of the Work plus a fee or when the Application for Payment includes Change Order Work to be compensated on the basis of Cost of the Work plus a fee, the Application for Payment shall include documentation of the costs, including not less than the following:
 - 1) Number of and labor classifications of workers employed and hours worked. Separately indicate overtime and holiday hours, when applicable.
 - 2) Construction equipment used including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used for the Work compensated on the basis of Cost of the Work. Where such equipment was used on overtime, separately indicate overtime hours.
 - 3) Consumables and similar materials used.
 - 4) Receipts, bills, or invoices for, and descriptions of, materials and equipment incorporated into the Work.
 - 5) Invoices and breakdowns of labor, construction equipment, and materials and equipment incorporated into the Work by Subcontractors, and Suppliers' onsite time, if any.
 - 6) Invoices or receipts for other expenses included in the Application for Payment, such as travel and subsistence expenses, costs for bonds and insurance, and all other eligible costs and expenses for which compensation is sought in the subject Application for Payment on the basis of Cost of the Work.
 - 7) Other information and documents required by Owner or Engineer,
 - b. Costs for which progress payment is requested on the basis of Cost of the Work plus a fee and for which documentation acceptable to Engineer is not submitted will not be eligible for payment.
 4. Listing of Subcontractors and Suppliers:
 - a. In accordance with the General Conditions, submit not less than monthly updated listing of all Subcontractors and Suppliers known to Contractor, whether or not such entities have a contract directly with Contractor.
 - b. Submit complete information using the form attached to this Specifications section.
 5. Partial Release or Reduction of Retainage:
 - a. For each Application for Payment where Contractor requests partial release or reduction of retainage in any amount (other than request for final payment),

submit with associated progress payment request consent of surety to partial release or reduction of retainage, duly completed by Contractor and surety.

- b. Acceptable form includes AIA G707A, "Consent of Surety to Reduction in or Partial Release of Retainage" (1994 or later edition), or other form acceptable to Owner.
- c. For payment requests that include reduction in or payment of retainage in an amount greater than that required by the Contract Documents, obtain Owner's concurrence for partial release or reduction in retainage prior to submitting such Application for Payment.

C. Final Payment:

1. Requirements for request for final payment are in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 77 19 - Closeout Requirements.

1.3 ADDITIONAL PROCEDURES FOR PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Restrictions:

1. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, notwithstanding, only the following items of materials or equipment will be eligible for payment when suitably stored, prior to incorporation into the Work:
 - a. Sludge Grinder.
 - b. Plug Valves..

B. Observation of Stored Materials and Equipment as Condition Precedent to Eligibility for Payment:

1. General:
 - a. Prior to materials or equipment suitably stored but not yet incorporated into the Work can be eligible for payment, Engineer or Resident Project Representative (RPR) shall visit the storage location and verify the extent, condition, and storage environment of the stored items.
 - b. When the same material or equipment item is stored for more than two months, such visits to storage location shall be not less than once every two months.
2. Cost Responsibility for Observations:
 - a. When storage location is less than 20 miles from the Site or less than 20 miles from Engineer's office, Contractor is not responsible for reimbursing Owner for cost of Engineer's time and expenses for observing stored materials and equipment.
 - b. When storage location is more than 20 miles from the Site and more than 20 miles from Engineer's office, Contractor shall reimburse Owner, via a set-off under the Contract Documents, for reasonable cost of Engineer's time and expenses, including travel time, to visit the storage location and observe the stored materials and equipment.

C. Other Requirements for Stored Items: Regardless of storage location, perform the following for stored materials and equipment for which payment is sought:

1. Clearly mark each stored container, crate, or item as follows: "Property of Sanitary District No. 5 of Marin County" using permanent marking. Such marking shall not blemish or deface the finish of items that will be exposed to view after installation at the Site.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below, following this Specifications section's "End of Section" designation, are part of this Specifications section:
1. List of Subcontractors and Suppliers form (two pages).

END OF SECTION

LIST OF SUBCONTRACTORS AND SUPPLIERS

Owner: Sanitary District No. 5 of Marin County
Project Name: Tiburon-Belvedere Wastewater Treatment Plant Digester Cleaning and Rehabilitation Project

Contractor: _____ Date: [_____]
Contract Designation: _____

Indicate below complete information for each Subcontractor and Supplier known to Contractor, regardless of whether the firm has a direct contract with Contractor. Include all lower-tier Subcontractors and associated Suppliers. Copy and paste the paragraphs below as required to indicate all Subcontractors and Suppliers.

SUBCONTRACTORS

1. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

2. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

3. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

Total of Subcontract Prices for all subcontracts equals approximately [_____] percent of the Contract Price (Contractor to fill in blank monthly)

SUPPLIERS

1. **Supplier Name:**

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

2. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

3. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preconstruction, progress and other project meetings.
- B. Related Sections include but are not necessarily limited to:

1.2 PRECONSTRUCTION MEETING

- A. Meet with the Owner and Engineer for a pre-construction conference at a time mutually agreed upon after the contract is awarded, but before any work is performed,
- B. The Engineer will schedule a meeting of the Owner, Contractor, Contractor's Subcontractors, and their respective representatives.
 - 1. The purpose of the meeting will be to clarify construction contract administration procedures, to establish lines of authority and communication and identify duties and responsibilities of the parties.
- C. The Engineer will schedule the pre-construction conference after receipt of the Contractor's draft proposed schedule.
- D. Agenda:
 - 1. Procedural and Administrative:
 - a. Personnel and Teams:
 - 1) Designation of roles and personnel.
 - 2) Limitations of authority of personnel, including personnel who will sign Contract modifications and make binding decisions.
 - 3) Subcontractors and Suppliers in attendance.
 - 4) Authorities having jurisdiction.
 - b. Procedures for communications and correspondence, including electronic communication protocols.
 - c. Copies of the Contract Documents and availability.
 - d. The Work and Scheduling:
 - 1) General scope of the Work.
 - 2) Contract Times, including Milestones (if any).
 - 3) Phasing and sequencing.
 - 4) Preliminary Progress Schedule.
 - 5) Critical path activities.
 - e. Safety:
 - 1) Responsibility for safety.
 - 2) Contractor's safety representative.
 - 3) Emergency procedures and accident reporting.
 - 4) Emergency contact information.
 - 5) Confined space entry permits.
 - 6) Hazardous materials communication program.
 - 7) Impact of Project on public safety.
 - f. Permits.
 - g. Review of insurance requirements and insurance claims.
 - h. Coordination:

- 1) Coordination of Subcontractors and Suppliers.
 - 2) Construction coordinator (for projects with multiple prime construction contracts).
 - 3) Coordination with Owner's operations.
 - 4) Progress meetings – schedule and frequency.
 - 5) Coordination meetings.
- i. Submittals:
- 1) Current critical Submittals:
 - a) Preliminary Schedule of Submittals.
 - b) Other schedules (Progress Schedule, Schedule of Values).
 - c) Preconstruction photographic documentation.
 - d) List of proposed Subcontractors and Suppliers.
 - e) List of emergency contact information.
 - f) Notice of elements of Contractor's safety program with which Owner and Engineer are to comply.
 - g) Site use plan.
 - h) Traffic control plan.
 - i) Form of Contractor's site superintendent's daily reports.
 - 2) Work not eligible for payment without approved or accepted Submittals (as applicable).
 - 3) Submittal procedures.
 - a) Compliance with accepted Schedule of Submittals.
 - b) Actions required of Contractor prior to furnishing Shop Drawings and other Submittals
 - c) Contractor's Submittal approval stamp required; Contractor's coordination of Submittals.
 - d) Furnishing of Submittals.
 - e) Submittal types and meaning of Engineer's action on each
 - f) Resubmittals—responsibility for, limitations on quantity.
 - 4) Identification of initial, critical Shop Drawings and product data.
 - 5) Construction photographic documentation.
- j. Substitutes and "Or-Equals":
- 1) Product options.
 - 2) Procedures for proposing "or-equals".
 - 3) Procedures for proposing substitutes.
- k. Contract Modification Procedures:
- 1) Requests for interpretation.
 - 2) Written clarifications.
 - 3) Field Orders.
 - 4) Proposal Requests.
 - 5) Change Proposals.
 - 6) Work Change Directives.
 - 7) Change Orders.
 - 8) Differing site conditions or discovery of Hazardous Environmental Condition.
 - 9) Substantiating and documenting Change Proposals and Claims.
 - 10) Claims.
- l. Progress Payment:
- 1) Owner's Project financing and funding, as applicable.
 - 2) Owner's tax-exempt status.

- 3) Preliminary Schedule of Values
 - 4) Procedures for measuring for payment (Unit Price Work).
 - 5) Retainage.
 - 6) Progress payment procedures; documents to accompany Applications for Payment.
 - 7) Payment for stored items not yet installed.
 - 8) Date of Owner's payments; payment is due.
 - 9) Prevailing wage rates and certified payrolls.
- m. Subcontractors and Suppliers:
- 1) List of proposed Subcontractors and Suppliers; monthly updates.
 - 2) Coordination and management.
 - 3) Subcontracts and purchase orders.
 - 4) Diversity Business Enterprises (MBE, WBE, DBE, VBE, etc.) – when applicable:
 - a) Goals.
 - b) Progress reports.
 - c) Requests for waivers.
- n. Testing and inspections:
- 1) Owner-hired and contractor-hired.
 - 2) Identification of Owner-hired testing entity and special inspectors.
 - 3) Responsibility for advising testing entity and special inspectors of need for services.
 - 4) Results of code-required special inspections and tests.
 - 5) Prompt remedy of apparent defects.
 - 6) Notice of defective Work.
 - 7) Remedy of defective Work.
 - 8) Defective Work not eligible for payment.
 - 9) Covering up defective Work.
 - 10) Cost responsibility for defective Work and retesting/re-inspection.
- o. Disposal of demolition materials.
- p. Record documents.
- q. Preliminary discussion of Contract closeout:
- 1) Procedures for Substantial Completion.
 - 2) Partial utilization procedures; property insurance.
 - 3) Contract closeout requirements.
 - 4) Correction period; duration of Contractor's general warranty and guarantee.
 - 5) Duration of bonds and insurance.
2. Authorities Having Jurisdiction (if not covered in a separate meeting):
- a. Municipal licenses.
 - b. Municipal permits required.
 - 1) Permits required and status.
 - 2) Inspections for building code official.
 - 3) Code-required special inspections and tests (if not covered in Administrative and Procedures part of meeting).
 - c. Right-of-way work permits; status of occupancy permit(s).
 - d. Environmental permits:
 - 1) Spill prevention control and countermeasures plan (40 CFR 112).
3. Site Mobilization (if not covered in a separate meeting):
- a. Working days, working hours, and overtime.
 - b. Use of Site and other areas; use of existing facilities.
 - c. Field offices, storage trailers, and staging areas.

- d. Temporary facilities.
 - e. Temporary utilities and limitations on utility use (where applicable).
 - f. Utility company coordination (if not done as a separate meeting).
 - g. Access to Site, access roads, and parking for construction vehicles.
 - h. Traffic controls.
 - i. Temporary controls:
 - 1) Erosion and sediment control; storm water pollution prevention plans.
 - 2) Dust control and air pollution control (including emissions control).
 - 3) Water control (storm water, surface water, groundwater).
 - 4) Water pollution control; spill prevention control and countermeasures plan.
 - 5) Solid waste control.
 - 6) Pest control.
 - 7) Other temporary controls.
 - j. Security; temporary security fencing (where required).
 - k. Storage of materials and equipment to be incorporated into the Work.
 - l. Protection of the Work and property; protective barriers.
 - m. Field engineering:
 - 1) Reference points and benchmarks.
 - 2) Surveys and layouts.
 - 3) Professional services for Contractor's means and methods (not delegated design).
 - 4) Contractor's site superintendent's daily records and submittal requirements.
 - n. Site maintenance during the Project:
 - 1) Progress cleaning; removal of trash and debris.
 - 2) Maintenance and cleaning of existing access roads and parking areas.
 - o. Restoration.
- 4. Next meeting.
 - 5. Site visit, as necessary.
- E. The Engineer will compile meeting minutes from the transcribed record of the meeting and electronically distribute copies to all participants.
- F. Pre-Construction Conference Submittals:
- 1. The names and telephone numbers of Contractor's Superintendent and Office Manager.
 - 2. List of personnel authorized to sign change orders and receive progress payments.
 - 3. The name, address and telephone numbers of two or more persons employed by the Contractor who can be reached at any time of the day or night to handle emergency matters.
 - 4. A list of all subcontractors that will work on the project, a description of work they will perform, and a contact list for each subcontractor with phone numbers and address.
 - 5. A list of materials suppliers and products over 5 percent of the total contract price.
 - 6. A draft proposed Construction Schedule.
 - 7. Material Safety Data Sheets for all hazardous chemical products to be used by the Contractor on this project.
 - 8. Traffic Control Plan.

1.3 PROGRESS MEETINGS

- A. Weekly or bi-weekly progress meetings will be held online, unless otherwise arranged.
- B. Attendees will include the Owner, Engineer, Contractor, subcontractors, and suppliers' representatives as may be needed, other Contractors working at the site, and other interested or affected parties.

- C. Preliminary Agenda: Be prepared to discuss in detail the topics indicated below. Revised agenda, if any, will be furnished to Contractor prior to associated progress meeting(s). Progress meeting agenda may be modified by Engineer during the Project as necessary.
1. Review, comment, and amendment (if necessary) of minutes of previous progress meeting.
 2. Review of progress since the previous progress meeting.
 3. Planned progress through next progress meeting.
 4. Review of Progress Schedule:
 - a. Review of the Contract Times; Contractor's ability to comply with Contract Times.
 - b. Identification of critical path activities.
 - c. Schedules for fabrication and delivery of materials and equipment.
 - d. Corrective measures, if necessary, including recovery schedule(s).
 5. Submittals:
 - a. Review status of critical Submittals.
 - b. Review revisions to Schedule of Submittals.
 6. Contract Modifications:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Field Orders.
 - d. Proposal Requests.
 - e. Change Proposals.
 - f. Work Change Directives.
 - g. Change Orders.
 - h. Claims.
 7. Applications for progress payments:
 - a. Status and deadline for submittal.
 - b. Stored materials and equipment; observation by Engineer or RPR; documents required.
 - c. Set-offs to which Owner is entitled (as applicable).
 - d. Other matters related to progress payments.
 8. Problems, conflicts, and observations.
 9. Quality standards, testing, and inspections.
 10. Coordination between Project participants.
 11. Site management issues, including vehicular access and parking, traffic control, security, status of temporary controls and temporary utilities, site maintenance and cleaning, and other Site matters.
 12. Safety and protection.
 13. Permits.
 14. Construction photographic documentation.
 15. Record documents status.
 16. Completion matters (as appropriate):
 - a. Status of checkout, startup, field quality control activities.
 - b. Status of training of facility O&M personnel and O&M manuals.
 - c. Partial utilization; inspection for Substantial Completion.
 - d. Punch list status (as applicable).
 - e. Other closeout matters (if any).
 17. Other business.
- D. Bring a six-week look ahead schedule to each meeting, including the following items:
1. Work completed last one or two weeks.
 2. Work anticipated for the next six weeks ("Look Ahead").

3. Subcontractors on site the prior week.
 4. Subcontractors scheduled on site for the next two weeks.
 5. Contract document deficiencies or questions noted during prior week.
 6. Anything that could impede the progress of the work or affect the critical path on the project schedule.
 7. Corrective measures and procedures planned to regain planned schedule, cost or quality assurance, if necessary.
 8. Report of any accidents, and any site safety issues that need to be addressed.
- E. Other Agenda items to be discussed:
1. Review and revise as necessary and approve minutes of previous meetings.
 2. Status of submittals of equipment and shop drawings.
 3. Identify problems that impede planned progress.
 4. Other current business.
- F. Revision of Minutes:
1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
 2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
 3. Challenge to minutes shall be settled as priority item of "old business" at the next regularly scheduled meeting.
- G. Minutes of Meeting:
1. The Engineer will compile minutes of each project meeting and will furnish electronic copies to the Contractor.

1.4 OTHER MEETINGS

- A. Other meetings will be required to facilitate progress of the Work. These include, but are not limited to the following:
1. Pre-Installation Conferences:
 - a. Coordinate and schedule with Engineer for each material, product or system specified.
 - 1) Conferences to be held prior to initiating installation, but not more than two weeks before scheduled initiation of installation.
 - 2) Conferences may be combined if installation schedule of multiple components occurs within the same two week interval.
 - 3) Review manufacturers recommendations and Contract Documents Specification Sections.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 31 26
ELECTRONIC COMMUNICATION PROTOCOLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Procedures with which Users will comply regarding transmission or exchange of Electronic Documents for the Project.
- B. Related Requirements:
1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, regarding transmitting Electronic Documents by Electronic Means.
 2. In addition to the requirements of this Specifications Section, comply with the requirements for Electronic Documents in the following Specifications:
 - a. Section 01 32 16 - Construction Progress Schedule.
 - b. Section 01 33 00 - Submittals.
 - c. Section 01 78 39 - Project Record Documents.

1.2 DEFINITIONS

- A. The following terms are defined for use in this Specifications Section and are indicated herein using initial capital letters. The terms have the associated meaning regardless of whether indicated in singular or plural.
1. Electronic Documents Protocol (abbreviated as "EDP"): Procedures and requirements set forth in this Specifications Section for the exchange of Electronic Documents by Electronic Means.
 2. Project Website: An internet-based software platform, such as a website or other project management information system (PMIS) designated by Contract or mutual consent of Users as the means of exchanging Electronic Documents during the Project.
 3. System Infrastructure: Hardware, operating system(s) software, internet access, e-mail service and software, security software, and large-file transfer functions.
 4. Users: Owner, Contractor, Engineer, and others exchanging Electronic Documents on the Project in accordance with the EDP.

1.3 ADMINISTRATIVE REQUIREMENTS.

- A. Coordination:
1. Contractor shall require all Subcontractors and Suppliers to comply with the EDP established in the Contract Documents.

1.4 GENERAL PROVISIONS OF ELECTRONIC DOCUMENT PROTOCOL

- A. EDP – General:
1. To the fullest extent practical, Users agree to and will transmit and accept Electronic Documents transmitted by Electronic Means in accordance with the requirements of this Specifications Section. Use of the Electronic Documents and any information contained therein is subject to requirements of this Specifications Section and other provisions of the Contract Documents governing transmittal of Electronic Documents.
 2. Content of Electronic Documents will be the responsibility of transmitting User.
 3. Unless otherwise provided in: (1) the EDP, (2) elsewhere in the Contract Documents, or (3) or other agreement between two or more Users governing use of Electronic Documents, Electronic Documents exchanged in accordance with the Contract Documents may be used in the same manner as paper or other printed versions of the same documents exchanged using other than Electronic Means, subject to the same governing requirements, limitations, and restrictions set forth in the Contract Documents.

4. Except as otherwise explicitly indicated in the EDP, the terms of this EDP will be incorporated into any other agreement or subcontract between a party and a third party for a portion of the Work or Project-related services, where such third party is, either directly or indirectly, required to exchange Electronic Documents with Owner, Contractor, or Engineer. Nothing in this EDP modifies the requirements of the Contract Documents regarding communications between and among Owner, Contractor, and Engineer Subcontractors, Suppliers, consultants, and others for which each is responsible.
 5. When transmitting Electronic Documents, transmitting User makes no representations regarding long-term compatibility, usability, or readability of the items resulting from the receiving User's use of software applications or System Infrastructure differing from those established in this EDP.
 6. This EDP does not negate or mitigate any obligation: (1) in the Contract Documents to create, provide, or maintain an original paper record version of Drawings and Specifications, signed and sealed in accordance with Laws or Regulations; (2) to comply with Laws and Regulations governing signing and sealing of design documents or signing and electronic transmission of other documents; or (3) to comply with notice requirements of the General Conditions (as. May be modified by the Supplementary Conditions).
 7. Modifications to EDP:
 - a. When modifications to the EDP are necessary to address issues affecting System Infrastructure, Users shall cooperatively resolve the issues.
 - b. If resolution within a reasonable time is not achieved, Owner is empowered to require reasonable and necessary changes to the EDP consistent with the original intent of the EDP.
 - c. If such changes result in additional cost or delay to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in the Contract Price, Contract Times, or both in accordance with the Contract Documents.
- B. System Infrastructure and Systems for Exchanging Electronic Document:
1. Each User will provide System Infrastructure (as defined in this EDP) at its own cost and sufficient for complying with EDP requirements. Except for minimum standards set forth in this EDP , it is the obligation of each User to determine, for itself, such User's own System Infrastructure.
 - a. Maximum size of e-mail file attachment under this EDP is 25 megabytes (MB). Attachments larger than the maximum size indicated in this paragraph shall be exchanged via secure electronic transfer using method mutually acceptable to Owner, Engineer, and Contractor.
 - b. Each entity transmitting or receiving Electronic Documents has full responsibility for its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, and otherwise enabling its System Infrastructure for use in accordance with this EDP.
 - c. Each User will provide its own printing facilities and will be responsible for its own costs of printing Electronic Documents.
 2. Each User is responsible for its own system operations, security, back-up, archiving, audits, and other technology and resources for operations of its System Infrastructure during the Project, including coordination with the User's individual(s) or subcontractor(s) responsible for managing its System Infrastructure and capable of addressing communications and other technology issues affecting exchange of Electronic Documents.
 3. Security:
 - a. Each User will operate and maintain industry-standard, industry-accepted, ISO standard, commercial-grade security software and systems to protect against threats including software viruses and other malicious software including worms, trojans, adware; data breaches; loss of confidentiality; and other threats in transmission to , or storage of , Electronic Documents from other Users, including transmission of Electronic Documents by physical media including flash drives/thumb drives, hard drives, compact discs (CD), digital video discs (DVD), and other portable devices, whether connected physically or wirelessly.

- b. To the extent that a User maintains and operates such security software and appropriate System Infrastructure, such User will not be liable to other Users participating in the Project for breach of system security.
 - 4. Archiving and Electronic Document Backup:
 - a. Each User is responsible for its own back-up and archive of Electronic Documents and data transmitted and received during the Project, unless this EDP establishes a Project Electronic Document archive, either as a mandatory Project Website or other communications protocol, upon which Users may rely for Electronic Document archiving for the duration of the Project Website or archiving system established in this EDP.
 - b. Each User is solely responsible for its own post-Project back-up and archive of Electronic Documents after the Project is complete or after termination of the Project Website or other Project archive (as applicable), for the longer of: (1) required by the Contract Documents, (2) required by Laws and Regulations, and (3) as each User deems necessary for its purposes.
 - 5. Receipt of Damaged, Incomplete, or Corrupt Electronic Documents: When a receiving User receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving User will advise the transmitting User of the incomplete transmission and transmitting User will retransmit the Electronic Document.
 - 6. Completion of Transmittals: Users will bring non-conforming Electronic Documents into compliance with the EDP. Users will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the transfer of the Electronic Documents.
 - 7. Project Website:
 - a. Engineer will establish, operate, and maintain a Project Website (as defined in this EDP) for use of Owner, Engineer, Contractor, and other Users as appropriate during the Project, for exchanging and storing Project Electronic Documents.
 - b. Unless otherwise provided in the Contract Documents, use of Project Website by Owner, Contractor, and Engineer is mandatory for exchanging Project documents as set forth in the EDP.
 - c. Address of Project Website will be furnished to Contractor, and Project Website will be available to Contractor, within 10 days following the Effective Date of the Contract.
- C. General Requirements and Limitations for Software for Electronic Document Exchange:
 - 1. Software and file formats for exchange of Electronic Documents shall be as indicated in Article 1.5 of this Specifications Section.
 - 2. Software Versions:
 - a. Each User will acquire the software and associated licenses necessary to create, transmit, receive, read, and use Electronic Documents for the Project, using the software and file formats indicated in Article 1.5 of this Specifications Section.
 - b. Prior to using any updated version of the software required in the EDP for Electronic Document(s) transmitted to other User(s), the originating User will first notify and either (1) receive concurrence from receiving User(s) for use of the updated version, or (2) adjust its transmission to comply with the EDP.
 - 3. Preservation of Intellectual Property and Confidentiality of Electronic Documents:
 - a. Users agree to not intentionally edit, reverse-engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes Electronic Documents, and information and data contained therein, transmitted in a file format, including portable document format (PDF), intended by transmitting User to not be modified, unless the receiving User (1) obtains permission from owner of the Electronic Document and intellectual property contained therein, or (2) is expressly allowed by the EDP to edit or modify the Electronic Document.
 - b. Where modifying, editing, decryption, or reverse-engineering is allowed by the EDP, such use is conferred only for the Project.
 - c. The EDP does not transfer any ownership or rights of any sort regarding use outside of the Project of Electronic Documents.

- d. Users shall not cite or quote excerpts of Electronic Documents for purposes outside of the Project unless required to do so by Laws and Regulations.

D. Contractor's Requests for Electronic Documents in Other Formats:

1. Release of Electronic Documents in format(s) other than those indicated in in Article 1.5 of this Specifications Section and elsewhere in the Contract Documents will be at the discretion of Owner and subject to terms and conditions required by the owner of such files and documents, and the provisions indicated below.
2. To extent determined by Owner, in its sole discretion, to be appropriate, release of Electronic Documents in alternative format(s) requested by Contractor ("Request") are subject to provisions of Owner's response to the Request and to the following:
 - a. Contractor's Request shall be in writing. Owner and others, as appropriate, will consider and respond to Request promptly, but neither Owner nor Engineer will be responsible for any time or cost impacts on Contractor associated with timing of the Request, or with Owner's decision associated therewith.
 - b. When Engineer is the owner of the Electronic Documents requested by Contractor in native format, prior to Engineer transmitting such Electronic Documents to Contractor, Contractor shall sign and deliver to Engineer, without modifying or amending, Engineer's "Electronic Media Release" agreement.
 - c. Content included in Electronic Documents created by Engineer and furnished in response to the Request was prepared by Engineer as an internal working document for Engineer's purposes solely and, when provided to Contractor, is on an "as-is" basis without warranties of any kind, including, but not limited to any implied warranties of fitness for purpose. Contractor acknowledges that content of Electronic Documents furnished in response to the Request may not be suitable for Contractor's purpose(s), or may require substantial modification and independent verification by Contractor. Content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other shown or indicated information that may affect subsequent use by Contractor or others for whom Contractor is responsible.
 - d. Electronic Documents containing text, graphics, metadata, or other types of data furnished by Engineer in response to the Request are only for Contractor's convenience and any and all conclusions or information obtained or derived from such Electronic Documents will be at Contractor's sole risk and expense. Contractor waives any and all claims against Engineer, Owner, or both arising from Contractor's use of Electronic Documents furnished in response to the Request.
 - e. Contractor shall indemnify and hold harmless Owner, Engineer, and their respective consultants and subconsultants from any and all claims, damages, losses, and expenses, including attorneys' fees and defense costs, fees and costs of engineers, architects, geologists, accountants, and other professionals, and any and all other costs, direct and indirect, resulting from Contractor's use, adaptation, or distribution of Electronic Document(s) furnished in response to the Request.
 - f. Contractor shall not sell, copy, transfer, forward, give away or otherwise distribute the Electronic Documents (in source format or modified file format) to any third party without direct written authorization of Engineer or other entity that owns the Electronic document(s), unless such distribution is specifically indicated in the Request and is limited to Subcontractors and Suppliers. Contractor warrants that subsequent use by Subcontractors and Suppliers complies with terms and conditions of the Contract Documents, Owner's response to the Request, and release agreement(s) (if any) by owner of the Electronic Documents (including Engineer, where applicable).

1.5 EXCHANGE OF ELECTRONIC DOCUMENTS

- A. Comply with the Electronic Document formats, transmission methods, and permitted uses set forth in Table 01 31 26-A, Exchange of Electronic Documents, below, when transmitting or using Electronic Documents on the Project. Where a row in the table has no indicated means of transmitting Electronic Documents, use for such documents only paper copies transmitted to the receiving party via appropriate delivery method.

TABLE 01 31 26-A – EXCHANGE OF ELECTRONIC DOCUMENTS

| Electronic Document Type | Format | Transmitting User | Transmission Method | Receiving User | Allowed Uses | Notes |
|--|---------------|--------------------------|----------------------------|-----------------------|---------------------|--------------|
| 1.5.A.1. Project communications | | | | | | |
| General communications & correspondence | EM, PDF | O, E, C | EM, EMA | O, E, C | R | |
| Meeting notices and agendas | EM, PDF | E | EM, EMA | O, C | R | |
| Meeting minutes | PDF | E | EM, EMA | O, C | R | |
| 1.5.A.2. Contractor's Submittals to Engineer | | | | | | |
| Shop Drawings | PDF | C | EMA | E | M (1) | (1) |
| Product data Submittals, delegated design Submittals, and other action Submittals (except Samples) | PDF | C | EMA | E | M (1) | (1) |
| Informational and closeout Submittals: | PDF | C | EMA | E | M (1) | (1) (6) |
| Documentation of delivery of maintenance materials submittals | PDF | C | EMA | E | M (1) | |
| 1.5.A.3. Engineer's return of reviewed Submittals to Contractor | | | | | | |
| Shop Drawings | PDF | E | EMA | O., C | R | |
| Product data Submittals, delegated design Submittals, and other action Submittals | PDF | E | EMA | O., C | R | |
| Informational and closeout Submittals: | PDF | E | EMA | O., C | R | (6) |
| Documentation of delivery of maintenance materials submittals | PDF | E | EMA | O. C | R | |
| 1.5.A.4. Contract Modifications Documents | | | | | | |
| Requests for interpretation to Engineer | PDF | C., O | EMA | E | M (1) | (1) |
| Engineer's interpretations (RFI responses) | PDF | E | EMA | C, O | R | |
| Engineer's clarifications to Contractor | EM, PDF | E | EM, EMA | C, O | R | |
| Engineer's issuance of Field Orders | PDF | E | EMA | C, O | R | |
| Proposal Requests | PDF | E, O | EMA | C | R | |
| Change Proposals – submitted to Engineer | PDF | C | EMA | O, E | S | |
| Change Proposals – Engineer's response | PDF | E | EMA | C. O | | |
| Work Change Directives (for Contractor signature) | PDF | E | EMA | C | R | (2) |
| Change Orders (for Contractor signature) | PDF | E | EMA | C | R | (2) |
| 1.5.A.5. Applications for Payment | | | | | | (3) |
| 1.5.A.6. Claims and other notices | | | | | | (4) |
| 1.5.A.7. Closeout Documents | | | | | | |
| Record drawings | DWG and PDF | C | EMA | E, O | M (5) | (5) |
| Other record documents | PDF | C | EMA | E. O | M (5) | (5) |

| Electronic Document Type | Format | Transmitting User | Transmission Method | Receiving User | Allowed Uses | Notes |
|-----------------------------|--------|-------------------|---------------------|----------------|--------------|-------|
| Contract closeout documents | | | | | | |

1. Key to Table 01 31 26-A:
 - a. Data Format:
 - 1) EM: .msg, .htm, .txt, .rtf, e-mail text.
 - 2) W: .docx, Microsoft Word 2013 or later.
 - 3) EX: .xlsx, Microsoft Excel 2013 or later.
 - 4) PDF: .pdf. portable document format.
 - 5) DWG: .dwg. Autodesk AutoCAD 2014 drawing.
 - b. Transmitting User:
 - 1) O: Owner.
 - 2) C: Contractor.
 - 3) E: Engineer.
 - c. Transmission Method:
 - 1) EM: Via e-mail.
 - 2) EMA: Attachment to e-mail transmission.
 - 3) PORT: Delivered via portable media such as flash drive/thumb drive, CD, or DVD
 - 4) PW: Posted to Project Website.
 - 5) FTP: FTP transfer to receiving FTP server.
 - d. Receiving User:
 - 1) O: Owner.
 - 2) C: Contractor.
 - 3) E: Engineer.
 - e. Permitted Uses:
 - 1) S: Store and view only.
 - 2) R: Reproduce and distribute.
 - 3) I: Integrate (incorporate additional electronic data without modifying data received)
 - 4) M: Modify as required to fulfill obligations for the Project.
 - f. Notes:
 - 1) Modifications by Engineer to Contractor's Submittals and requests for interpretations are limited to printing, marking-up, and adding comment sheets.
 - 2) May be distributed only to affected Subcontractors and Suppliers. Print, sign document, and return signed paper originals to Engineer.
 - 3) Submit printed Applications for Payment with original ("wet") signatures.
 - 4) Submit notices, including Claims, in accordance with the notice provisions of the General Conditions, as may be modified by the Supplementary Conditions.
 - 5) Submit record drawings in native CAD format indicated when Contractor has signed Engineer's standard agreement for release of electronic media. In addition, always submit record drawings as PDF files. Comply with Contract Documents requirements for Project record documents.
 - 6) For operation and maintenance data, also submit paper copies as required by Section 01 78 23 - Operations and Maintenance Manuals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for Contractor's construction Progress Schedules and related Submittals, including:
 - a. Administrative requirements regarding progress Schedules.
 - b. Qualifications of Progress Schedule preparer and related personnel.
 - c. Submittals of Progress Schedules and associated schedule-related Submittals.
 - d. Initial Progress Schedules.
 - e. Look-ahead schedules.
 - f. Progress Schedule updates.
 - g. Time impact analyses.
 - h. Recovery schedules.

B. Scope:

1. Contractor shall prepare and submit to Engineer required Progress Schedules and related Submittals, as required by this Section and elsewhere in the Contract Documents. Maintain and update Progress Schedules and related Submittals throughout the Project.
2. Owner, facility manager (if other than Owner), Engineer, and others involved with the Project have the right to rely on accuracy of Contractor-prepared Progress Schedule.
3. Engineer's review or acceptance of the Progress Schedule or related Submittals, and Engineer's comments on and expressed opinions concerning activities in the Progress Schedule and related Submittals, and progress of the Work, does not control Contractor's independent judgment concerning construction means, methods, techniques, sequences and procedures, unless the associated means, method, technique, sequence, or procedure is required by the Contract Documents. Contractor is solely responsible for complying with the Contract Times.

C. Related Requirements: Include, but are not necessarily limited to:

1. Section 01 11 00 - Summary of Work.
2. Section 01 14 16 - Coordination with Owner's Operations.
3. Section 01 26 00 - Contract Modification Procedures.
4. Section 01 31 19 - Project Meetings.

1.2 REFERENCES.

A. Defined Terms and Terminology:

1. Defined terms, indicated with initial capital letters, are indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Terminology: The following are not defined terms and are not indicated with initial capital letters but, when used in this Section, have the meaning indicated below, whether applied to the singular or plural thereof.
 - a. "Activity" is an element of the Work that has the following specific characteristics: consumes time, requires resources, has a definable start and finish, is assignable, and is measurable.
 - b. "Baseline Progress Schedule" means, in addition to the General Conditions' definition of "Progress Schedule", the version of the Progress Schedule (for the entire Project) initially accepted by the Engineer. In the event of subsequent modifications to the Project, Contractor and Engineer may mutually agree that a subsequent revision of the

Progress Schedule constitutes a new baseline Progress Schedule that supersedes the prior baseline Progress Schedule.

- c. "Constraint" means an imposed date on the Progress Schedule or an imposed time between activities. The Contract Times are constraints.
- d. "CPM Progress Schedule" means, in addition to the General Conditions' definition of "Progress Schedule", a computerized Progress Schedule in critical path method (CPM) format, for the entire Work, indicating interrelationships between elements of the Work; indicates sequences, dates, and durations for Work performed to date; indicates sequences, dates, and duration for incomplete Work yet to be performed; indicates constraints; and indicates the critical path for the Work.
- e. "Critical path" is the continuous chain of activities, from start to completion of the Work, with the longest duration for completion within the Contract Times.
- f. "Early finish" means the earliest date an activity can finish according to the assigned relationships among the activities in the Progress Schedule.
- g. "Early start" means the earliest possible date an activity can start according to the assigned relationships among activities in the Progress Schedule.
- h. "Float" means the time difference between the calculated duration of an activity chain on the Progress Schedule and the critical path.
- i. "Late finish" means the latest date an activity on the Progress Schedule can finish without extending the Contract Times.
- j. "Late start" means the latest date an activity on the Progress Schedule can start without extending the Contract Times.
- k. "Schedule date" (and similar terms, whether used in this Section or Project communications related to Progress Schedules) mean the "early start" and "early finish" date for the associated activity. "Late start" and "late finish" dates are for determining float and do not represent the schedule dates.
- l. "Total float" means the total number of days an activity (or chain of activities) on the Progress Schedule can be delayed without affecting the Contract Times.
- m. "Work areas" and "work system" means a logical breakdown of the Work elements or a group of activities which, when collectively assembled, are readily identifiable on the Project (for example: yard piping, a structure or building, a treatment process, or other logical grouping).

1.3 ADMINISTRATIVE REQUIREMENTS

A. General Provisions on Progress Schedules:

- 1. This Section augments requirements for the Progress Schedule, and Contractor's control of the Work, indicated in the General Conditions, as may be augmented by the Supplementary Conditions.

B. Use of Float:

- 1. Float belongs to the Project and may be used by Contractor or Owner to accommodate changes in the Work, or to mitigate the effect of events delaying the Work or compliance with the Contract Times.
- 2. Changes or delays that influence activities that have float and do not extend the critical path do not justify changes in the Contract Times.
- 3. Float Suppression: Pursuant to float sharing requirements of this Section, use of float suppression techniques in Progress Schedules, such as preferential sequencing logic, special lead/lag logic restraints, and extended activity durations are unacceptable.

C. Factors Affecting the Progress Schedule:

- 1. In preparing and updating the Progress Schedule, take into consideration: preparing and signing subcontracts and purchase orders, complying with Submittal requirements and Submittal review times, fabricating materials and equipment, source quality control (including required shop tests and inspections), shipping and deliveries, field quality control (including required field tests and inspections at the Site), Work by Subcontractors, coordination with others (such as other contractors including those indicated in Section 01

11 00 – Summary of Work, utility owners, and owners of transportation facilities), compliance with Laws and Regulations and permits, availability of construction equipment and machinery, abilities of workers, weather conditions, condition of the Site, seasonal restrictions in operations at the Site and coordination with Owner's (or facility manager's) operations, training of facility operation and maintenance personnel, checkout, startup, adjusting and balancing, and other factors that have the potential to affect completion of the Work within the Contract Times.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Progress Schedule Preparer.
 - a. Contractor shall retain services of a scheduling consultant to, or shall self-perform, preparation and updating of the Progress Schedule using qualified personnel experienced in: (1) construction scheduling, (2) the scheduling software required for the Project, and (3) serving as Progress Schedule preparer on construction projects of similar type, size, and complexity as the Project.
 - b. Progress Schedule preparer shall have not less than two years' experience using the required schedule software on construction projects of similar type, size, and complexity as the Project.

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Planned Work Schedule:
 - a. Submit initial and updated (as necessary) planned work schedule, in accordance with this Section's "initial Progress Schedule" Article.
2. Progress Schedule:
 - a. Preliminary Progress Schedule.
 - b. Acceptable Progress Schedule ("baseline Progress Schedule").
3. Look-Ahead Schedules:
 - a. Submit six week look-ahead schedule at each construction progress meeting, in accordance with this Section's "Look-Ahead Schedules" Article.
4. Progress Schedule Updates:
 - a. Progress Schedule updates shall comply with requirements of this Section, and shall include updated Progress Schedule and associated, required, schedule-related Submittals.
 - b. Submit updated Progress Schedule prior to each associated construction progress meeting. When a Progress Schedule remains unchanged from one construction progress meeting to the next, submit written statement expressly so stating. In addition to monthly Progress Schedule update Submittals, also bring to construction progress meetings the number of paper copies of the updated Progress Schedule indicated in Section 01 31 19 - Project Meetings.
5. Time Impact Analyses: Submit in accordance with this Section.
6. Recovery Schedules: Submit in accordance with this Section.

1.6 INITIAL PROGRESS SCHEDULE

A. Applicability of this Article:

1. This Article addresses the initial Progress Schedules and selected, related Submittals required at the outset of the Project's construction phase, through Engineer's acceptance of the Progress Schedule and its related Submittals.
2. Subsequent Progress Schedule Submittals, including Progress Schedule updates, recovery schedules, and other schedule-related Submittals, shall comply with software, type, organization, content, and similar requirements of this Article.

B. Type and Organization of Progress Schedules:

1. Prepare Progress Schedules using Microsoft Project or Oracle Primavera P6 software, unless other scheduling software is acceptable to Engineer.
 2. Sheet Size: 11 inches by 17 inches, unless otherwise accepted by Engineer.
 3. Time Scale: Indicate first date of each work week.
 4. Activity Assignments and Designations:
 - a. Limit activities, where possible, excluding fabrication of materials and equipment, to durations not longer than 10 days. Activities shall be definable and measurable. For example, an activity described only as, "Concrete," will likely be unacceptable.
 - b. Assign to each activity an appropriate, unique numerical designation and description.
 - c. Numerical designation shall incorporate the associated Specifications section number.
 - d. Activity description shall include sufficient detail to clearly communicate the intended activity. Descriptions shall include identifiers for physical locations of work area or work system, such as (where appropriate): column lines, stationing (for linear projects), and elevations. Indicate unique description for each activity.
 - e. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.
 - f. Group construction into work area sub-schedules (that are part of the Progress Schedule) by activity.
 - g. Clearly indicate, as activities separate from installation, necessary and required curing periods.
 5. Indicate interfaces and dependencies with preceding, concurrent, and follow-on activities, including those associated with the Work, other contractors at the Site, Owner and facility manager, Owner's consultants (including Engineer), authorities having jurisdiction, and others as appropriate. Clearly indicate activities not under Contractor's control.
 6. Progress Schedules shall be CPM Progress Schedules.
 7. Indicate on the separate Schedule of Submittals dates for submitting and reviewing Shop Drawings, product data Submittals, Samples, and other required Submittals. Coordinate Progress Schedule with the Schedule of Submittals.
 8. Clearly indicate the critical path on the Progress Schedule.
- C. Planned Work Schedule:
1. Within 21 days of the Effective Date of the Contract, indicate to Engineer the work days and hours proposed by Contractor. Also indicate planned non-work days, such as Contractor's holidays, weekends, and the like.
 2. Enforce Subcontractors' and Suppliers' (when at the Site) compliance with Contractor's work schedule submitted to Engineer.
 3. In the event of changes, submit to Engineer revised work schedule. Furnish such Submittal not less than three days prior to changing Contractor's work schedule, except in event of unanticipated emergency.
- D. Preliminary Progress Schedule:
1. Within 10 days after the Contract Times commence running, Contractor shall submit to Engineer the preliminary Progress Schedule covering the entire Project, with associated schedule-related Submittals required in this Section's "Submittals" Article.
 2. Submit preliminary Progress Schedule in accordance with Section 01 31 26 - Electronic Communication Protocols and Section 01 33 00 - Submittal Procedures. Also submit preliminary Progress Schedule in its native (executable) format generated by the scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.
 3. Engineer will perform timely review of the preliminary Progress Schedule.
 4. Preliminary Progress Schedule shall comply with the Contract Documents relative to Progress Schedules.
- E. Initial Acceptance of Progress Schedule:

1. Not less than 10 days before submission of the first Application for Payment, a scheduling conference attended by Contractor, Progress Schedule preparer, Engineer, and others as appropriate will be held at the Site to review for acceptability to Engineer the preliminary Progress Schedule and associated schedule-related Submittals. Following the scheduling conference, Contractor shall have five days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated schedule-related Submittals. Contractor will not be eligible for first progress payment until acceptable Progress Schedule and associated schedule-related Submittals are submitted to Engineer and are acceptable to Engineer.
2. Submit acceptable Progress Schedule, together with associated schedule-related Submittals in accordance with this Section's "Submittals" Article, Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures. Also submit acceptable form of Progress Schedule in its native (executable) format generated by the scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.
3. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times, in accordance with the Contract Documents.
4. Initially-accepted Progress Schedule shall be identified as the baseline Progress Schedule.

1.7 PLANNED COMPLETION DIFFERENT FROM THE CONTRACT TIMES:

- A. If the Progress Schedule accepted by Engineer indicates completion date(s) different than the Contract Times, the Contract Times are not thereby changed.
 1. Where the Progress Schedule accepted by Engineer indicates date(s) by which the Work, or designated portion thereof, will (a) achieve a Contractually stipulated Milestone, or (b) be substantially complete, or (c) all the Work will be complete and ready for final payment, earlier than the Contract Times ("early completion date"), Contractor shall, not less than 120 days prior to the associated Contract Time, prepare and submit a Change Proposal setting forth Contractor's request to modify the Contract Times to an earlier date, which may or may not be the same as the scheduled early completion date. The Contract Times can be modified only via a Change Order.
 2. In the event the Progress Schedule accepted by Engineer indicates one or more early completion dates and the Contract Times have not been reduced, Owner may, at Owner's option, use available float without Owner being liable for Contractor's costs to remain onsite, mobilized, and working (whether on the original scope of the Work or for modified Work) beyond the scheduled early completion date(s), as long as the Work will be completed within the Contract Times.
 3. When the Work will not be completed within the Contract Times, the Contract Documents' provisions concerning delays and changes in the Contract Times govern.

1.8 LOOK-AHEAD SCHEDULES

- A. Look-Ahead Schedules – General:
 1. Look-ahead schedules are short-duration, often more-detailed, time-based schedules for the Work to be performed during the coming month or other required span of the look-ahead schedule.
 2. Purpose of look-ahead schedules is to present , for Project stakeholders, including Owner, facility manager (if other than Owner), Engineer, Owner-hired testing and inspection entities, other contractors working at or adjacent to the Site, utility owners, transportation facility owners, and others as necessary, Contractor's detailed, time-based plan for performing the Work during the period covered by the time span of the look-ahead schedule.
 3. This Section's "Submittals" Article indicates the required span and frequency of look-ahead schedules.
 4. Each look-ahead schedule shall be fully coordinated and consistent with the current Progress Schedule update.

5. Submit look-ahead schedules concurrent with construction progress meetings, in accordance with Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 – Submittal Procedures. Also submit look-ahead schedules in native (executable) format, in accordance with Section 01 31 26 - Electronic Communication Protocols.
6. As handouts, bring to each construction progress meeting the quantity of paper copies of the new look-ahead schedule indicated in Section 01 31 19 - Project Meetings. If quantity is not indicated in Section 01 31 19 - Project Meetings, furnish quantity equal to typical number of attendees of progress meetings.

B. Organization and Content of Look-Ahead Schedules:

1. Look-ahead schedules shall be prepared from the current Progress Schedule update, of the same type, using the same software, content, and organization required in this Section for initial Progress Schedules.
2. Activity designations on look-ahead schedules shall incorporate the associated activity designations from the Progress Schedule.
3. Sheet Size: Format look-ahead schedules to sheet size of 11 inches by 17 inches, unless other sheet size is acceptable to Engineer.
4. Look-ahead schedules should generally be more detailed than the Progress Schedule. Activity durations on look-ahead schedules should not exceed five days.

1.9 PROGRESS SCHEDULE UPDATES

A. Updates – General:

1. Update the Progress Schedule not less-often than once per month. If during progress of the Work events develop that necessitate changes in the initially accepted Progress Schedule (baseline Progress Schedule), identify updated Progress Schedules sequentially as “Progress Schedule Revision “1”, “2”, “3”, and continuing in sequence as required. Number the Progress Schedule submittals in accordance with Section 01 33 00 - Submittal Procedures.
2. Starting with the first Progress Schedule update, and continuing with each subsequent update, indicate on the Progress Schedule the actual start and finish dates of each activity that is completed or is currently underway. Inaccurate representation of completed or in-progress activities will be grounds for Engineer’s non-acceptance of the Progress Schedule update.
3. Progress Schedule update shall be based on retained logic. Progress override logic is not allowed.
4. Required scheduling software, and schedule organization, format, and content for updated Progress Schedules are identical to that required in this Section for initial Progress Schedules.
5. Transmittal Letter:
 - a. Furnish each Progress Schedule update Submittal with transmittal letter expressly indicating the following:
 - 1) List of activities and dates changed since the previous Progress Schedule Submittal.
 - 2) Clear indication of the activities on the Project’s critical path.
 - 3) List of Work performed since the previous Progress Schedule Submittal.
 - 4) Discussion of problems causing delays, anticipated duration of delays, and proposed countermeasures.
 - b. Required transmittal letter does not count as contractually-required notice of Change Proposal or Claim, nor any other notice required by the Contract Documents. Separately prepare and transmit such notices in accordance with the Contract Documents.
6. Submit to Engineer updated Progress Schedule, together with associated schedule-related Submittals, in accordance with this Section’s “Submittals” Article, Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures. Also submit updated Progress Schedule in its native (executable) format generated by the

scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.

1.10 TIME IMPACT ANALYSIS

A. Time Impact Analyses – General:

1. Prepare and submit time impact analysis when one or more of the following occurs: (a) Change Proposal is prepared; (b) Work Change Directive is issued that will affect the Progress Schedule; or (c) when delays occur.
2. Time impact analysis shall illustrate the influence of each Change Order, Work Change Directive, allowance authorization, or delay, as applicable, on Contractor's ability to comply with the Contract Times and Progress Schedule constraints.
3. In performing time impact analysis, use Progress Schedule having revision date closest to and prior to the event giving rise to the delay or other change in the Work.
4. Indicate in time impact analysis activities on the Project's critical path prior to the event giving rise to the delay or other Change in the Work; activities added, extended, or deleted as a result of the delay or change in the Work; and impact of such changes on the Project's critical path activities.
5. Indicate in time impact analysis activities not within Contractor's control.
6. Time impact analysis shall demonstrate the time impact, based on date the Change Order, Work Change Directive, or allowance authorization was given to Contractor or, as applicable, date the delay started to occur; the status of the Work at that time; and activity duration of affected activities. Activity duration used in time impact analysis shall be those included in most recent Progress Schedule update accepted by Engineer, closest to start of the delay or start of the Change Order, Work Change Directive, or allowance authorization as adjusted by mutual, written agreement of the parties and Engineer.
7. Timing of Time Impact Analysis:
 - a. Submit time impact analysis with Change Proposal, in accordance with Section 01 26 00 - Contract Modification Procedures.
 - b. When time impact analysis is not part of a Change Proposal, submit each time impact analysis within 15 days after the following, as applicable:
 - 1) Start of the delay.
 - 2) After Contractor's receipt of Work Change Directive.
 - c. When Contractor does not submit time impact analysis for a specific change or delay, within the specified period for such submittal, such non-submittal will indicate extension of the Contract Times is not needed.

B. Evaluation by Engineer and Acceptance:

1. Engineer's evaluation of each time impact analysis comprised of complete information will be completed in timely manner (in accordance with the Contract Documents) after Engineer's receipt.
2. When time impact analysis is incomplete or otherwise inappropriate, Engineer will furnish comments to Contractor. When time impact analysis is complete and apparently appropriate, its acceptability will be indicated by associated Contract modification or allowance authorization.
3. Changes in the Contract Times will be made only by Change Order.
4. When mutual agreement is reached between the parties on effect of the change or delay in the Project, incorporate into the next Progress Schedule update the associated Progress Schedule revisions illustrating the influence of changes and delays.

1.11 RECOVERY SCHEDULES

A. Recovery Schedules – General:

1. When updated Progress Schedule indicates the ability to comply with the Contract Times falls 10 days or more behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, Contractor shall prepare and submit to Engineer Contractor's recovery schedule.

2. Recovery schedule is a Progress Schedule demonstrating Contractor's plan to accelerate the Work to achieve compliance with the Contract Times. If achieving the Contract Times is not feasible, Contractor's recovery schedule shall indicate Contractor's plan to recover as much of the lost time as possible to complete the Work as close as possible to the Contract Times.
3. Submit recovery schedule within 10 days after submittal of updated Progress Schedule where need for recovery schedule is indicated.

B. Recovery Schedule Report:

1. With each recovery schedule Submittal, include recovery schedule narrative report, manually prepared by Contractor, on Contractor's company letterhead, indicating name of person responsible for preparing the recovery schedule and report.
2. Recovery schedule report shall verbally indicate Contractor's plan for accelerating the Work and recovering lost time, and shall indicate the total number of days expected to be recovered by Contractor's implementation of the recovery schedule. Clearly indicate how the intended actions will recover lost time.
3. Contractor is fully responsible for complying with the Contract Documents, including the contract Times.

C. Implementation of Recovery Schedule:

1. At no additional cost to Owner, do one or more of the following, as appropriate: (a) furnish additional labor, (b) provide additional construction equipment and machinery, (c) provide suitable materials to accelerate the Work, (d) employ additional work shifts, (e) expedite procurement of materials and equipment to be incorporated into the Work or otherwise expedite delivery of such items, (f) provide other needed resources, and (g) provide other measures necessary to complete the Work within the Contract Times.
2. Upon acceptance of recovery schedule by Engineer, incorporate recovery schedule into the next Progress Schedule update.

D. Contractor's Failure to Recover Lost Time:

1. Contractor's refusal, failure, or neglect to take appropriate measures to recover lost time, or to submit a recovery schedule, shall constitute reasonable evidence that Contractor is not prosecuting the Work, or designated part of the Work, with diligence to ensure completion in accordance with the Contract Times. Such action or inaction by Contractor shall constitute sufficient basis for Owner to exercise remedies available to Owner under the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 32 33
PROJECT PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the following types of Contractor-furnished construction photographic documentation:
 - a. Still photographs.
 - b. Video.
 - 2. Requirements for preconstruction, construction progress, and final photographic documentation.
- B. Scope:
 - 1. Contractor shall perform construction photography and submit construction photographic documentation, including providing all labor, materials, equipment, and services required.
 - 2. Perform photography (i.e., still photography and video) and submit construction photographic documentation, in accordance with this Section, throughout the Work.
- C. Related Requirements:
 - 1. Section 01 31 26 - Electronic Communication Protocols.
 - 2. Section 01 33 00 - Submittal Procedures.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate construction photography with progress of the Work. Unless otherwise required by the Contract Documents, do not cover or conceal the Work until construction photographic documentation has been properly obtained.
 - 2. Coordinate dates and times for performing construction photography with Engineer .

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Construction Photographer:
 - a. Photographer shall be a specialist regularly engaged in professional photography and experienced in photographing construction sites for the purpose of project photographic documentation.
 - b. One photographer shall furnish all required construction photographic documentation for the Project, unless otherwise accepted by Engineer.
 - c. Contractor may propose, as a substitute, a non-professional photographer, who may be Contractor's employee. Comply with Contract requirements for substitutions. When proposed. As part of such substitution request, submit Change Proposal indicating the proposed, associated reduction in the Contract Price.
 - d. Upon Engineer's request, submit photographer's name, business name, address, and documentation of photographer having successfully performed photographic documentation for not less than five previous, completed construction projects, each lasting not less than six months.
- B. Selection of Views for Construction Photography:
 - 1. At the Site, Engineer or Resident Project Representative will indicate the views to be taken and will select time at which images will be obtained.
 - 2. Photographic subjects, views, and angles will vary with progress of the Work.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:
1. Preconstruction Photographic Documentation:
 - a. Submit Electronic Documents (still photographs and video).
 - b. Submit acceptable preconstruction photographic documentation prior to mobilizing to and disturbing the Site, and not later than the first progress payment request, unless other schedule for preconstruction photographic documentation is accepted by Engineer.
 2. Construction Progress Photographic Documentation:
 - a. Submit Electronic Documents (still photographs and video).
 - b. Obtain construction progress photographic documentation at the frequency indicate in this Section. Coordinate submittal of construction progress photographic documentation with submittal of each progress payment requests.
 3. Qualifications Statements:
 - a. Photographer: When requested by Engineer, prior to starting photographic documentation Work, submit photographer qualifications and record of experience. List of construction photography experience shall include for each project:
 - 1) Project name and location
 - 2) Nature of construction.
 - 3) Photographer's client with contract information.
 - 4) Approximate duration of photographer's services.
- B. Closeout Submittals: Submit the following:
1. Final Photographic Documentation:
 - a. Submit prints and Electronic Documents (still photographs and video).
 - b. Submit acceptable final photographic documentation prior to requesting final inspection.

1.5 CONSTRUCTION PHOTOGRAPHY – GENERAL

- A. Images - General:
1. Photographic documentation shall be in color.
 2. Photographic images shall be suitably staged and set up ("framed"), focused, and have adequate lighting to illuminate the Work and conditions that are the subject of the photograph.
 3. For still photographs and video, use digital camera equipment with resolution of not less than 16.0-megapixels.
 4. Do not imprint date and time in the image.
- B. Photographic Electronic Documents:
1. For each still photograph submitted, furnish high-quality, high-resolution digital image in JPEG (".jpg") file format compatible with Microsoft Windows 10 and higher operating systems.
 2. GPS geo-tagging enabled and recorded with each image.
 3. Image Resolution: Sufficient for clear, high-resolution digital images and prints. Minimum resolution shall be 600 dots per inch (dpi). Minimum size of digital images shall be:
 - a. Non-Aerial Still Photographs: Eight inches by ten inches.
 4. Electronic Document image filename shall describe the image; do not submit filenames automatically created by camera. For example, acceptable Electronic Document image filenames are, "Inside Primary Digester – Looking West.jpg". and "Digester Area Back Wall – Looking Northeast.jpg"
 5. Submittal of Electronic Documents Still Photographs:
 - a. Submit in accordance with Section 01 31 26 – Electronic Communication Protocols.

- b. When use of online document management system is required by the Contract Documents, also save copy of Electronic Documents of photographic documentation in a directory for Contractor's photographic images. Each time photographs are obtained , save the associated Electronic Documents files in a new subdirectory named for the date and basic subject of the photographs. For example, "2022-06-30 – Site Work" and "2023-03-21 – Dewatering Building".
- c. Submit Electronic Documents of still photographs not more than 72 hours after such images are obtained.

C. Video:

- 1. Video shall be high-definition (HD), high-quality video of the Site and Project work.
- 2. Submit all video files for the entire Project as Electronic Documents in a single type of container file. Electronic Document video files shall be in one of the following container file types:
 - a. ".mp4" (MPEG-4 Part 14).
 - b. ".wmv" (Windows Media Video).
 - c. ".webm" (Matroska Video).
 - d. ".mkv" (Matroska Video).
 - e. ".f4v" (Flash Video).
- 3. Video image shall include imprinted date and time the video was taken.
- 4. Include audio track narration, in American-English, sufficient to explain the scenes shown.
- 5. Electronic Document video filename shall indicate date video was taken and shall describe the video; do not submit filenames automatically created by camera. For example, acceptable Electronic Document video filenames are, "2023-07-24 – Site Work" or "2024-09-29 – Inside Primary Digester".
- 6. Submittal of Video Electronic Documents:
 - a. Submit in accordance with Section 01 31 26 – Electronic Communication Protocols.
 - b. When use of online document management system is required by the Contract Documents, also save copy of Electronic Documents of video in a directory for Contractor's photographic video documentation. Save each video to same directory. When video taken on the same visit to the Site depicts different parts of the Work, save as separate video files.

1.6 PRECONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

A. Preconstruction Photographic Documentation:

- 1. Obtain and submit sufficient preconstruction photographic documentation to record conditions at the Site prior to construction. Photography shall document all work areas for the Project.
- 2. Preconstruction photography is separate from construction progress photographic documentation required in this Section.
- 3. Submit preconstruction video of all work areas included in the Project, including indoor and outdoor work areas and areas to be occupied by field offices, temporary sheds, material and equipment storage areas, staging and laydown areas, areas that will be used by or for construction vehicular traffic and parking, and other locations that will or may be disturbed by construction of the Project.

B. If disagreement arises on the condition of the Site and insufficient preconstruction photographic documentation was submitted prior to the disagreement, restore the property in question to extent directed by Engineer and to Engineer's satisfaction.

1.7 CONSTRUCTION PROGRESS PHOTOGRAPHIC DOCUMENTATION

A. Progress Photography:

- 1. Take still photographs not less often than every two weeks.

2. Take not less than 20 still photographs each time photographer is at the Site.
3. Obtain and submit interior and exterior photographic documentation of each building and structure in the work area as directed by Engineer or Resident Project Representative at the time photographs are taken.

B. Video:

1. Obtain construction progress video each time Contractor's photographer is at the Site.
2. Construction progress videography shall cover all areas of work on the Project since the previous video was obtained.

1.8 FINAL PHOTOGRAPHIC DOCUMENTATION

A. Final Photography:

1. Take still photographs at time and day acceptable to Engineer. Do not take final photographs prior to Substantial Completion of the entire Project, removal of temporary facilities, and restoration. Work documented in final, still photographs shall be complete in accordance with the Contract Documents, including painting and finishing, furnishings, landscaping, and other visible Work
2. Submit not less than five final photographs per bid item, based on scope of the Project upon the Effective Date of the Contract. Proportionately modify the quantity of final, still photographs if scope of the Project is modified. Final, still photographs are not part of construction progress photographs required elsewhere in this Section.

B. Video:

1. Record final video at same time final, still photographs are taken.
2. Final video shall show final conditions of all areas of the Project.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Definition of various types of Submittals.
 2. Coordination requirements for Submittals.
 3. General provisions concerning Submittals.
 4. Schedule of Submittals.
 5. Contractor's preparation of Submittals, including:
 - a. Numbering.
 - b. Marking.
 - c. Organization and content.
 - d. Proposed "or-equals", substitutes, and deviations from Contract requirements.
 - e. Electronic Documents Submittals.
 - f. Contractor's review and approval of each Submittal.
 - g. Resubmittals.
 6. Contractor's transmittal of Submittals, including transmittal letters, transmittal and delivery method, and delivery of Samples, Closeout Submittals, and Maintenance Materials Submittals.
 7. Engineer's review, including:
 - a. Timing.
 - b. Meaning of Engineer's Submittal action code(disposition) assigned.
 - c. Delivery of Engineer's responses on Submittals.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, incidentals, and other effort necessary to furnish Shop Drawings, product data Submittals, Samples, and other Submittals in accordance with the Contract Documents.
 2. This Section's Article, "General Provisions Concerning Submittals" includes a summary of the Contract Documents' locations of Submittals requirements.
 3. Shop Drawings, product data Submittals, Samples, and other Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Engineer's approval or acceptance, as applicable, of a Submittal does not alter or modify the Contract Documents.
 4. Engineer and Owner have the right to rely on Contractor's representations and certifications made regarding each Submittal.
- C. Related Requirements: Include but are not limited to:
1. Section 01 25 00 - Substitution Procedures.
 2. Section 01 31 26 - Electronic Communication Protocols.
 3. Section 01 32 16 - Construction Progress Schedule.
 4. Section 01 35 73 - Delegated Design Procedures.
 5. Section 01 62 00 - Product Options.
 6. Section 01 78 23 - Operations and Maintenance Manuals.

1.2 REFERENCES

A. References – Introduction:

1. This Article presents definitions and terminology used in this Section and throughout the Contract Documents.
2. Applicability of the Term “Submittals”: Where reference is made to Shop Drawings, product data Submittals, Samples, or other Submittals in this Section and elsewhere in the Contract Documents, the term “Submittals”, as defined in the Contract Documents, is intended. The foregoing applies regardless of whether such term is indicated with an initial capital letter, unless context of the subject provision clearly indicates otherwise.
3. Types of Submittals:
 - a. Submittal types are classified as follows: (1) Action Submittals, (2) Informational Submittals, (3) Closeout Submittals, and (4) Maintenance Materials Submittals.
 - b. Type of each required Submittal is indicated in the associated Specifications section. When Submittal type is not clearly indicated in the associated Specifications section, Submittal will be classified as indicated in this Article. Submit request for interpretation when Contractor is uncertain of required Submittal type.

B. Action Submittals:

1. Action Submittals require an explicit, written approval or other appropriate action by Engineer (or other entity to whom the Submittal is required to be furnished, in accordance with the Contract Documents) before Contractor may release the associated item(s) for raw materials procurement, fabrication, production, and shipping.
2. Unless otherwise indicated in the Contract Documents, Action Submittals include the following:
 - a. Shop Drawings.
 - b. Product data.
 - c. Samples.
 - d. Shutdown plans/schedules and sequence of work with confined space safety plan with consideration for digester and purge gases.
 - e. Testing plans for quality control activities required by the Contract Documents.
 - f. Delegated Designs: Delegated design professional’s “instruments of service” Submittals required by the Contract Documents, as further described in Section 01 35 73 – Delegated Design Procedures.
3. General Conditions’ requirements for Shop Drawings and Samples hereby apply to all Action Submittals.

C. Informational Submittals:

1. Informational Submittals are so indicated in the Contract Documents. Unless otherwise indicated, Informational Submittals include certifications, evaluation reports, results of source quality control activities, results of field quality control activities, Supplier instructions, reports of Suppliers’ visits to the Site, sustainable design Submittals (that are not Closeout Submittals), delegated design Submittals that are not “instruments of service” Submittals, qualifications statements, and others.
2. Informational Submittals, when submitted in accordance with the Contract and indicating full compliance with the Contract Documents, do not require explicit response from Engineer (or other entity to whom the Submittal is to be delivered); Engineer’s (or other entity’s) acceptance thereof will be indicated in the Engineer’s

Submittals log. Copy of Engineer's Submittals log is available to Contractor upon Contractor's written request.

3. When Informational Submittal does not indicate full compliance with the Contract Documents, Engineer (or other entity to which Submittal is to be delivered) will indicate the non-compliance in a written response to Contractor.

D. Closeout Submittals:

1. Closeout Submittals are so indicated in the Contract Documents and are, in general, required before the associated Work is completed, unless earlier submittal is required by the Contract Documents.
2. Unless indicated otherwise in the Contract Documents, Closeout Submittals include maintenance contracts, operation and maintenance data, warranties, bonds (other than performance and payment bonds required prior to the start of construction), record documents, sustainable design closeout Submittals, software, keys, and others.
3. Closeout Submittals are processed in the same manner as described above for Informational Submittals.

E. Maintenance Materials Submittals:

1. Maintenance materials include spare parts, extra materials, tools, and similar items required to be furnished in accordance with the Contract Documents.
2. Furnish required physical maintenance materials, delivered to Owner or facility manager (if other than Owner), as applicable, at the location(s) indicated in the Contract Documents, for the corresponding required Maintenance Materials Submittals.
3. Maintenance Materials Submittals are documentation of delivery to Owner's or facility manager, and their acceptance of, required physical maintenance materials.
4. Maintenance Materials Submittals are processed in the same manner as described above for Informational Submittals.

F. Additional Terms:

1. The following terms have the meanings indicated below, regardless of whether such terms are indicated using initial capital letters, and apply to singular and plural of each:
 - a. "Product data" means illustrations, standard schedules, performance charts, Supplier's published instructions, brochures, diagrams, and other information furnished by Contractor to illustrate or describe materials or equipment for some portion of the Work. In general, product data are manufacturers' pre-published information on the items proposed to be incorporated into the Work. Product data includes manufacturer's catalog pages and similar documents with contractor-made markings and indications of proposed products and proposed options.
 - b. The term "Shop Drawings", defined in the General Conditions, is supplemented by the following: Shop Drawings include: (1) fabrication and assembly drawings, usually having a title block, or (2) schedules, prepared specifically for the Project. Here, "schedules" means a Project-specific summary of systems and components, such as a schedule of HVAC equipment, schedules of doors and door hardware, or windows, or a schedule of paint systems by room and surface, or other, similar Project information in a tabular format. In contrast, construction Progress Schedules, Schedules of Submittals, and Schedules of Values are not Shop Drawings.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Furnish Submittals well in advance of need for the associated material or equipment, or procedure (as applicable), in the Work and with ample time necessary for delivery of materials and equipment and to implement procedures following Engineer's approval or acceptance of the associated Submittal.
2. Work covered by a Submittal will not be included in payments by Owner until approval or acceptance (as applicable) of related Submittals has been obtained in accordance with the Contract Documents.

1.4 GENERAL PROVISIONS CONCERNING SUBMITTALS

A. Locations of Requirements:

1. Requirements concerning Submittals are generally located as follows:
 - a. General Conditions, as may be modified by the Supplementary Conditions, applicable to the Project.
 - b. This Section, which presents general requirements for Submittals applicable to the Project.
 - c. Other Division 01 Specifications that include general requirements for certain types of Submittals, such as Section 01 31 26 - Electronic Communications Protocols, Section 01 78 23 - Operation and Maintenance Data, Section 01 35 73 - Delegated Design Procedures (when the Contract includes delegation of professional design services), and others.
 - d. The "Submittals" Article of the various Specifications sections, which indicates the required Submittals for the associated Work. Furnish all Submittals required by the Contract Documents regardless of whether explicitly indicated in the associated Specifications' "Submittals" Article.

B. This Section augments and supplements the requirements of the General Conditions, as may be modified by the Supplementary Conditions, relative to Submittals.

1.5 SCHEDULE OF SUBMITTALS

A. Informational Submittals: Submit the following:

1. Schedule of Submittals:
 - a. Timing:
 - 1) Furnish Schedule of Submittals within time frames indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Submit updated Schedule of Submittals with each submittal of the updated Progress Schedule.
 - b. Content: In accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent Submittals of the Schedule of Submittals are identical. Identify on Schedule of Submittals all Submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Clearly indicate Submittals that are on the Project's critical path. Indicate the following for each Submittal:
 - 1) Date by which Submittal will be received by Engineer.
 - 2) Whether Submittal will be for a substitution or "or-equal".
 - 3) Date by which Engineer's response is required. Allow not less than 14 days for Engineer's review, starting on Engineer's actual receipt of each Submittal. Allow increased time for large or complex Submittals.
 - 4) For Submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of others (if any).

- c. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules in Section 01 32 16 - Construction Progress Schedule.
- d. Coordinate Schedule of Submittals with the Progress Schedule.
- e. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate Submittals on the Project's critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include Submittals not required by the Contract Documents.
- f. In preparing Schedule of Submittals:
 - 1) Considering the nature and complexity of each Submittal, allow sufficient time for reviews and revisions.
 - 2) Allow reasonable time for: Engineer's review and processing of Submittals, for Submittals to be revised and resubmitted, and for returning Submittals to Contractor.
 - 3) Identify and accordingly schedule Submittals that are expected to have long anticipated review times.

1.6 PREPARATION OF SUBMITTALS

A. Prior to Submittal Preparation:

- 1. The General Conditions, as may be modified by the Supplementary Conditions, address Contractor's responsibility for submitting for Owner's acceptance identification of Subcontractors and Suppliers. Obtain Owner's acceptance before entering into subcontracts and purchase orders for the Work.
- 2. Comply with the Contract Documents relative to terms and conditions of subcontracts and purchase orders for the Work.
- 3. Contractor's responsibilities for the following are set forth in the General Conditions, as may be modified by the Supplementary Conditions, and as may be augmented elsewhere in the Contract Documents:
 - a. Obtaining field measurements and dimensions.
 - b. Determining and verifying required quantities.
 - c. Verifying compatibility of materials.
 - d. Apportioning the Work among Subcontractors, Suppliers, and Contractor.
 - e. Reconciling required materials, equipment, and other Contract requirements with Contractor's means, methods, techniques, sequences, and procedures of construction and with Contractor's safety and protection programs and precautions incident thereto.
 - f. Reviewing applicable provisions of the Contract Documents and obtaining from Engineer necessary interpretations or clarifications.

B. Submittal Identification:

- 1. Submittal Number: Shall be a unique number assigned to each individual Submittal. Assign Submittal numbers as follows:
 - a. First part of Submittal number shall be the applicable Specifications section number, followed by a hyphen.
 - b. Second part of Submittal number shall be a three-digit number (sequentially numbered from 001 through 999) assigned to each separate Submittal furnished under the associated Specifications section.
 - c. Example: Submittal number for the third Submittal furnished for Section 10 14 00 - Signage, would be "10 14 00-003".
- 2. Review Cycle Number: Each resubmittal of a given Submittal shall be indicated with a lower-case letter designation:
 - a. No letter designation for initial (first) submittal of the Submittal number.

- b. "a" shall indicate first resubmittal of the Submittal number.
 - c. "b" shall indicate second resubmittal of the Submittal number.
3. Examples:

| Example Description | Submittal Identification | |
|--|--------------------------|--------------|
| | Submittal No. | Review Cycle |
| Initial (first) review cycle of the third Submittal furnished under Section 10 14 00 – Identification Devices | 10 14 00-003- | |
| Second review cycle (first resubmittal) of third Submittal furnished under Section 10 14 00 – Identification Devices | 10 14 00-003- | a |

C. Marking of Submittals:

- 1. Mark on each page of each Submittal and each individual component submitted with Submittal number and applicable Specifications paragraph.
- 2. Mark each page of each Submittal with the Submittal page number.
- 3. Each Shop Drawing sheet shall have a title block with complete identifying information satisfactory to Engineer.
- 4. For product data Submittals, operation and maintenance data Submittals, and other Submittals:
 - a. Mark options to be furnished using broad, dark arrows or "clouds" clearly drawn around the relevant text or diagrams. Do not use highlighter for indicating options and features.
 - b. Indicate options and features not furnished using clear strikeouts through the text or diagrams.

D. Submittal Organization and Content – General:

- 1. Page or Sheet Size; Furnish Submittals with one or more of the following page or sheet sizes: (a) 8.5 inches by 11 inches; (b) 11 inches by 17 inches; (c) 22 inches by 34 inches; unless another sheet size is acceptable to Engineer.
- 2. Language: All parts of each Submittal shall be in the English language.
- 3. Units of Measurement: Clearly indicate units of measurement on Shop Drawings, product data Submittals, record documentation, and operation and maintenance data Submittals.
- 4. Organize each Submittal logically to facilitate ease of understanding and review with bookmarks.
- 5. To the extent practicable, arrange Submittal information in same order as requirements are written in the associated Specifications section.
- 6. Each Submittal shall cover Work under only one Specifications section.
- 7. To the extent practicable, package together Submittals for the same Specifications section. Do not furnish required information piecemeal.
- 8. For large or complex Submittals, include a title page, a table of contents, and bookmarks.
- 9. Include appropriately labeled fly sheets to separate distinct parts of each Submittal.
- 10. Ensure legibility of all pages in each Submittal.
- 11. Minimize extraneous and unnecessary information in Submittals for materials and equipment. Do not submit information not relevant to the Submittal and associated requirements of the Contract Documents.

12. Contractor's, Subcontractor's, and Supplier's written comments on Shop Drawings and product data diagrams shall be colored green
 13. Do not submit under Specifications sections with title that include "Basic Requirements", unless the subject material or equipment is specified, in total, in a Specifications section with the words, "Basic Requirements" in its title.
- E. Electronic Documents Submittals:
1. Format: Electronic Documents Submittals shall be "portable document format" (.PDF) files unless expressly required otherwise by applicable provisions of the Contract Documents.
 2. Electronic Documents Submittals must be electronically searchable when delivered to Engineer and other recipients.
 3. Organization and Content:
 - a. Each Electronic Documents Submittal shall be one file; do not divide individual Submittals into multiple Electronic Documents files each unless file size exceeds 20 MB.
 - b. When Submittal is large or contains multiple parts, furnish PDF file with suitably titled electronic bookmark for each section of the Submittal.
 - c. Content shall be identical to paper or other original Submittal. The first page of each Electronic Documents Submittal shall be transmittal letter required in this's Paragraph 1.7.A.
 4. Quality and Legibility: Electronic Documents Submittal files shall be made from the original and shall be clear and legible. Markings applied by Contractor, Subcontractor, or Supplier shall be clear, distinct, and readily apparent. Electronic Documents file shall be full size of original documents. Properly orient all pages for convenient reading on a computer display; do not furnish pages sideways or upside-down.
 5. Provide sufficient internet service, software, and systems for Contractor with capability appropriate for transmitting the necessary files and receiving responses from Engineer or other entities.
 6. Check not less than once per day for distribution of Electronic Documents Submittals responses and related Electronic Documents correspondence.
- F. Proposed "Or-Equals", Substitutes, and Deviations from Contract Requirements:
1. "Or-Equals":
 - a. The meaning of "or-equal" is addressed in Section 01 25 00 - Substitution Procedures.
 - b. Contractor's request for approval of "or-equals" is to be presented via the associated Action Submittal(s) and shall include the information required in provisions governing "or-equals" in Section 01 62 00 - Product Options.
 - c. Expressly and prominently indicate, "Proposed Or-Equal" on the associated Action Submittals when Submittal is for an "or-equal".
 - d. Submittals requesting approval of an "or-equal" but not accompanied by the required, supplemental information will be deemed incomplete by Engineer and returned to Contractor without approval.
 2. Substitutes:
 - a. The meaning of "substitute" is indicated in Section 01 25 00 - Substitution Procedures.
 - b. Requests for approval of substitutes shall comply with Section 01 25 00 - Substitution procedures, and other relevant provisions of the Contract Documents.
 - c. Contractor's request for approval of substitute is separate from the associated Action Submittal(s). Action Submittals that request approval of a substitute

when a separate, formal substitution request (furnished in accordance with the Contract Documents) was not previously furnished to Engineer, followed by formal approval in via an appropriate contract modification (typically either a Field Order or Change Order), will be deemed by Engineer as non-compliant with the Contract Documents and will be returned to Contractor without approval.

- d. Contractor is solely responsible for delays incurred due to substitutes proposed via Submittals that have not been previously duly approved via an appropriate Contract modification.
 - e. Action Submittals for items or procedures approved via an appropriate Contract modification shall include a copy of the Contract modification in which the substitute was approved.
3. Submittals with Proposed Deviations from Contract Requirements:
- a. When Submittal proposes deviations from requirements of the Contract Documents, the Submittal shall clearly and expressly indicate each proposed deviation.
 - b. Also comply with this Section's provision, in the Article below, on Contractor's transmittal letter expressly alerting Engineer to the proposed deviations.
 - c. Comply with requirements of the Contract regarding substitutes and "or-equals".
 - d. When deviation is proposed, also appropriately revise text of Contractor's approval, from that required below in this Article.
 - e. When Submittal includes deviations from Contract requirements and either the Submittal itself, Contractor's transmittal letter, or both, do not comply fully with Contract requirements for indicating deviations in Submittals and giving separate written notice thereof, Engineer's approval of such deviations will be deemed null and void unless Engineer's written response to the Submittal has expressly acknowledged such deviation and indicated Engineer's approval thereof.
 - f. Contractor is solely responsible for delays and costs incurred due to any and all Submittals with deviations from Contract requirements that were not properly, expressly indicated and approved in accordance with the Contract Documents. Deviations not duly approved in accordance with the Contract Documents may be deemed defective Work. Contractor is solely responsible for remedying defective Work and all associated cost and time impacts.

G. Contractor's Approval of Submittals:

1. Contractor's Review: Before transmitting Submittals to Engineer, review each Submittal to:
 - a. Ensure proper coordination of the Work.
 - b. Determine that each Submittal is in accordance with Contractor's desires.
 - c. Verify that Submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.
2. Incomplete or inadequate Submittals will be returned without detailed review by Engineer.
3. Contractor's Approval Stamp and Signature:
 - a. Each Submittal furnished shall bear Contractor's approval stamp (or facsimile thereof) and signature, as evidence that the Submittal has been reviewed and approved by Contractor and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without Contractor's approval and signature (as required by the contract Documents) will be returned to Contractor without further review by Engineer and deemed incomplete.

- c. Engineer reserves the right to reject as incomplete Submittals where Contractor's approval signature appears computer-generated or reproduced without the active involvement or review of Contractor's signatory.
- d. Contractor's approval shall contain the following text:

Project Name: _____
 Contractor's Name: _____
 Contract Designation: _____
 Date: _____

----- Reference -----

Submittal Title: _____
 Specifications: _____
 Section: _____
 Page No.: _____
 Paragraph No.: _____
 Drawing No.: [_____] of _____
 Location of Work: _____

Submittal No. and Review Cycle: _____
 Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that Contractor has satisfied Contractor's obligations under the Contract Documents relative to Contractor's review and approval of this Submittal, including: (1) reviewed and coordinated the Submittal with other Submittals and with the requirements of the Work and the Contract Documents; (2) determined and verified all: field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal, (b) 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 (c) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; (3) confirmed the Submittal is complete with respect to all related data included in the Submittal; and (4) clearly and expressly indicated all proposed deviations (if any) from the requirements of the Contract Documents both in the Submittal itself and in the Submittal's transmittal letter. Accordingly, this Submittal is hereby approved for Contractor by:

Approved for Contractor by: _____

H. Resubmittals:

1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, for requirements regarding resubmitting required Submittals.
2. In addition to limits on the quantity of resubmittals, as indicated in the General Conditions, Contractor shall furnish Submittals with such completeness, accuracy, and compliance with the Contract Documents to obtain Engineer's approval or acceptance, as applicable, without the total quantity of Submittals furnished, including all initial Submittals and all resubmittals, exceeding 125% of the number of Submittals indicated on the Schedule of Submittals initially accepted by Engineer, plus a corresponding percentage of the quantity of Submittals required by Change Orders, Work Change Directives, and Field Orders.
3. Do not increase the scope of prior review cycle of the same Submittal.

4. Indicate on Contractor's transmittal letter how Submittal was revised from previous review cycle of the Submittal and where the revisions or corrections are located within the resubmittal.
5. Expressly address and provide response for all components previously transmitted by Engineer on prior review cycles of the subject Submittal. Where resubmittal lacks complete response to Engineer's prior comments, Engineer may deem such resubmittal as incomplete and return it to Contractor without further review.
6. Where part of the Submittal's prior review cycle was expressly approved or accepted, as applicable, by Engineer, do not include such items in subsequent resubmittals.
7. Indicate, "Not Yet Resolved—To Be Resubmitted at a Later Date" for any items not approved in prior review cycle of the Submittal for items not included in the subject resubmittal. Engineer reserves the right to deem incomplete Submittals "Not Approved" or "Revise and Resubmit". Furnishing incomplete or partial resubmittals is discouraged.
8. Resubmittal of Previously Approved or Accepted Items:
 - a. Do not resubmit on a given item previously approved or accepted, as applicable, by Engineer, without Engineer's advance consent. Consent will be given for bona-fide unavailability of a previously approved or accepted item where Contractor has acted in good faith in a timely manner with due diligence to comply with the Contract Times.
 - b. Destroy or conspicuously mark "SUPERSEDED" on all documents having previously received Engineer's approval or acceptance, as applicable, that are superseded by a resubmittal.

1.7 TRANSMITTAL OF SUBMITTALS BY CONTRACTOR

A. Contractor's Transmittal Letters for Submittals:

1. Furnish separate transmittal letter with each Submittal. Use transmittal form attached to this Section (as Exhibit 01 33 00-A) unless other transmittal form is acceptable to Engineer at the start of the Project's construction.
2. When transmittal form other than this Section's Exhibit 01 33 00-A is acceptable to Engineer, at beginning of each transmittal, include a reference heading indicating: Contractor's name, Owner's name, Project designation, Contract designation, transmittal number, and Submittal number (with review cycle).
3. "Or-Equals": When the Submittal is proposing an "or-equal", expressly so indicate on transmittal form submitted by Contractor.
4. Proposed Deviations from Contract Requirements: When the Submittal proposes deviations from requirements of the Contract Documents, transmittal letter shall specifically describe each proposed deviation.

B. Submittal Delivery Method:

1. This provision presents general requirements for delivery of all Submittals unless otherwise required elsewhere in the Contract Documents.
2. Furnish Submittals as Electronic Documents delivered in accordance with Section 01 31 26 – Electronic Communication Protocols.
3. Furnish Submittals to Engineer and each other entity indicated in the Contract Documents as receiving a Submittal directly from Contractor.
4. Address Submittals to Engineer as follows: HDR, 2379 Gateway Oaks Dr #200, Sacramento, CA 95833, to attention of Maika Winkler, Maika.Winkler@hdrinc.com.

C. Samples - Transmittal and Delivery:

1. Labeling and Tagging Samples:
 - a. Securely label or tag each Sample with Submittal identification number.

- b. Label or tag shall include clear space at least 4 inches by 4 inches in size for affixing Engineer's review stamp indicating disposition assigned by Engineer.
 - c. Label or tag shall not cover, conceal, or alter Sample's appearance or features.
 - d. Label or tag shall not be separated from the Sample.
 - 2. Timing: Deliver required Samples concurrently with other Action Submittals required for the same element of the Work, unless other delivery time frame is indicated in the Schedule of Submittals accepted by Engineer.
 - 3. Quantity Required:
 - a. Where the Contract Documents require a Sample as a field mock-up, provide Sample at the Site or in the Work at location acceptable to Engineer. Provide the quantity of field mock-ups required by the contract Documents; if not otherwise shown or specified, provide one of each required field mock-up.
 - b. For reasonably portable Samples, deliver the quantity of Samples required in the associated Specifications. If quantity of Samples is not indicated in the associated Specifications section, deliver to Engineer not less than two identical Samples of each item for which Sample is required.
 - c. Samples will not be returned to Contractor. If Contractor requires Sample(s) for Contractor's use, so advise Engineer in writing and furnish additional copies of the Sample. Contractor is responsible for furnishing, shipping, and transporting additional Samples.
 - 4. Locations for Delivery of Reasonably Portable Samples for Review:
 - a. Deliver one physical Sample to Owner at the Site.
 - b. Deliver balance of required physical Samples to Engineer at address indicated in this Article for receipt of Submittals, unless otherwise directed by Engineer.
- D. Closeout Submittals –Transmittal and Delivery:
- 1. Furnish the following Closeout Submittals in accordance with general requirements for transmitting and delivering Submittals, indicated above in this Article: maintenance contracts; warranty bonds (when required) and other bonds required for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation (when required). On documents such as maintenance contracts and bonds, include on each document furnished original ("wet") signature of entity issuing said document. When original "wet" signatures are required, furnish such Submittals to Engineer both on original paper and as Electronic Documents, and to other entities furnish as indicated above in this Article for general requirements for Submittals.
 - 2. Operations and Maintenance Manuals: Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.
 - 3. Record Documents: Submit in accordance with Section 01 78 39 - Project Record Documents.
 - 4. Software: In addition to software installed on Owner's computer system, furnish number of copies of software required in the Specifications section where the software is specified. Preferred means of transmittal is via secure file transfer directly to Owner (or facility manager, if other than Owner) via secure file transfer method mutually acceptable to software developer and the receiving entity. When secure file transfer is used, submit to Engineer documentation signed or electronically acknowledged by Owner that the files were received. Where such software is available only on the software developer's portable media, furnish such software-on-software developer's original, portable media, sealed in software developer's original, unopened, clearly labeled packaging.
- E. Maintenance Materials Submittals – Delivery:
- 1. Deliver physical maintenance materials required by the Contract Documents in accordance with applicable provisions of the Contract.

2. Submit documentation of delivery of (Maintenance Materials Submittals) in accordance with general requirements for Submittals as indicated in this Section.

1.8 ENGINEER'S REVIEW OF SUBMITTALS

- A. This Article applies to review of all Submittals by Engineer or other entity to whom the Contract Documents require such Submittal be furnished.
- B. Timing:
 1. Timing of Engineer's review will be in accordance with the Schedule of Submittals accepted by Engineer.
 2. When Submittal is delivered to Engineer on a date other than that indicated in the Schedule of Submittals accepted by Engineer, duration of Engineer's review may differ from that indicated in the Schedule of Submittals, based on Engineer's availability and resources. Engineer will make good-faith effort to furnish responses to Submittals in a timely manner.
 3. Contractor is responsible for communicating to Engineer when a Submittal is on the Project's critical path.
- C. Engineer's Review:
 1. Markings:
 - a. Comments or responses marked directly on Submittal by Engineer (or other entity reviewing Submittal) will be colored red.
 - b. Engineer may also present narrative comments on a comment sheet inserted by Engineer into the Submittal or included on Engineer's transmittal letter for the Submittal. Such comments will be in black text. When a separate comment sheet is included by Engineer, such sheet will be clearly identified as Engineer's comments.
 2. Engineer's review and disposition assigned to Submittal are subject to the following:
 - a. Submittal disposition is subject to: Engineer's comments on the Submittal; disclaimer language on Engineer's Submittal transmittal letter; Engineer's Submittal review stamp (when used) or equivalent (when used); and this provision.
 - b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.
 - c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.
 - d. Engineer is not responsible for resubmittals not yet furnished by Contractor or tracking Contractor's progress on resubmittals.
 3. Documents not required by the Contract Documents but nonetheless furnished by Contractor as submittals will not be reviewed by Engineer.
- D. Meaning of Submittal disposition Assigned by Engineer:
 1. Action Submittals:
 - a. "Approved" (Action Code A): Upon return of Submittal marked "Approved", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-

related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents.

- b. "Approved as Noted" (Action Code B): Upon return of Submittal marked "Approved as Noted", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with Engineer's comments and notes indicated in Engineer's Submittal response
 - c. "Revise and Resubmit" (Action Code C): Upon return of Submittal marked "Revise and Resubmit", make the revisions necessary and indicated and resubmit to Engineer for approval.
 - d. "Not Approved" (Action Code D): This disposition indicates material or equipment that cannot be approved. "Not Approved" disposition may also be applied to Submittals that are incomplete. Upon return of Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete Submittal clearly indicating all information required.
2. Informational, Closeout, and Maintenance Materials Submittals:
 - a. "Accepted" (Action Code F): Information included in Submittal complies with the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to such Submittal, and the Work covered by the Submittal may proceed. Materials and equipment with Submittals with this disposition may be shipped or operated, as applicable. Submittals assigned "Accepted" by Engineer (or other reviewing entity) does not indicate Engineer's acceptance of the associated Work, which is indicated only as set forth in the General Conditions and Section 01 77 19 – Closeout Requirements.
 - b. "Not Acceptable" (Action Code G): Submittal, or part thereof, does not indicate full compliance with applicable requirements of the Contract Documents and is not acceptable. Provide labor, materials, equipment, services, and incidentals necessary to properly and accurately revise Submittal and resubmit to indicate acceptability and compliance with the Contract Documents
 3. Other:
 - a. "Submittal Not Reviewed" (Action Code E): Documents so marked by Engineer are not required by the Contract Documents. Submittals may also be marked with this disposition when information in the document was previously reviewed and approved or accepted by Engineer, as applicable.

E. Distribution of Engineer's Responses:

1. Unless otherwise indicated in the Contract Documents, Engineer will distribute written responses (as Electronic Documents) to Submittals to the following:
 - a. Contractor.
 - b. Owner.
 - c. Engineer's file.
2. Engineer's acceptance of Informational Submittals, Closeout Submittals, and Maintenance Materials Submittals will be recorded in Engineer's Submittal log. Copy of Engineer's Submittals log is available from Engineer upon written request of Owner or Contractor. If no such request is received by Engineer, Engineer will distribute copy of Engineer's Submittals log once per month (when Submittals have been received or acted on by Engineer). Engineer may distribute copy of

Engineer's Submittals log as an Electronic Document or as handout at construction progress meetings.

3. Paper copies of Engineer's Submittal responses will not be distributed unless otherwise required by the Contract Documents or otherwise agreed to by Engineer.
4. Contractor is responsible for forwarding Engineer's Submittals responses to Subcontractors and Suppliers as appropriate, and for coordinating the Work of all trades.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Section's "End of Section" designation, are part of this Specifications Section:
 1. "Exhibit 01 33 00-A – Transmittal for Submittal No. [_____]" (one page).

END OF SECTION

**Transmittal for Submittal
No. []-[]**

| Project Name: | | | | Date Received: | |
|---|---------------|---|--|-----------------------------------|--|
| Project Owner: | | | | Checked By: | |
| Contractor: | | HDR Engineering, Inc. | | Log Page: | |
| Address: | | Address: | | HDR No.: | |
| | | | | Spec Section: | |
| | | | | Drawing/Detail No.: | |
| Attn (Contractor): | | Attn (HDR): | | Review Cycle | |
| Date Transmitted by Contractor: | | Date of Engineer's Response Transmittal: | | | |
| Item No. | Submittal No. | Description (indicate number of copies where paper copies of physical Samples are returned) | Manufacturer | Supplier Dwg or Data No. | Engineer's Disposition (Action Code) * |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| Contractor's Remarks <i>(insert text):</i> | | | | | |
| Engineer's Remarks <i>(insert text):</i> | | | | | |
| * Legend for Action Code indicated above, assigned by Engineer: | | | | | |
| Action Submittal: A – Approved B – Approved as Noted C – Revise and Resubmit D – Not Approved | | | E – Submittal Not Reviewed Informational, Closeout, or Maintenance Materials Submittal: F – Accepted (this code normally recorded in Engineer's Submittals log). G – Not Acceptable | | |
| Engineer's Disclaimer (for Submittals that do <u>not</u> involve delegated design): | | | | | |
| a. Submittal action code is subject to: Engineer's comments on the Submittal, comment sheets (if any), and this transmittal letter; disclaimer language on Engineer's Submittal review stamp or equivalent; and Specifications Section 01 33 00 – Submittal Procedures. b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents. c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades. | | | | | |
| Reviewed for HDR by: | | | | Date of Engineer's Review: | |
| Distribution: | | Contractor | File | Field | Owner |
| | | | | | Other |

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SECTION 01 35 43.13
ENVIRONMENTAL PROCEDURES FOR HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General responsibilities and enforcement concerning Constituents of Concern at the Site.
 2. Notifying Owner of Constituents of Concern at the Site.
 3. Hazard communication plan.
 4. Emergency/spill response plan.
 5. Storage of materials containing Constituents of Concern and storage of non-hazardous materials.
 6. Area for storing materials containing Constituent(s) of Concern.
 7. Verification of compliance.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to comply with requirements of this Section and related provisions of the General Conditions, as may be modified by the Supplementary Conditions.
 2. In this Section's title, "hazardous materials" means "Constituents of Concern" as defined in the General Conditions.
- C. Related Requirements:
1. Include, but are not necessarily limited to:
 - a. Section 01 35 44 - Spill Prevention Control and Countermeasures Plan.

1.2 BASIC RESPONSIBILITIES AND ENFORCEMENT REGARDING CONSTITUENTS OF CONCERN AT THE SITE

- A. Scope – Basic Responsibilities:
1. Contractor shall develop, implement, and maintain throughout the Project a hazardous materials management program (HMMP) in accordance with Laws and Regulations and the Contract Documents.
 2. Constituents of Concern Brought to Site by Contractor:
 - a. Transport, handle, store, label, use, and dispose of materials containing Constituents of Concern in accordance with this Section, other applicable provisions of the Contract Documents, and Laws and Regulations.
 3. Constituents of Concern Generated by Contractor:
 - a. Materials containing Constituents of Concern shall be properly handled, stored, labeled, transported and disposed of by Contractor in accordance with Laws and Regulations, and this Section.
 - b. If Contractor will generate or has generated materials containing Constituents of Concern at the Site or adjacent areas, obtain a USEPA identification number listing Contractor's name and address of the Site as generator of the Constituents of Concern. Obtain identification number from state environmental agency or other authority having jurisdiction at the Site. Submit identification number within time limit indicated in this Section's "Submittals" Article.
 - c. Contractor is responsible for identifying, analyzing, characterizing, labeling, storing, transporting, and disposing of Constituents of Concern generated by Contractor.
 4. Cost Responsibility:
 - a. Fines and civil penalties imposed on Owner or facility manager (if other than Owner) for Contractor's violations, whether at the Site or other locations, and other costs incurred

- by Owner and facility manager associated with cleanup of a Hazardous Environmental Condition created or exacerbated by Contractor shall be paid by Contractor.
- b. If Contractor has exacerbated a Hazardous Environmental Condition existing at the Site prior to the start of the Work, Contractor shall pay Contractor's appropriate share of costs associated with fines, civil penalties, and cleanup costs in proportion equal to the extent of costs for which Contractor caused or exacerbated the Hazardous Environmental Condition and fines and civil penalties associated therewith.
 - c. If Contractor fails or refuses to pay such costs, Owner may pay the costs and deduct from payments due Contractor a reasonable set-off.
- B. Enforcement of Laws and Regulations Regarding Constituents of Concern and Hazardous Environmental Conditions:
1. To extent practicable, avoid creating or exacerbating situations causing or contributing to injury to persons, spills and emissions of Constituents of Concern, contamination of the Site and other areas, and damage (to property and the environment) caused by Hazardous Environmental Conditions.
 2. When Owner or facility manager (if other than Owner) is aware of or suspects violations may have occurred or may occur, Owner or facility manager will notify Contractor, and authorities having jurisdiction, when Owner or facility manager reasonably believes doing so is necessary or appropriate. However, no such right of Owner, facility manager, or any entity for whom Owner or facility manager is responsible, including Engineer (or its consultants and subcontractors), is for benefit of Contractor. Owner, facility manager, and any entity for whom Owner or facility manager is responsible, including Engineer, are not obligated to monitor presence of, use of, storage or handling of, Constituents of Concern at the Site or other areas, or present of a potential Hazardous Environmental Condition, or to act on behalf of Contractor or anyone for whom Contractor is responsible.
 3. Responsibilities regarding Laws and Regulations shall be in accordance with the General Conditions, as may be modified by the Supplementary Conditions.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following to the entity(ies) indicated for each:
1. Indication of Constituents of Concern (including Chemicals) Proposed for Use at the Site:
 - a. Submit to Owner; do not submit to Engineer. Engineer will not accept, review, or retain such information or Submittals in Engineer's files.
 - b. Submit the information required in sufficient time for Owner's review and acceptance not later than three days before bringing associated Constituent of Concern to the Site.
 - c. Submittal Content:
 - 1) Current (dated within the past two years) safety data sheets (SDS, formerly "material safety data sheets") in accordance with 29 CFR 1910.1200 (OSHA Hazard Communication Standard).
 - 2) Manufacturer of material or equipment containing such substance.
 - 3) Supplier (if other than manufacturer).
 - 4) Container sizes and number of containers proposed to be at the Site.
 - 5) Minimum and maximum volume of material intended to be stored at the Site.
 - 6) Description of process or procedures in which Constituent(s) of Concern will be used at the Site.
 2. Material Containing Constituents of Concern Generated at the Site:
 - a. Submit to Owner; do not submit to Engineer. Engineer will not accept, review, or retain such information or Submittals in Engineer's files.
 - b. Submit the information required prior to generating each associated Constituent of Concern at the Site or adjacent areas. Submit within not less than 48 hours after Contractor's receipt of associated analytical results.
 - c. Submittal Content:
 - 1) For each Constituent of Concern generated at the Site or adjacent areas:

- a) USEPA identification number.
 - b) Laboratory analysis results.
 - c) Quantity, size, and location of storage containers at the Site or adjacent areas.
3. Permits:
- a. Submit to Owner; do not submit to Engineer. Engineer will not accept, review, or retain such information or Submittals in Engineer's files.
 - b. Submit within 48 hours of obtaining each associated permit.
 - c. Submittal Content:
 - 1) Copies of each permit obtained for storing, handling, using, transporting, and disposing of materials containing Constituents of Concern, obtained from authorities having jurisdiction.
4. Other Documents Required for the HMMP:
- a. Submit to Owner; do not submit to Engineer. Engineer will not accept, review, or retain such information or Submittals in Engineer's files.
 - b. Submit requested documents within 72 hours of Contractor's receipt of such request.
 - c. Submittal Content:
 - 1) Submit requested HMMP documents, which may include emergency/spill response plan, communication plan, and other documents.

1.4 HAZARDOUS MATERIALS MANAGEMENT

- A. Obtain Owner's acceptance before bringing to the Site each material containing a Constituent of Concern.
- B. Hazard Communication Plan:
- 1. Develop and implement a communication plan relative to materials containing one or more Constituents of Concern.
 - 2. Safety Data Sheet (SDS) Notebooks:
 - a. Maintain at the Site not less than two notebooks containing:
 - 1) Inventory of materials containing a Constituent of Concern (including all chemicals).
 - 2) Current (dated within the past two years) SDS for all materials being used to accomplish the Work, whether or not defined as a Constituent of Concern.
 - b. Keep one notebook in Contractor's field office at the Site; keep second notebook at location acceptable to Owner.
 - c. Keep notebooks up to date as materials are brought to and removed from the Site.
- C. Emergency/Spill Response Plans:
- 1. Develop, implement, and maintain an emergency/spill response plan, for each Constituent of Concern or each class or group of material containing a Constituent(s) of Concern, as applicable.
 - 2. Response plan shall include not less than the following:
 - a. Description of materials and equipment available at the Site to contain or respond to emergencies related to or spills of the materials containing one or more Constituents of Concern.
 - b. Procedures for notifying, and contact information for:
 - 1) Authorities having jurisdiction.
 - 2) Emergency responders.
 - 3) Owner.
 - 4) Engineer.
 - 5) Resident Project Representative (RPR).
 - 6) The public, as applicable.
 - 7) Other entities as necessary or required.

- c. Response coordination procedures between Contractor, Owner or facility manager (if other than Owner), and others as appropriate.
 - d. Site plan showing proposed locations of Constituents of Concern storage areas and location of spill containment/response materials and equipment, and location of storm water drainage inlets, catch basins, and drainage routes, including storm sewers, ditches and swales, and surface waters.
 - e. Description of Constituent of Concern handling and emergency/spill response training provided to Contractor's and Subcontractors' workers, in accordance with 29 CFR 1926.21(b) ("Employer Responsibility") and other Laws and Regulations.
 - f. Comply with Section 01 35 44 - Spill Prevention Control and Countermeasures Plan.
- D. Storage of Materials Containing Constituents of Concern and Storage of Non-Hazardous Materials:
- 1. Vessels containing materials with a Constituent of Concern shall bear applicable, clearly visible NFPA hazard diamonds.
 - 2. Container Labeling:
 - a. Properly label each container of combustible materials, whether or not classified as containing a Constituent of Concern.
 - b. Stencil Contractor's name and, as applicable, Subcontractor's name, on:
 - 1) Each vessel containing a Constituent of Concern; and
 - 2) For non-hazardous materials, on each container over five-gallon capacity.
 - c. Each container shall have securely attached label clearly identifying contents. Also label containers that are filled from larger containers.
 - d. If Owner or facility manager (if other than Owner) becomes aware of unlabeled containers at the Site, Owner will so advise Contractor, although Owner's and facility manager's personnel are not obligated to do so. Properly label each container within one hour of receipt of such notice from Owner or facility manager or remove container from the Site and adjacent areas.
 - e. Properly dispose of materials containing Constituents of Concern, in accordance with Laws and Regulations, at a location other than the Site and adjacent areas.
 - 3. To the greatest extent possible, store at offsite location materials containing a Constituent of Concern until required for use in the Work.
- E. Area for Storing Materials Containing Constituent(s) of Concern:
- 1. Maintain designated storage area for materials containing one or more Constituents of Concern. Storage area shall include secondary containment to prevent release of spilled or leaking substances. Storage area shall include barriers to prevent vehicles from colliding with storage containers, and shall include protection from environmental effects such as elements, temperature, sunlight, and other environmental effects.
 - 2. Provide signage in accordance with Laws and Regulations, clearly identifying the storage area.
- F. Verification of Compliance:
- 1. Not less than monthly, Contractor's safety representative shall meet with Owner at the Site to:
 - a. Review Contractor's HMMP documents.
 - b. Review HMMP procedures.
 - c. Inspect storage areas and the Site in general, to verify compliance with this Section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 35 44
SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor's spill prevention control and countermeasures, in accordance with 40 CFR 112 and other Laws and Regulations.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, professional services (when necessary or required), and incidentals as shown, specified, and required to comply with Laws and Regulations regarding spill prevention, control, and countermeasures (SPCC) planning and compliance, including 40 CFR 112.
2. Single Prime Contract: Contractor shall determine whether an SPCC plan is necessary. If SPCC plan is necessary, Contractor shall prepare, implement, and maintain SPCC plan in accordance with Laws and Regulations.

1.2 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Section have the meaning indicated below:
 - a. "Oil" has the meaning set forth in Laws or Regulations and generally includes petroleum products, fuel oil, hydraulic fluid, oil sludge, oil refuse, oil mixed with wastes other than dredged material, synthetic oil, vegetable oil, animal fats and oils, and other oils defined in Laws and Regulations.
 - b. "Solids" generally includes digester sludge, dewatering sludge, primary solids, and WAS.
 - c. "Navigable waters of the United States" includes navigable waters of the United States, contiguous zones, and associated shorelines, as set forth in Laws and Regulations.
 - d. "SPCC" means "spill prevention control and countermeasures".
 - e. "SPCC plan" means a SPCC plan complying with this Section and Laws and Regulations.

1.3 DETERMINATION OF NEED FOR SPCC PLAN FOR PROJECT

A. Determination of Need for SPCC Plan:

1. Contractor shall determine need for SPCC plan for the Project.
2. Onsite oil/solids storage thresholds at which a SPCC plan is necessary are indicated in this Article.
3. Depending on Site conditions and oil/solids storage at the Site and other factors, the Project may: (a) not need a SPCC plan, or (b) need a SPCC plan prepared by a Contractor-hired professional engineer, or (c) need part of the SPCC plan prepared by a Contractor-hired professional engineer. When Contractor-hired professional engineer is not necessary for all or part of a required SPCC plan, Contractor may self-prepare and self-certify SPCC plan elements not prepared by Contractor's professional engineer.
4. Contractor's Professional Engineer:
 - a. If the Site will include storage of more than 10,000 GAL of oil/solids, as defined in Laws and Regulations, in aboveground storage, or if the Site does not comply with oil discharge history criteria of 40 CFR 112, Contractor shall retain a qualified professional engineer to determine need for SPCC plan for the Project and, if SPCC plan is necessary, Contractor's professional engineer shall prepare or supervise preparation of Contractor's SPCC plan.

- b. Qualifications requirements and basic responsibilities of Contractor's professional engineer are set forth in this Section's "Quality Assurance" Article.
 - c. If a professional engineer is not required to prepare the entirety of the Project's SPCC plan, but the SPCC plan includes environmentally-equivalent SPCC measures (as set forth in Laws or Regulations), or impracticality determinations (in accordance with Laws or Regulations), then Contractor shall retain a qualified professional engineer to prepare and certify those portions of the SPCC plan dealing with environmentally equivalent measures and impracticality determinations; the balance of the SPCC plan may be prepared by and be self-certified by Contractor.
5. Submit to Engineer letter presenting results of evaluation of whether a SPCC plan is necessary for the Project, in accordance with Laws and Regulations.
- B. SPCC plan is necessary when the Project activities at the Site meet the following criteria:
- 1. The Site and activities thereon are not exempt from Laws and Regulations relative to SPCC planning and implementation.
 - 2. Oil/solids are stored, used, transferred, or otherwise handled at the Site, unless otherwise exempted by Laws or Regulations.
 - 3. Maximum oil storage capacity at the Site equals or exceeds either of the following thresholds: 42,000 GAL of completely buried capacity, or 1,320 GAL of aboveground capacity. Capacity includes total storage tank volume and operational storage volume at the Site for Contractor, other prime contractors, and Subcontractors, including bulk storage tanks, containers with 55 GAL storage capacity and larger, mobile tanks located at the Site, and other containers covered by Laws or Regulations. Exempt from the storage capacity determination are motive storage containers, such as those integral to construction equipment and vehicles.
 - 4. There is reasonable expectation, based on location of the Site, that an oil or solids spill would reach navigable waters of the United States (or contiguous zones or adjoining shorelines).
- C. Reassessment of Need for SPCC Plan after Initial Determination that SPCC Plan is not Needed:
- 1. After initial determination that SPCC plan is not necessary, Contractor shall ensure that conditions that preclude the need for SPCC plan for the Project, including the activities of Contractor, all other prime contractors (if any), and Subcontractors working on the Project at the Site, are maintained throughout the Project's duration.
 - 2. Should changes that affect the storage, use, or handling of oil/solids at the Site occur, reassess the need for SPCC plan for the Project at no additional cost to Owner and submit written reassessment to Engineer.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Contractor's Professional Engineer:
 - a. When required by Laws and Regulations, engage a licensed, registered professional engineer legally qualified to practice in the jurisdiction where the Site is located and experienced in performing engineering services of the type required. Submit qualifications data.
 - b. Responsibilities include but are not necessarily limited to:
 - 1) Carefully reviewing Laws and Regulations relative to SPCC.
 - 2) Preparing written requests for interpretations of the Contract Documents relative to SPCC for submittal to Engineer by Contractor, and obtaining from authorities having jurisdiction clarifications regarding Laws and Regulations as required.
 - 3) Preparing or supervising the preparation of letter-report evaluation of need for Contractor's SPCC plan in accordance with the Contract Documents. Evaluation shall include professional engineer's seal or stamp, registration number, and original signature.

- 4) When Contractor's SPCC plan is necessary, preparing, supervising the preparation of, or reviewing Contractor's SPCC plan (or designated portions thereof when oil storage at the Site will be less than the threshold indicated in this Section or Laws and Regulations) in accordance with the Contract Documents. Contractor's SPCC plan (or designated portions thereof) shall include professional engineer's seal or stamp, registration number, and original signature.
- 5) Periodically re-evaluating the need for Contractor's SPCC plan and issuing findings as letter-reports with seal or stamp, license number, and signature. When Contractor's SPCC plan is required, periodically evaluating Contractor's SPCC plan and providing recommendations for compliance with Laws and Regulations, in accordance with the Contract Documents.
- 6) Certifying that:
 - a) it is familiar with the Laws and Regulations, including 40 CFR 112, and
 - b) it has visited, examined, and is familiar with the Site, planned modifications to the Site under the Project as such modifications pertain to SPCC Laws and Regulations, and
 - c) it has performed the evaluations and prepared Contractor's SPCC plan in accordance with the Contract Documents, and
 - d) procedures for required testing and inspections have been established, and
 - e) the said evaluations and Contractor's SPCC plan are adequate for the Project, and
 - f) the said evaluations and Contractor's SPCC plan comply with Laws and Regulations, applicable industry standards, and to prevailing standards of practice.

1.5 SUBMITTALS

- A. Furnish Submittals required under this Section to Engineer for information only. Engineer will not accept, review, or retain such Submittals in Engineer's files.
- B. Submittals: Submit the following:
 1. Certifications:
 - a. With each evaluation letter and Contractor's SPCC plan Submittal, include certification signed by preparer of Submittal that the Submittal complies with the Contract Documents and Laws and Regulations. Signature on all certifications shall be original.
 2. Evaluations:
 - a. Submit letter presenting results of evaluation of whether Contractor's SPCC plan is required for the Project. Submit evaluation not later than 14 days after the Contract Times commence running, unless longer time is allowed (in writing) by Owner or Engineer.
 - b. Submit updated evaluations as required when conditions at the Site change. Submit updated evaluation not later than seven days after the conditions at the Site changed, or within seven days of Owner's or Engineer's request, unless longer time is allowed (in writing) by Owner or Engineer.
 - c. Owner, facility manager (if other than Owner), and Engineer have no responsibility for completeness, accuracy, or appropriateness of Contractor's evaluations and Contractor and Subcontractors (as applicable) have full responsibility and all liability associated therewith.
 3. Contractor's SPCC Plan: When SPCC Plan is required:
 - a. Submit jointly to Owner and facility manager (if other than Owner). Submit within 14 days of Owner's or facility manager's acceptance of evaluation Submittal.
 - b. Limitations Regarding Reviews:
 - 1) Review and comments (if any) by Owner or facility manager on Contractor's SPCC plan Submittal are not for benefit of Contractor, Subcontractors, or anyone else for whom Contractor may be responsible.

- 2) Such reviews and comments (if any) shall not impose on Owner, facility manager, or Engineer any obligation to evaluate the completeness, accuracy, or appropriateness of Contractor's SPCC plan.
- 3) Contractor, together with Subcontractors (as applicable), bears full responsibility and all liability for completeness, accuracy, and appropriateness of Contractor's SPCC plan.
4. Record of Distribution of Contractor's SPCC Plan:
 - a. When Contractor's SPCC plan is required, submit copies of letters transmitting Contractor's SPCC plan and amendments (if any) to other prime contractors and Subcontractors working at the Site.
5. Qualifications Statements:
 - a. Submit qualifications of Contractor's professional engineer, when requested by Owner or Engineer.

1.6 CONTRACTOR'S SPCC PLAN AND IMPLEMENTATION

- A. When Contractor's SPCC plan is required, develop the SPCC plan and submit for acceptance to entity indicated in this Section's "Submittals" Article. Contractor's SPCC plan shall be specific to the Site and the Project and shall include the following:
 1. Seal or stamp, original signature, date, and license number of Contractor's professional engineer, when self-certification by Contractor is not allowed by Laws and Regulations.
 2. Site plan identifying the name (or tag number) and location of each tank and container that will contain a substance regulated in 40 CFR 112 and other Laws and Regulations, including aboveground and buried tanks. Site plan shall indicate general directions of storm water runoff, including storm sewers, drainage inlets, and catch basins. Show arrows indicating directions of storm water flow. Show and label all storm sewer outfall locations.
 3. For each tank and container shown or indicated on the Site plan, include a table indicating tank or container's name and tag number, type of oil or solids stored therein, and maximum storage capacity in gallons. Indicate total storage capacity of all regulated tanks and containers at the Site covered by SPCC Laws and Regulations.
 4. Predictions of direction, rate of flow, and total quantity of oil or solids that could be discharged from the Site as result of storage tank or container failure.
 5. Operating procedures that prevent oil/solids spills, including procedures for oil/solids handling, details of secondary containment structures at fuel, solids and oil transfer areas, and details and descriptions of equipment to be used for oil/solids handling, including piping.
 6. Control Structures and Secondary Containment:
 - a. Show details of and indicate descriptions of control measures to be provided at the Site by Contractor to prevent spill from reaching navigable waters of the United States, including secondary containment and diversionary structures.
 - b. For on-shore Sites, use not less than one of the following: dikes, berms, or retaining walls; curbing; culverts, gutters, or other drainage systems; weirs, booms, or other barriers; spill diversion ponds; retention ponds; or sorbent materials or methods.
 - c. Where appropriate, Contractor's SPCC plan shall clearly demonstrate that containment or diversionary structures or equipment are not practical.
 - d. Include brittle fracture evaluation, where necessary, for field-constructed aboveground storage containers undergoing repair, alteration, construction, or change in service.
 7. Plans for countermeasures to contain, clean up, and mitigate effects of oil/solids spills that reach navigable waters of the United States, including written commitment of manpower, equipment, and materials to quickly control and remove spilled oil or solids. Include estimation of time required to contain spills after spill occurs.
 8. Contact list and telephone numbers for facility response coordinator, National Response Center, cleanup Subcontractors, and all appropriate federal, state, and local authorities having jurisdiction to be contacted in event of spill or discharge.
 9. Program for monthly inspections of the Site by Contractor for compliance with Contractor's SPCC plan and Owner's SPCC plan (as applicable). Advise Owner (and facility manager, if

other than Owner) in writing of each inspection not less than 72 hours prior to each inspection.

10. Measures for Site security relative to oil or solids storage.
 11. Procedures for safely handling mobile containers such as totes and drums, and procedures for refueling vehicles and construction equipment and machinery at the Site.
 12. Procedures and schedules for periodic testing of integrity of tanks and containers, and associated piping and valves.
 13. Plans for bulk storage container compliance with Laws and Regulations and the Contract Documents.
 14. Plans for personnel training and oil/solids spill prevention briefings.
 15. For SPCC plans that do not follow the format indicated in Laws and Regulations, provide cross-reference to requirements of Laws and Regulations, including 40 CFR 112.7.
- B. Obtain acceptance of Contractor's SPCC plan by entity indicated in this Section's "Submittals" Article, for coordination with Owner's Site-specific SPCC plan, if any.
- C. Contractor's SPCC plan shall be reviewed by Contractor's professional engineer (when professional engineer is required) and Owner every five years, as applicable, unless more-frequent reviews or updates are required by Laws or Regulations. Contractor shall perform updates and revisions of Contractor's SPCC plan as necessary and submit same in accordance with the provisions of this Section for submittal and acceptance of Contractor's initial SPCC plan.
- D. Post a copy of Contractor's accepted, certified SPCC plan in conspicuous location at the Site and furnish copies to Owner, facility manager (if other than Owner), other prime contractors (if any), and Subcontractors as appropriate. All contractors shall comply with Contractor's SPCC plan.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SPILL OR VIOLATION OF CONTRACTOR'S SPCC PLAN

- A. In event of violation of Contractor's SPCC plan or release of oil or solids attributable to construction or related activities, Contractor shall:
1. Notifications:
 - a. Immediately issue oral advisories and written notifications in accordance with Laws and Regulations, including 40 CFR 110 and 40 CFR 112.
 - b. When required by Laws and Regulations, report to National Response Center, USEPA, and other authorities having jurisdiction, if any.
 2. Perform spill cleanup promptly and in accordance with Laws and Regulations, Contractor's SPCC plan, and requirements of authorities having jurisdiction.
 3. Pay fines and civil penalties (or responsible portion thereof) imposed on Owner and facility manager (if other than Owner) by authorities having jurisdiction, and pay costs associated with cleanup of spills. If Contractor fails to promptly pay such costs, Owner may withhold such amounts from payments due Contractor, as one or more set-offs.
- B. Should cleanup of spills attributable to Contractor be necessary, Contractor will not be entitled to any associated increase in the Contract Price or Contract Times. Should Contractor share responsibility for spill and cleanup with another entity, changes in Contract Price and Contract Time, if any, will be proportionate to other entity's responsibility.

END OF SECTION

SECTION 01 35 73
DELEGATED DESIGN PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General provisions for delegated design services.
 2. Coordination of delegated designs with other Work.
 3. Qualifications requirements for delegated design professionals.
 4. Limitations on Engineer's review of delegated design Submittals.
 5. Responsibilities of delegated design professionals.
- B. Scope:
1. Where delegated design is specifically Contractor's responsibility in accordance with the Contract Documents, Contractor shall provide labor, services, other effort, and pay all costs necessary and required to perform delegated design services for Work that will be part of the completed Project as a functioning whole.
 2. Perform delegated design Work in accordance with the Contract Documents, delegated design Action Submittals approved by Engineer, and Shop Drawings, product data Submittals, and Samples approved by the associated delegated design professional.
 3. Contractor's correction period, general warranty and guarantee, and obligations for safety and protection apply to delegated design Work to the same extent such provisions apply to all other Work under the Contract.
 4. Specifications requiring delegated design services include, but are not necessarily limited to, the following:
 - a. Section 03 15 19 - Anchorage to Concrete.
 - b. Section 40 05 07 - Pipe Support Systems.
 5. Not Delegated Design: The following are not delegated design and are not covered by this Section:
 - a. Contractor's use of design professionals for: (1) temporary construction or temporary facilities not part of the completed Project as a functioning whole, or (2) Contractor's means, methods, procedures, techniques, and sequences of construction and safety and protection measures incident thereto.
 - b. Certain final designs that, in accordance with commonly accepted practice, are typically prepared by unlicensed, unregistered individuals, including for manufactured or fabricated systems, components or assemblies, not acting under the supervisory control of the design professional in responsible charge, but who commonly possess appropriate certification from a relevant industry organization, together with appropriate training and experience.
- C. Related Requirements:
1. Sections of Divisions 02-49 where delegated design Work is required.

1.2 REFERENCES

- A. Terminology:
1. Terminology indicated below are not defined terms and are not indicated with initial capital letters but, when used in this Section and Specifications of Division 02-49 where delegated design Work is required, have the meaning indicated below:

- a. "Delegated design" means preparing the final design of part of the completed, permanent Work by one or more delegated design professionals, in accordance with the Contract Documents. The terms "delegated design", "delegated design services", "delegation of design responsibility", and similar or derivative terms have the same meaning.
- b. "Delegated design professional" means the licensed and registered engineer, architect, geologist, or other design professional retained by or employed by Contractor, Subcontractor, or Supplier to perform delegated design services for delegated design Work and possessing appropriate experience and qualifications for such delegated design services.
- c. "Delegated design Work" means delegated design services, associated construction, and related Work.
- d. "Instruments of service", relative to delegated designs, means delegated design professional's: (1) certifications (including delegated design professional's certification of compliance, as required in this Section, and other certifications required of delegated design professional), (2) reports (where required), (3) design drawings, (4) design specifications, (5) other documents specifically indicated as delegated design professional's "instruments of service" in the Contract Documents, and (6) documents modifying a delegated design (after Engineer's approval of the original delegated design Submittals). "Instruments of service" are to be sealed, signed, and dated by delegated design professional and expressly required as Submittals. Shop Drawings sealed and signed by delegated design professional are delegated design professional's "instruments of service".

1.3 GENERAL PROVISIONS CONCERNING DELEGATED DESIGN SERVICES

- A. Delegated Designs - General:
 - 1. This Section augments the requirements of the General Conditions, as may be amended by the Supplementary Conditions, and other provisions of the Contract Documents regarding Contractor's responsibilities for delegated design Work.
 - 2. Delegated design professionals or their employer shall furnish professional liability insurance. Provisions on professional liability insurance are set forth in the Supplementary Conditions. Submit through Contractor appropriate documentation of professional liability insurance.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordination - General:
 - a. Contractor shall coordinate the services of delegated design professionals with all other elements of the Work.
 - b. Contractor has full responsibility for scheduling delegated designs and all related Work.
 - c. Allow sufficient time in Progress Schedule for performance of delegated design services, including requests for interpretation or clarification between delegated design professional and Contractor and between Contractor and Engineer.
 - 2. Coordination of Delegated Design Work's Connections to Other Work:
 - a. Where delegated design Work connects to other Work designed by Engineer, existing construction, or both, the delegated design Work shall be consistent with the other Work and existing construction to which delegated design Work connects, and adjacent construction.
 - b. Submit details, loading, anchorage, and other coordinating information necessary for the delegated design Work to properly interface with Work designed by Engineer.

- c. Changes in the Work, whether designed by Engineer, designed by delegated design professional, or existing construction, necessary as a result of the delegated design are ineligible for increase in Contract Price or Contract Times, unless: (1) otherwise agreed by both Engineer and Owner, or (2) expressly indicated otherwise elsewhere in the Contract Documents for the associated delegated design Work.
- d. Changes requiring extra compensation, time, or both arising from delegated design aspects needed for convenience of Contractor, Subcontractor, or Supplier, are not grounds for increase in Contract Price or Contract Times.
- 3. Coordination of Submittals, Fabrication, Production, and Shipment:
 - a. Do not release for raw materials procurement, fabrication, production, and shipment to the Site materials, equipment, or systems designed by delegated design professional until the associated delegated design professional has reviewed and approved all associated Shop Drawings, product data, Samples, and (relative to shipment) source quality control Submittals, and such Submittals have been delivered to and accepted by Engineer.
 - 1) For delegated design systems that required reactions to be submitted to the Engineer. These submittals shall be submitted and approved first before approval is given for the delegated design submittal.
 - b. Allow sufficient time in the Progress Schedule for required Submittals and required actions by delegated design professionals and Engineer.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Delegated Design Professionals:
 - a. Each delegated design professional shall possess not less than the minimum qualifications set forth in this provision. Where the Specifications for the associated delegated design Work establish more-stringent qualifications requirements, comply with the more-stringent requirements.
 - b. Each delegated design professional shall comply with all of the following:
 - 1) Legally qualified, as both an individual and as a business entity, to practice the associated design discipline(s) in the jurisdiction where the Site is located, including possessing current, valid license and registration for the design discipline(s) for which the delegated design professional will render its services on the Project.
 - 2) Possess not less than five years of experience in the subject design discipline(s).
 - 3) Served as design professional in responsible charge on not less than five other designs similar in scope and complexity to the Work for which delegated design professional is retained on the Project; construction of such prior projects shall be complete by the start of the Project's construction.
 - c. Summary of Qualifications: Submit to Engineer summary of delegated design professional's experience and qualifications, including:
 - 1) Evidence of coverage under appropriate professional liability insurance in accordance with the Contract Documents.
 - 2) Evidence of delegated design professional's ability to legally conduct business as a design professional in the same jurisdiction as the Site, as a business entity.
 - 3) Copy of delegated design professional's current, valid personal design professional license and registration for the same jurisdiction as the Site. Such documents shall indicate the individual's name, license or registration number, and dates for which the license or registration is valid.
 - 4) Other information reasonably requested by Engineer.

1.6 GENERAL PROVISIONS FOR DELEGATED DESIGN SUBMITTALS

- A. Under the Division 02-49 Specifications section(s) where delegated design Work is required, furnish to Engineer Submittals such as:
 - 1. Action Submittals:
 - a. Delegated design professional's instruments of service Submittals.
 - 2. Informational Submittals:
 - a. When delivered to Engineer, the following must bear delegated design professional's Submittal approval stamp:
 - 1) Shop Drawings, product data Submittals, Samples, testing plans.
 - 2) Results of source quality control and field quality control activities.
 - b. Delegated design professional's calculations.
 - c. Other Informational Submittals required for the subject delegated design Work.
- B. Limitations of Engineer's Review of Delegated Design Submittals:
 - 1. Delegated Design Professional's Instruments of Service Submittals:
 - a. Engineer's review of delegated design Instruments of Service Submittals is for the limited purposes indicated in this Section's "General Provisions Concerning Delegated Designs" Article.
 - b. The following disclaimer applies to Engineer's responses to delegated design professional's instruments of service Submittals:
 - 1) Engineer's review and approval of delegated design instruments of service is only for the limited purpose of verifying that performance and design criteria given in the Contract were used in the delegated design, and checking for compliance with the Engineer's design concept expressed in the Contract Documents.
 - 2) Contractor is solely responsible for complying with: the Contract Documents, Subcontractor and Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations.
 - 3) Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the Work of all trades.
 - 4) Engineer is not responsible for the effects of resubmittals or tracking progress of resubmittals.
 - 2. Delegated Design Informational Submittals:
 - a. Other provisions of the Contract Documents notwithstanding, Engineer's review of delegated design Informational Submittals is limited to only:
 - 1) Verifying the Submittal was furnished as required; and
 - 2) Submittal generally appears complete (except for calculations); and
 - 3) Submittal bears delegated design professional's approval stamp; or, for calculations prepared by or for delegated design professional, that such calculations bear delegated design professional's seal, signature, and date; or, for delegated design professional's reports of visits to the Site, that such report is legible, and bears delegated design professional's signature with date.
 - b. Engineer receives such Submittals, including delegated design professional's calculations, on behalf of Owner, for Owner's records.
 - c. Engineer, Owner, and others involved in the Project have the right to rely on delegated design professional's approval stamp as meaning that the delegated design professional has performed and appropriate review of the Submittal and determined it to be complete, in accordance with delegated design professional's instruments of service approved by Engineer, in accordance with delegated design professional's design intent, and in accordance with the Contract Documents.

3. Engineer's Other Comments on Delegated Design Submittals:
 - a. Despite the limitations of Engineer's review of Submittals for delegated design Work, should Engineer become aware of, or reasonably suspect existence of, potential of associated delegated design Work to adversely affect health, safety, or welfare of persons, or pose reasonable potential for damage to the Work, work of other contractors, or adjacent property, Engineer will advise Contractor in writing of general nature of Engineer's concern.
 - b. Such advisory by Engineer, if issued, is rendered in good faith and does not in any way constitute:
 - 1) Engineer's review of all aspects of the delegated design.
 - 2) Any sharing by Engineer of any of delegated design professional's responsibilities or professional liability.
 - 3) Any responsibility imposed, in any way, on Engineer for any aspect of the delegated design professional's services or design, beyond the limited purposes of Engineer's review as set forth in the Contract Documents.
 - c. Contractor and its Subcontractors and Suppliers, including delegated design professionals, shall immediately investigate Engineer's concern indicated in such advisory and remedy as necessary and required.
 - d. Neither Engineer nor Owner, nor their respective consultants and subcontractors, is obligated to review any Submittal for delegated design Work beyond the limited review required by the Contract Documents. No such advisory, if issued, entitles Contractor, Subcontractor, or Supplier, including delegated design professionals, to rely on such advisory or to assume that any further such reviews or written or oral advisories are forthcoming.

1.7 RESPONSIBILITIES OF DELEGATED DESIGN PROFESSIONALS

- A. Standard of Care:
 1. Unless a higher standard of care is established by the Division 02-49 Specifications section where the associated delegated design Work is required, the delegated design services shall comply with the following standard of care:
 - a. Except as provided in the paragraph immediately above this, the standard of care for all delegated design professional services and related services performed or furnished by delegated design professionals for the Project will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality.
- B. Responsibilities of delegated design professionals employed on the Work include, but are not necessarily limited to, the following, unless specifically indicated otherwise in the associated elements of the Contract Documents where the delegated design is required:
 1. Ethical Conduct and Professionalism: Comply with Laws and Regulations and applicable standards and guidelines relevant design professional organizations for ethical conduct and professional practice.
 2. Comply with Laws and Regulations and relevant design standards applicable to the subject delegated design Work.
 3. Performance and Design Criteria Indicated in the Contract Documents and Other Information:
 - a. Review performance and design criteria, indicated in the Contract Documents, that the delegated design Work must satisfy.
 - b. Prepare written requests for interpretations or clarifications of performance or design criteria.
 4. Site Information and Investigations: With Contractor, obtaining all other necessary dimensions, field information, and other information necessary for preparing delegated design Submittals.

5. Design and Other Professional Services: Personally perform and prepare, or actively exercise direct, personal, supervisory control over others performing or preparing:
 - a. Necessary design professional evaluations of conditions, materials, and equipment.
 - b. Prepare the instruments of service Submittals and calculations Submittal for the subject delegated design Work, where required by the associated Division 02-49 Specifications and other, associated Contract Documents.
 - c. Assist Contractor with applying for and obtaining permits and approvals (not previously obtained by Owner or those for whom Owner is responsible) necessary for the delegated design Work.
 - d. Review and approve or take other appropriate action on Shop Drawings (unless such Shop Drawings are sealed and signed by delegated design professional), product data, Samples, and testing plans, and other Submittals associated with the delegated design Work.
 - e. Prepare modifications of the delegated design instruments of service as necessary.
6. Sealing and Signing:
 - a. Seal, sign, and indicate date of sealing and signing, on all of the following when such Submittals are required by the Division 02-49 Specifications where the delegated design Work is required:
 - 1) Instruments of service Submittals, including certification of compliance required.
 - 2) Calculations.
 - 3) Modifications to the delegated design.
 - 4) Other documents required to be sealed and signed by Laws or Regulations or the Contract Documents.
 - b. Sealing and signing documents in accordance with Laws and Regulations and the Contract Documents, prior to submittal (through Contractor) to Engineer, and for submittal to authorities having jurisdiction to obtain necessary permits and approvals.
 - c. Sealing and signing shall be in accordance with Laws and Regulations.
7. Certification of Compliance by Delegated Design Professional:
 - a. Schedule:
 - 1) Submit certification of compliance after Engineer's acceptance of delegated design professional's qualifications statement.
 - 2) Obtain Engineer's approval of certificate of compliance Submittal prior to furnishing other Submittals for delegated design Work under the same Specifications section, unless otherwise allowed by Engineer.
 - b. Through Contractor, submit to Engineer, delegated design professional's written certification indicating:
 - 1) General Information: (1) Project name and designation, (2) Contractor name and Contract designation, (3) Subcontractor or Supplier name (when applicable), (4) full name of delegated design professional's business entity under which the delegated design services were performed, (5) full name and license number of the individual sealing and signing the subject delegated design Work, (6) specific elements of delegated design Work to which the certification applies, and (7) delegated design professional's seal, signature, and date of signature.
 - c. Explicit certification that the subject delegated design complies with:
 - 1) All applicable performance and design criteria indicated in the Contract Documents. Expressly indicate on certification of compliance the specific performance and design criteria used in the delegated design, and reaction forces of the delegated design imparted to other Work and existing construction. Reaction forces imparted from the delegated design elements to the Engineer's designed system shall include the following:

- a) Reaction forces imparted from the delegated design elements to the Engineer's designed system shall be presented as follows:
 - (1) Unfactored loads per category (dead, live, wind, seismic, etc.).
 - (2) Load combinations presented in Load Factor Resistance Design (LRFD) format from each element transmitting load.
 - b) All Laws and Regulations.
 - c) Applicable design standards commonly applicable to such types of construction. Expressly indicate such design standards on the certification of compliance.
 - d) The applicable standard of care. Expressly indicate the applicable standard of care.
- 8. Approvals of Other Delegated Design Submittals:
 - a. Review and taking appropriate action on Submittals for delegated designs:
 - b. Such reviews and approvals or other appropriate action shall be to ascertain compliance with:
 - 1) Delegated design professional's design intent.
 - 2) Delegated design professional's instruments of service and calculations.
 - 3) Associated requirements of the Contract Documents.
 - c. Delegated design professional's review stamp or facsimile thereof, review action or disposition concerning the associated Submittal for the delegated design, date of review, and name of person performing the review shall be clearly legible on the associated Submittals (except for delegated design professional's own instruments of service Submittals, calculations, and reports of delegated design professional's visits to the Site). Prominently display delegated design professional's Submittal review stamp or facsimile thereof on: (1) each sheet of Shop Drawings, (2) each major section of product data Submittals, (3) each Sample, (4) each testing plan, and (5) each other Submittal associated with the delegated design for which such review stamp is required.
 - d. Do not apply delegated design professional's Submittal review stamp and comments, if any, over other text, tables, or graphics.
 - e. Where review stamp or facsimile thereof is required, submit to Engineer only those Submittals for delegated design Work that bear delegated design professional's explicit approval of the Submittal.
- 9. Respond promptly to requests for interpretation or clarification on delegated design professional's instruments of service and other Submittals for the delegated design Work.
- 10. Progress and Quality of Construction of Delegated Design Work:
 - a. Where appropriate for the subject delegated design Work, periodically visit the Site at appropriate intervals to observe the progress and quality of the subject delegated design Work.
 - b. Where delegated design professional does not visit the Site during construction, keep informed of the progress and quality of the subject delegated design Work via discussions with Contractor, Subcontractor, and Suppliers, via photographic documentation, and other means acceptable to delegated design professional.
 - c. Advise Contractor in writing when the subject delegated design Work is not in accordance with the delegated design professional's instruments of service (approved by Engineer) and related Submittals approved by delegated design professional.
 - d. Furnish to entity that retained delegated design professional copy of delegated design professional's written report of each visit to the Site.
- 11. Modifications to Design:
 - a. Design appropriate modifications to the delegated design Work, including preparing new or revised certifications, reports, design drawings, sketches, design specifications, and calculations, as appropriate.

- b. Such instruments of service and calculations shall be submitted to Engineer through Contractor to same extent original instruments of service Submittals and calculations, if any, where required by the Contract Documents for the subject delegated design Work.
12. Other services, as mutually agreed upon by delegated design professional and its client, or as required elsewhere in the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 41 24
PERMIT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements relative to permitting of which Owner and Engineer are aware that apply to the Work.
 - 2. Required municipal permits and licenses of which Owner and Engineer are aware.
- B. Scope:
 - 1. Contractor shall provide labor, materials, equipment, tools, and incidentals shown, specified, and required to obtain required permits and comply with required permits and licenses.
 - 2. Obtain, pay for, and comply with required permits and licenses whether or not indicated in this Specifications section or elsewhere in the Contract Documents.
- C. Related Requirements:
 - 1. In addition to permits and licenses required under this Specifications section, obtain and comply with permits required under the following Specifications:
 - a. Section 01 35 43.13 - Environmental Procedures for Hazardous Materials.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compliance with permit and license requirements with Work under other Specifications sections and with other contractors, if any, working at the Site.
 - 2. Coordinate with the Progress Schedule the time required to apply for and obtain required permits and licenses and to comply with requirements thereof. Changes in Contract Times or Contract Price will not be authorized because of timing and costs associated with obtaining permits and licenses required for the Work.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Copy of each of the following permits, as applicable to the Work:
 - a. Road Closure Permit.
 - b. Air Quality Permit.
 - 2. Copy of each of the following licenses, as applicable to the Work:
 - a. General Contractor's License.
 - b. Electricians License.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 42 00 REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Defined terms and terminology.
 2. Abbreviations in general use in the Contract Documents.
 3. Reference Standards: General requirements regarding reference standards, including a listing of reference standard-issuing organizations (and their acronyms) used in the Contract Documents.

1.2 REFERENCES

- A. Contract Language Addressed to Contractor:
1. Unless expressly indicated otherwise, language of the Contract Documents addresses Contractor, and the Contract Documents show and indicate Contractor's obligations.
 2. Unless indicated otherwise, expressions such as, "provide", "furnish", "install", "perform", "retain services of", "remove", "demolish", "replace", and the like refer to Contractor's obligations under the Contract.
- B. Defined Terms:
1. Defined terms, indicated with initial capital letters or with all-capital letters, used in the Contract Documents, are indicated in the General Conditions, as may be modified by the Supplementary Conditions. Additional defined terms, if any, in general use in the Contract Documents are indicated below. Where used, such defined terms apply to the singular and plural thereof.
 - a. None.
 2. Additional defined terms, applicable to the Work of a given Specifications Section, may be indicated in the associated Specifications Section.
- C. Terminology:
1. Terminology, indicated without initial capital letters, used in the Contract Documents, are indicated in the General Conditions, as may be modified by the Supplementary Conditions. Additional terminology in general use in the Contract Documents are indicated below. Where used, such terminology applies to the singular and plural thereof.
 - a. "Shown" means information or requirements presented on the Drawings, in schedules, or in other types of graphic instruments.
 - b. "Indicated" means, as applicable: (1) graphic representations, notes, or schedules on the Drawings, or (2) other paragraphs, provisions, tables, or schedules in the Specifications and elsewhere in the Contract Documents.
 - c. "Specified", "noted", "scheduled", and similar terms, have the same meaning as "shown" and "indicated", as applicable, and are used to help the user locate the reference without limitation on the location.
 - d. "Installer", "applicator", or "erector" is Contractor's employees or Subcontractor, engaged to perform a specific construction activity, including installation, erection, application, or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.
 - e. "Experienced", when used in conjunction with terms such as "installer", "Subcontractor", "Supplier", "manufacturer", and similar terms means (unless expressly indicated otherwise for the subject Work elsewhere in the Contract Documents) such person or entity, as applicable, has successfully completed not less than five previous projects similar in size, scope, and complexity to such person's or entity's work on this Project; being familiar with the special requirements indicated and required; being familiar with Laws and Regulations; and having complied with requirements of authorities having

jurisdiction, and complying with written requirements of the Supplier of the material or equipment being installed.

- f. "Assigned specialists" and similar terms: Certain Specifications require specific construction activities be performed by specialists with recognized, extensive experience in such operations. Engage said specialists for such activities, and their engagement is a requirement over which Contractor has no option. These requirements do not conflict with enforcement of building codes and other Laws and Regulations. Such requirements are not intended to interfere with local trade union jurisdictional settlements and similar conventions. Such assignments shall not relieve Contractor of responsibility for complying with the requirements of the Contract Documents.
 - g. Trades: Use of terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter", unless otherwise indicated in the Contract Documents or required by Laws or Regulations, or required by an applicable project labor agreement. Such terminology also does not imply that indicated requirements apply exclusively to trade personnel of the corresponding generic name.
2. Additional terminology, applicable to the Work of a given Specifications Section, may be indicated in the associated Specifications Section.

1.3 ABBREVIATIONS.

A. Abbreviations - General:

- 1. Abbreviations commonly used in the Contract Documents are indicated in this Article or on the Drawings, except as further indicated in the following paragraphs.
- 2. Additional abbreviations, specific to the Work of a given Specifications section, may be indicated in the associated Specifications.
- 3. Typical equipment abbreviations are indicated in Section 01 61 03 - Equipment - Basic Requirements.
- 4. Piping system abbreviations are indicated in Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.

B. Common abbreviations that may be used in the Contract Documents are indicated below, alphabetically by their written-out meaning:

| | |
|--|-------------------|
| alternating current | AC |
| ampere | A, or amp |
| Americans with Disabilities Act | ADA |
| Americans with Disabilities Act Accessibility Guidelines | ADAAG |
| ante meridian | a.m. |
| Architectural Barriers Act | ABA |
| average | avg |
| biochemical oxygen demand | BOD |
| five-day biochemical oxygen demand | BOD ₅ |
| brake horsepower | Bhp or BHP |
| British thermal unit | Btu |
| building information model | BIM |
| carbonaceous biochemical oxygen demand | CBOD |
| five-day carbonaceous biochemical oxygen demand | CBOD ₅ |
| chemical oxygen demand | COD |

| | |
|--|---|
| Celsius (or Centigrade) | C |
| chlorinated polyvinyl chloride | CPVC |
| chlorofluorocarbons | CFC |
| Code of Federal Regulations | CFR |
| computer-aided drafting and design | CADD, or CAD |
| cubic inch | cu in, or CU IN, or in ³ |
| cubic foot | cu ft, or CU FT, cf, CF, or ft ³ |
| cubic yard | cu yd, or CU YD, or CY, or yd ³ |
| cubic feet per minute | CFM, or cfm |
| cubic feet per second | CFS, or cfs |
| decibel | dB, dBA, or dBa |
| degree Celsius | degrees C, °C, or deg C |
| degrees Fahrenheit | degrees F, °F, or deg F |
| diameter | dia |
| direct current | DC |
| dollars | \$ |
| each | ea |
| efficiency | eff |
| Fahrenheit | F |
| feet | ft or FT |
| feet per hour | FPH, or ft/hr |
| feet per minute | FPM or ft/min |
| feet per second | fps, or ft/s |
| figure | fig |
| flange | flg |
| foot-pound | ft-lb or FT-LB |
| gallon | gal or GAL |
| gallons per hour | GPH, gph, or gal/hr |
| gallons per minute | GPM, or gpm |
| gallons per second | GPS, or gps |
| gram | g |
| grams per liter | g/L |
| heating, ventilating, and air conditioning | HVAC |
| Hertz | Hz |
| horsepower | hp or HP |
| hour | hr or HR |
| human-machine interface | HMI |

| | |
|--|-------------------------|
| inch | in. or IN |
| inches of mercury | in. Hg |
| inches water gage | in. w.g. |
| inch-pound | in.-lb |
| inside diameter | ID |
| iron pipe size | IPS |
| thousand pounds | kips |
| thousand pounds per square inch | ksi or KSI |
| kilovolt-ampere | kva, or kVA |
| kilowatt | Kw, or |
| kilowatt-hour | Kwhr, kWhr, or kwh, kWh |
| linear foot | lin ft or LF |
| liter | L |
| Leadership in Energy and Environmental Design (USGBC) | LEED |
| maximum | max |
| mercury | Hg |
| mile | mi |
| miles per hour | mph or MPH |
| milligram | mg |
| milligrams per liter | mg/l or mg/L |
| milliliter | ml |
| millimeter | mm |
| million gallons per day | MGD or MGD |
| million gallon | MG |
| minimum | min |
| national pipe threads | NPT |
| net positive suction head | NPSH |
| net positive suction head available | NPSHA |
| net positive suction head required | NPSHR |
| nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) and nitrogen dioxide (NO ₂)) | NO _x |
| nominal pipe size | NPS |
| number | no. or #. |
| operator interface terminal | OIT |
| ounce | oz |
| ounce-force | ozf |
| outside diameter | OD |
| parts per hundred | PPH, or pph |

| | |
|---------------------------------|--|
| parts per million | PPM, or ppm |
| parts per billion | PPB, or ppb |
| polychlorinated biphenyl | PCB |
| polyvinyl chloride | PVC |
| post meridian | p.m. |
| pound | lb, LB, lbs, or LBS |
| pounds per square inch | PSI, or psi |
| pounds per square inch absolute | PSIA, or psia |
| pounds per square inch gauge | PSIG, or psig |
| pounds per square foot | PSF, or psf |
| process control system | PCS |
| programmable logic controller | PLC |
| revolutions per minute | RPM, or rpm |
| second | sec, or s |
| specific gravity | sp gr, or SG |
| square | sq |
| square foot | sq ft, or SQ FT, or sf, or ft ² |
| square inch | sq in., or SQ IN, or in ² |
| square yard | sq yd, or SY, or yd ² |
| standard | std |
| standard cubic feet per minute | SCFM, or scfm |
| total dynamic head | TDH |
| totally-enclosed fan-cooled | TEFC, or tefc |
| volt | V |
| volts alternating current | VAC, or vac |
| volts direct current | VDC, or vdc |
| volatile organic compounds | VOC |

1.4 REFERENCE STANDARDS AND ORGANIZATIONAL ACRONYMS

A. Reference Standards - General:

1. Each entity engaged in the Work, including Contractor, Subcontractors, and Suppliers, shall be familiar with reference standards applicable to its portion(s) of the Work. Comply with such reference standards when required by the Contract Documents or appropriate fabrication and construction practice, unless the Contract Documents requirements exceed those of the associated reference standard.
2. Refer to the General Conditions, as may be modified by the Supplementary Conditions, relative to reference standards and resolving discrepancies between reference standards and the Contract Documents.
3. Provisions of reference standards are in effect in accordance with the Specifications and other provisions of the Contract Documents where reference standards are cited.

4. Copies of applicable reference standards are not included in or bound with the Contract Documents. Where reference standards are needed for the Work, obtain such reference standards(s) from the publication source.

B. Organization Names and Acronyms:

1. Where reference standards, specifications, manuals, Laws or Regulations, or other published data of international, national, regional, or local organizations are cited in the Contract Documents, the organization issuing the standard (or other type of document) may be referred to by its acronym only.
2. The following acronyms that may appear in the Contract Documents shall have the meanings indicated below, unless expressly indicated otherwise in that part of the Contract Documents where such standard (or other document) is cited.
3. Listing is alphabetical by acronym.

| | |
|-----------|---|
| AA | Aluminum Association |
| AABC | Associated Air Balance Council |
| AAMA | American Architectural Manufacturers Association |
| AAR | Association of American Railroads |
| AASHTO | American Association of State Highway and Transportation Officials |
| ABMA | American Bearing Manufacturers Association (formerly Anti-Friction Bearing Manufacturers Association (AFBMA)) |
| ACI | American Concrete Institute |
| ACS | American Chemical Society |
| ADSC-IAFD | International Association of Foundation Drilling. |
| AEIC | Association of Edison Illuminating Companies |
| AF&PA | American Forest and Paper Association |
| AGI | American Geosciences Institute |
| AGMA | American Gear Manufacturers Association |
| AI | Asphalt Institute |
| AIA | American Institute of Architects |
| AIChE | American Institute of Chemical Engineers |
| AIPG | American Institute of Professional Geologists |
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| AITC | American Institute of Timber Construction |
| ALSC | American Lumber Standards Committee |
| AMA | Acoustical Materials Association |
| AMCA | Air Movement and Control Association |
| AMP | National Association of Architectural Metal Manufacturers, Architectural Metal Products Division |
| AMPP | Association for Materials Protection and Performance |
| ANSI | American National Standards Institute |
| APA | The Engineered Wood Association |
| APHA | American Public Health Association |

| | |
|--------|---|
| API | American Petroleum Institute |
| AREA | American Railway Engineering Association |
| ARI | Air Conditioning and Refrigeration Institute |
| ARS | American Rail Standard |
| ASAE | American Society of Agricultural Engineers |
| ASCE | American Society of Civil Engineers |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASNT | American Society for Non-Destructive Testing |
| ASQ | American Society for Quality |
| ASSE | American Society of Safety Engineers |
| ASTM | American Society for Testing and Materials |
| AWCI | Association of the Wall and Ceiling Industry |
| AWI | Architectural Woodwork Institute |
| AWPA | American Wood Protection Association |
| AWPI | American Wood Preservers Institute |
| AWS | American Welding Society |
| AWWA | American Water Works Association |
| BAAQMD | Bay Area Air Quality Management District |
| BHMA | Builders Hardware Manufacturers Association |
| BIA | Brick Industry Association |
| CASE | Coalition of American Structural Engineers (part of the American Council of Engineering Companies (ACEC)) |
| CBMA | Certified Ballast Manufacturers Association |
| CBP | United States Customs and Border Protection |
| CDA | Copper Development Association |
| CEMA | Conveyor Equipment Manufacturers Association |
| CGA | Compressed Gas Association |
| CISCA | Ceilings and Interior Systems Construction Association |
| CISPI | Cast Iron Soil Pipe Institute |
| CLFMI | Chain Link Fence Manufacturers Institute |
| CMAA | Crane Manufacturers Association of America |
| CRSI | Concrete Reinforcing Steel Institute |
| CSI | Construction Specifications Institute |
| DBIA | Design-Build Institute of America |
| DHS | United States Department of Homeland Security |
| DIN | Deutsches Institut für Normung, eV (German Institute for Standardization) |
| DIPRA | Ductile Iron Pipe Research Association |
| EJCDC | Engineers Joint Contract Documents Committee |

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|--------|--|
| EJMA | Expansion Joint Manufacturers Association, Inc. |
| ETL | Intertek Testing Services, Inc. (formerly ETL Testing Laboratories, Inc.) |
| FAA | Federal Aviation Administration (US Department of Transportation) |
| FCC | United States Federal Communications Commission |
| FEMA | Federal Emergency Management Agency (US Department of Homeland Security) |
| FHWA | Federal Highway Administration (US Department of Transportation) |
| FIDIC | International Federation of Consulting Engineers |
| FM | Factory Mutual (FM Global) |
| FRPI | Fiberglass Reinforced Plastics Institute |
| FS | Federal Specification |
| FTA | Federal Transit Administration, United States Department of Transportation |
| GA | Gypsum Association |
| GANA | Glass Association of North America |
| HEW | United States Department of Health, Education and Welfare |
| HI | Hydraulic Institute |
| HMI | Hoist Manufacturers Institute |
| HUD | United States Department of Housing and Urban Development |
| IBC | International Building Code |
| ICC | International Code Council |
| ICEA | Insulated Cable Engineers Association |
| IEEE | Institute of Electrical and Electronics Engineers |
| IESNA | Illuminating Engineering Society of North America |
| IFI | Industrial Fasteners Institute |
| IRI | Industrial Risk Insurers |
| ISA | International Society of Automation |
| ISI | Institute for Sustainable Infrastructure |
| ISO | Insurance Services Office |
| ISO | International Organization for Standardization |
| LPI | Lightning Protection Institute |
| MIA | Marble Institute of America |
| ML/SFA | Metal Lath/Steel Framing Association |
| MS | Military Specifications |
| MSS | Manufacturers' Standardization Society |
| MMA | Monorail Manufacturers Association |
| NAAMM | National Association of Architectural Metal Manufacturers |
| NACE | National Association of Corrosion Engineers |
| NAPF | National Association of Pipe Fabricators, Inc. |
| NARUC | National Association of Regulatory Utilities Commissioners |

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|--------|---|
| NAVFAC | Naval Facilities Engineering Command (US Navy) |
| NBHA | National Builders Hardware Association |
| NBS | National Bureau of Standards (United States Department of Commerce) |
| NCMA | National Concrete Masonry Association |
| NEC | National Electric Code |
| NELMA | Northeastern Lumber Manufacturers' Association |
| NEMA | National Electrical Manufacturers Association |
| NEPA | National Environmental Policy Act |
| NESC | National Electrical Safety Code |
| NETA | International Electrical Testing Association |
| NFPA | National Fire Protection Association |
| NFRC | National Fenestration Rating Council |
| NGA | National Glass Association |
| NHLA | National Hardwood Lumber Association |
| NHPMA | Northern Hardwood and Pine Manufacturers Association |
| NICET | National Institute for Certification in Engineering Technologies |
| NIST | National Institute of Standards and Technology (United States Department of Commerce) |
| NLGA | National Lumber Grades Authority |
| NRC | United States Nuclear Regulatory Commission |
| NRCA | National Roofing Contractors Association |
| NRMCA | National Ready Mixed Concrete Association |
| NSF | National Sanitation Foundation |
| NSPE | National Society of Professional Engineers |
| NSSGA | National Stone, Sand, and Gravel Association |
| NTMA | National Terrazzo and Mosaic Association |
| OSHA | Occupational Safety and Health Administration, United States Department of Labor |
| PCA | Portland Cement Association |
| PCI | Precast/Prestressed Concrete Institute |
| PEI | Porcelain Enamel Institute |
| PFI | Pipe Fabrication Institute |
| PPI | Plastics Pipe Institute |
| PGMC | Primary Glass Manufacturers Council |
| PS | Product Standards Section, United States Department of Commerce |
| RCSC | Research Council on Structural Connections (part of AISC) |
| RMA | Rubber Manufacturers Association |
| RUS | Rural Utility Service (division of Rural Development of the USDA) |
| SAE | Society of Automotive Engineers |
| SCAQMD | Southern California Air Quality Management District |

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|---------|--|
| SCPRF | Structural Clay Products Research Foundation |
| SCTE | Society of Cable Telecommunications Engineers |
| SDI | Steel Deck Institute |
| SDI | Steel Door Institute |
| SIGMA | Sealed Insulating Glass Manufacturing Association |
| SJI | Steel Joist Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractor's National Association |
| SPI | Society of the Plastics Industry |
| SPIB | Southern Pine Inspection Bureau |
| SSPC | Society for Protective Coatings (formerly, Steel Structures Painting Council) |
| SWI | Steel Window Institute |
| TCNA | Tile Council of North America |
| TEMA | Tubular Exchanger Manufacturers Association |
| TIA/EIA | Telecommunications Industry Association/Electronic Industries Alliance |
| TSA | Transportation Security Administration (United States Department of Homeland Security) |
| UCC | Uniform Commercial Code |
| UL | Underwriters Laboratories, Inc. |
| USAB | United States Access Board |
| USACE | United States Army Corps of Engineers (also abbreviated as COE or USACOE) |
| USDA | United States Department of Agriculture |
| USDOE | United States Department of Energy |
| USDOT | United States Department of Transportation |
| USEPA | United States Environmental Protection Agency |
| USGBC | United States Green Building Council |
| USGS | United States Geological Survey |
| USPHS | United States Public Health Service |
| WCLIB | West Coast Lumber Inspection Bureau |
| WCMA | Window Covering Manufacturers Association |
| WCMA | Wood Component Manufacturers Association |
| WDMA | Window and Door Manufacturers Association |
| WEF | Water Environment Federation (formerly the Water Pollution Control Federation) |
| WWEMA | Water and Wastewater Equipment Manufacturers Association |
| WWPA | Western Wood Products Association |

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 52 53
TEMPORARY PUMPING AND SLUDGE SCREENING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for temporary pumping and sludge screening during digester cleaning and transfer of sludge between tanks.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, tools, equipment, and incidentals shown or indicated for temporary pumping and handling of fluids and slurries during the Project.
 - 2. This Section does not address temporary handling of storm water runoff at the Site, which is addressed in Section 01 57 05 - Temporary Controls.
- C. Related Requirements: Include, but are not necessarily limited to, the following:
 - 1. Section 01 14 16 - Coordination with Owner's Operations.
 - 2. Section 01 35 44 - Spill Prevention Control and Countermeasures Plan.
 - 3. Section 01 57 05 - Temporary Controls.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Owner, the locations of temporary pumping systems and appurtenances.
- B. Scheduling and Sequencing:
 - 1. Include on the Progress Schedule separate activities for set up, check out, and testing of each temporary pumping system; operation of each temporary pumping system; removal of temporary pumping system; and associated restoration.
 - 2. Where necessary include on the Progress Schedule separate activities for shut downs, installation, and removal of temporary plugs, bulkheads, and line stops, and other Work associated with temporary pumping.
 - 3. Submit Progress Schedule with required temporary pumping activities prior to furnishing temporary pumping Submittal required by this Section.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Provide, operate, and maintain temporary pumping systems in accordance with Laws and Regulations.
 - 2. Comply with Laws and Regulations relative to locations of temporary pumping systems (including effect, if any, on public transportation routes and facilities and private property), secondary containment (regarding temporary fuel storage), air quality (relative to emissions from internal combustion engines), water quality (regarding leakage and cleanout of temporary pumping systems), compliance with facility operating permits, and other matters.
 - 3. Onsite fuel storage for temporary pumping systems shall be included in Contractor's spill prevention control and countermeasures plan required by Section 01 35 44 – Spill Prevention Control and Countermeasures Plan.
- B. Qualifications:
 - 1. Temporary Pumping System Supplier or Subcontractor:
 - a. Retain a single Supplier or Subcontractor to furnish, install, operate, and remove temporary pumping systems required for the Project.

- b. Supplier or Subcontractor shall possess not less than five years of experience providing temporary pumping systems similar in size or larger than those required for the Project.
- c. Upon request, submit evidence of having previously provided not less than five temporary pumping systems on other projects similar in size (or larger) and similar in service to temporary pumping systems required for the Project.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Temporary pumping plan:

- a. Submit the following for each required temporary pumping system not less than 30 days prior to delivery of temporary pumping system to the Site:
 - 1) Layout Drawings:
 - a) Sketches showing proposed layout of temporary pumping system, including locations of temporary plugs, bulkheads, and line stops; suction and discharge locations; location of pumps and associated piping and valves; and source of power for temporary pumping system. Sketches shall be scale drawings acceptable to Engineer, and shall include site plans similar to those in the Contract Documents.
 - b) Details of system suction and discharge locations. Discharge details shall include measures to protect the receiving structure and dissipate energy.
 - c) Where temporary lines will be buried, submit trench details. Submit sketches and information on other types of protection proposed for temporary piping.
 - 2) System curve of flow plotted against total dynamic head, and calculations that substantiate the proposed temporary pumping system, including comparison of net positive suction head required and net positive suction head available.
 - 3) Manufacturer's data and specifications on each type and size of pump proposed and its capacity, including pump curves.
 - 4) Manufacturer's data and specifications for engines and other equipment required for temporary pumping system, including expected exhaust emissions data. Furnish information on emissions air pollution control system, when proposed, together with expected air quality of emissions.
 - 5) Technical information and specifications on noise controls for noise-emitting equipment.
 - 6) Technical data on temporary piping, pipe joints, valves, pipe supports, controls, flow meter, secondary containment for fuel tanks, and other information pertinent to the temporary pumping system.
 - 7) Temporary Plugs, Bulkheads, and Line Stops: Manufacturer's literature and fabrication drawings showing type of plug, bulkhead or line stop as applicable, materials, and hydrostatic head that the plug, bulkhead, or line stop is designed to withstand. Submit complete technical information for Contractor-proposed line stops, line stop manufacturer's name and product data for line stops proposed, installation procedures, name of proposed line stop installer, and documentation of experience on at least five similar projects.
 - 8) Narrative describing proposed operation of temporary pumping system, including who will operate system, staffing, planned frequency of fueling, contingency plan in event of pump failure, and statement of existing systems that may be affected during operation of temporary pumping system. Where temporary pumping system's instrumentation and controls will be connected to Owner's existing facility monitoring and control system, clearly indicate how and where such temporary connection will be performed and other information necessary to demonstrate compliance with the Contract Documents.
- b. Disclaimer and Limitations of Engineer's review: Engineer's review, comments (if any), and approval (or other appropriate action) on the temporary pumping plan Submittal are only for the limited purposes of endeavoring to verify compliance with the Contract

Documents. Engineer's review will not address calculations for the temporary pumping system, sizing of components of temporary pumping systems, or other matters that are part of Contractor's construction means, methods, procedures, techniques, and sequences, for which Contractor remains solely responsible, together with associated safety and protection measures.

B. Informational Submittals: Submit the following:

1. Qualifications Statements:
 - a. Temporary pumping system Supplier or Subcontractor.

PART 2 - PRODUCTS

2.1 TEMPORARY PUMPING SYSTEMS

A. Suppliers:

1. Subject to compliance with the Contract Documents, provide temporary pumping systems by one of the following:
 - a. Godwin, a Xylem brand.
 - b. Western Oilfields Supply Company doing business as Rain for Rent.
 - c. Baker Tank.
 - d. Adler Tank.
 - e. Or equal.
2. Subject to compliance with the contract documents, provide temporary screening of pumped sludge by one of the following:
 - a. MicroOzzy screen
 - 1) Contact information: Brad Leidecker with Coombs Hopkins (brad@chcwater.com, 925.876.0646).
 - b. Or equal.

B. Description:

1. Design, provide, and maintain temporary pumping systems, including temporary plugs, bulkheads, and line stops as necessary or required; pumps; piping, supports, restraints, and valves; temporary instrumentation and control systems; fuel and electricity; personnel; and appurtenances. System shall be suitable for its service and operating environment.
2. Contractor will plan for and provide temporary dumpster for screenings and arrange for disposal promptly when full or completion of the task of transferring digested sludge.

C. Performance Criteria:

1. Required capacity of temporary pumping systems is indicated in Section 01 14 16 - Coordination with Owner's Operations.
2. System components shall be suitable for continuous operation with the fluid or slurry pumped or easily started and stopped as needed according to process demands.
3. Screening equipment with a maximum orifice opening for passage of clean sludge of 3 mm. The screen requires a concrete pad, has 8" inlet, outlet and passive bypass connections. Footprint is about 5 ft x 8 ft. Performance of the pumping system needs to be coordinated with the screen capacity and/or process needs to transfer sludge during seeding operations. Contractor shall design electrical supply to screen control panel. Contractor shall design additional pump to discharge clean sludge into sludge pipe going into rotary drum thickener. Contractor shall work with and train plant operators to operate equipment to facilitate the efficient transfer of sludge. Contractor and Operators shall operate equipment cooperatively and contractor will remain on site during sludge transfer operations.
4. Noise Controls: Provide noise controls for temporary pumping systems. Noise emitted from temporary pumping systems shall comply with Laws and Regulations and shall not exceed 70 decibels at a distance of thirty feet from noise source.

5. Fuel-consuming temporary pumping system components intended for use when Contractor is not present shall include fuel tanks sized for not less than 24 hours of uninterrupted operation at system's operating capacity, and means to automatically notify Contractor upon high and low suction water level and low fuel level.

D. Operation:

1. Instrumentation and Controls:

- a. Provide each temporary pumping system with flow meter acceptable to Engineer and suitable for pumped fluid or slurry, pipe material, and hydraulic conditions. Flow meter shall provide accurate flow measurement and include local display of flow rate in gallons per minute or and a flow totalizer.
- b. Temporary hoses shall have flushing connection to clean pipe from plant water when required. .

E. Temporary Piping Systems:

1. Piping shall be high density polyethylene, steel, ductile iron, or other material accepted by Engineer, and suitable for system operating pressures. Aluminum piping and PVC piping not mechanically restrained are unacceptable. Durable hoses can be used only for short sections and with acceptance by Engineer.
2. Piping systems shall have watertight joints of the following types: fused joints, restrained couplings, flanged coupling adapters, quick-connects by Camlok or equal, flanged joints, grooved and shouldered end-type couplings, or other watertight joints accepted by Engineer.
3. Size discharge piping for flow velocity of not more than 10 feet per second.
4. Provide check valves or appropriate pump control valves as necessary.
5. Provide air valves on discharge piping as necessary. Air valves shall expel air upon pipe filling and admit air upon pipe dewatering, and release small quantities of entrained air during operation. Air valves shall be suitable for service with the pumped fluid or slurry.
6. Discharge from temporary pumping systems shall not adversely affect the existing process or facilities. Provide energy-dissipating measures at piping discharge as necessary.

F. Temporary Plugs, Bulkheads, and Line Stops:

1. Acceptable temporary plugs and bulkheads include inflatable dams specifically designed for such service, brick bulkheads, timber bulkheads, sandbags, and other bulkhead methods suitable for the service and conduit conditions. Temporary line stops, where necessary or required, shall be manufactured units specifically intended for use as line stops.
2. Each temporary plug, bulkhead, and line stop shall be suitable for the maximum pressure encountered.
3. Where temporary plugs and bulkheads are under pressure or surcharged, provide either two plugs or a plug and temporary bulkhead.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Preparation and Installation of Temporary Pumping Systems:

1. Temporary piping shall be located off of roads, drives, other travelled ways, and sidewalks. Piping shall not be located in environmentally-sensitive areas such as wetlands.
2. Where required for Owner's access to and operation of existing facilities, bury temporary piping that would otherwise inhibit access to processes, buildings, structures, roads, drives, and travelled ways. In paved areas, provide temporary surfacing, sufficient for AASHTO H-20 wheel loads over buried temporary piping.
3. Install temporary pumping systems in accordance with written instructions of manufacturer of system component, Laws and Regulations, and requirements of temporary pumping system Supplier.

4. Provide flushing connection on temporary pipes so it can be cleaned by disassembly.
5. Hydrostatic Testing of Temporary Piping System:
 - a. Perform successful hydrostatic testing of temporary piping systems using clean water at pressure equal to 1.2 times highest expected system operating pressure, for one hour while maintaining test pressure within 3.0 psig of required test pressure.
 - b. Engineer will witness hydrostatic test.
 - c. Hydrostatic test criteria for acceptance: No leakage.
6. Verify that entire temporary pumping system is ready for operation before commencing shutdown of Owner's operations, facilities, or systems. Verify that temporary pumping system controls and flow meter are properly connected and functional.
7. Furnish to Owner, facility manager (if other than Owner), and Engineer written advisory of intent to commence temporary pumping system operation in accordance with Section 01 14 16 - Coordination with Owner's Operations.

3.2 OPERATION OF TEMPORARY PUMPING SYSTEMS

A. During Operation of the Temporary Pumping Systems:

1. Temporary pumping system shall operate continuously unless otherwise indicated. In the event of equipment failure, immediately make repairs or replace equipment. Provide spare parts and redundant units as necessary for continuous operation.

3.3 DEMOBILIZATION

A. Upon Conclusion of Temporary Pumping:

1. Remove temporary plugs, bulkheads, and line stops in manner that allows flow to slowly return to normal, without surging, surcharging, and adverse effects on existing system. Completely remove all elements of temporary plugs, bulkheads, and line stops.
2. Flush out temporary pumping system with clean water discharged to an appropriate location.
3. Remove temporary pumping system and appurtenances from the Site.
4. When Contractor has obtained permit(s) for temporary pumping from authorities having jurisdiction, furnish written notice to such authorities that temporary pumping has been completed.

END OF SECTION

SECTION 01 55 13
VEHICULAR ACCESS AND PARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for:
 - a. Contractor's access to the Site.
 - b. Contractor's use of existing access roads and parking areas.
 - c. Traffic controls for access roads and parking areas.
 - d. Maintenance of vehicle access roads and parking areas.
 - e. Offsite haul routes.
 - f. Removals and restoration.

B. Scope:

1. Contractor shall provide temporary signage on existing access roads, construction roads, walks, parking areas, and appurtenances necessary and required during the Project for use by Contractor, Owner and facility manager (if other than Owner) and entities for which they are responsible, and emergency vehicles.
2. Contractor shall make arrangement for offsite haul routes and shall comply with restrictions on haul routes imposed by authorities having jurisdiction and the Contract Documents.

C. Related Requirements:

1. Include but are not necessarily limited to:
 - a. Section 01 55 26 - Traffic Control.
 - b. Section 01 57 05 - Temporary Controls.
 - c. Section 01 71 33 - Protection of the Work and Property.
 - d. Section 01 74 00 - Cleaning.

D. See sheet G102 for more information about staging, access, and restrictions. Coordinate this Section and all work with in on G102.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Map of proposed offsite haul routes, together with list of right-of-way owner for each roadway proposed as offsite haul routes and indication of other authorities, if any, having jurisdiction over offsite haul routes. Furnish such Submittal, acceptable to Engineer, prior to furnishing the Submittals indicated immediately below this paragraph.
2. Written permit or permission for use of offsite haul routes, issued by authorities having jurisdiction. Furnish such Submittals acceptable to Engineer prior to commencing use of offsite haul routes.

PART 2 - PRODUCTS

2.1 TEMPORARY TRAFFIC CONTROLS FOR ACCESS ROADS AND PARKING AREAS

A. Traffic controls shall comply with requirements of authorities having jurisdiction. When such authority is Owner or facility manager (if other than Owner), and no other applicable requirements are indicated in the Contract Documents or applicable permits, comply with:

1. Standard specifications of the associated state or provincial (as applicable) department of transportation; and
2. Manual of Uniform Traffic Control Devices (MUTCD), by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA).

PART 3 - EXECUTION

3.1 ACCESS TO THE SITE

A. Site Access – General:

1. Contractor Vehicles:
 - a. Minimize the number of construction vehicles at site. Carpool Contractor employees to site due to limited parking. Do not park Contractor vehicles in designated parking lots shown on G102.

3.2 USE OF EXISTING ACCESS ROADS AND PARKING AREAS

A. Existing Access Roads and Parking Areas – General:

1. Use of Existing Access Roads:
 - a. Contractor is allowed to use Owner's existing access roads, starting on the Effective Date of the Contract and after complying with other Contract requirements relative to starting the Work at the Site.
2. Existing Parking Areas for Use by Contractor:
 - a. Parking for Contractor's workers and construction vehicles is not available at the Site. Contractor shall arrange for offsite parking and provide transportation between the Site and offsite parking.
3. Restrictions:
 - a. Prevent interference with traffic on existing access roads and parking areas. Always keep access roads and entrances serving the Site clear and available to Owner, facility manager (if other than Owner), and their respective employees, suppliers, and consultants; emergency vehicles; and other contractors.
 - b. Do not use access roads or Site entrances for parking or storage of materials or equipment.
 - c. Obey posted speed limits. If the Site has no posted speed limit, restrict traffic of Contractor's personnel, construction vehicles and equipment, deliveries, and haul-trucks to maximum speed of 15 miles per hour on access roads at the Site.
 - d. Schedule deliveries to minimize use of existing access roads and Site entrances. Deliveries and arrivals shall be limited to between 9:30 AM and 4:00 PM, Monday through Friday.
 - e. Use only rubber-tire vehicles on existing roads and parking areas. Do not use tracked (caterpillar-type) vehicles or equipment on existing pavement unless such pavement will be replaced by Contractor. Maintain existing pavement for safe access by Owner, facility manager (if other than Owner), and their respective employees, suppliers, and consultants; emergency vehicles; and other contractors.
 - f. Remedy damage to existing access roads, staging areas, vegetation and parking areas caused by Contractor's operations.
4. Contractor shall indemnify and hold harmless Owner, facility manager (if other than Owner), Engineer, and their respective consultants and subcontractors from expenses and losses caused by Contractor's operations over existing access roads and parking areas.

3.3 TRAFFIC CONTROLS FOR ACCESS ROADS AND PARKING AREAS

A. Onsite Traffic Controls – General:

1. Provide temporary traffic controls at intersections of temporary access roads and parking areas with each other, including intersections with other temporary access roads, intersections with public roads, and intersections with permanent access roads at the Site.
2. Provide temporary warning signs on permanent access roads, and provide temporary stop signs for traffic on temporary access roads where required and at entrances to permanent pavement.
3. Comply with requirements of authorities having jurisdiction. When such authority is the Owner or facility manager (if other than Owner), and no other requirements are indicated in the Contract Documents or applicable permits, comply with the standard specifications of

the applicable state or provincial (as applicable) department of transportation and the MUTCD.

4. Provide temporary signs indicated maximum allowable speed limit on temporary access roads.
5. Comply with Section 01 55 26 - Traffic Control.

3.4 MAINTENANCE OF VEHICLE ACCESS AND PARKING AREAS

A. Maintenance of Vehicle Access and Parking Areas – General:

1. Maintain access roads and parking areas to provide continuous access at the Site for construction vehicles and trucks, Owner and facility manager's (if other than Owner) vehicles, deliveries for Owner and facility manager (including chemical delivery and sludge hauling), emergency vehicles, and parking areas for Owner's and facility manager's personnel.
2. Public roads shall be passable at all times unless a road closure is allowed in writing by authority having jurisdiction. Provide neighborhood with 5-day and 24-hour advance notices, including day and time, of any street closures due to project.
3. Refer to cleaning and dust control provisions of this Article.

B. Maintenance of Existing Access Roads and Parking Areas Used by Contractor:

1. Unless otherwise indicated in the Contract Documents, Owner or facility manager (if other than Owner) will perform routine maintenance of access roads and parking areas, existing prior to the start of construction, during the Project. Contractor is responsible for dust control and cleaning existing paved areas used by Contractor.

C. Cleaning and Dust Control – All Vehicle Access and Parking Used by Contractor:

1. Cleaning:
 - a. Clean paved surfaces over which construction vehicles, construction equipment, and construction machinery travel. Perform cleaning not less-often than indicated in Section 01 74 00 - Cleaning, or more frequently as directed by Engineer, by mechanical sweeping or other means acceptable to Engineer.
 - b. Clean paved areas using vacuum powered street sweeper, when visible soil materials are tracked onto pavement.
 - c. Clean the following surfaces:
 - 1) Roads within limits of the Project.
 - 2) Permanent roads at the Site between the Site entrance and work areas, and between the Site entrance and construction parking and areas used for staging, storage, and laydown.
 - 3) Public roads that require sweeping and cleaning due to construction operations.
2. Dust Control:
 - a. Control dust resulting from construction activities to prevent nuisances, violations of air quality Laws or Regulations, and adverse health effects at and adjacent to the Site and in downwind areas.
 - b. Comply with Section 01 57 05 - Temporary Controls.

D. Protection of Underground Facilities:

1. Regarding construction traffic, vehicles, construction equipment and machinery, and parking and protection of Underground Facilities, comply with the General Conditions, as may be modified by the Supplementary Conditions, Section 01 71 33 - Protection of the Work and Property, and other requirements of the Contract Documents.
2. Where existing Underground Facilities are close to the ground surface over which construction equipment or machinery, other construction vehicles, or traffic will pass, protect the Underground Facilities, including providing temporary bridging, as necessary.

3.5 OFFSITE HAUL ROUTES

A. Offsite Haul Routes – General:

1. Where required by Laws or Regulations, or by one or more authorities having jurisdiction, obtain, pay for, and comply with permits and orders of authorities having jurisdiction regarding use of offsite haul routes. Submit to Engineer copy of each permit or written permission necessary for use of offsite haul routes.
 2. Unless expressly allowed otherwise by authorities having jurisdiction or the express provisions of the Contract Documents, to the extent practicable, avoid routing construction traffic through residential areas and other areas sensitive to noise, vibration and vehicle exhaust emissions.
 3. Restrict use of offsite haul routes to days and hours of construction allowed in the General Conditions and Supplementary Conditions.
 4. Comply with requests of authorities having jurisdiction relative to coordinating construction traffic on haul routes with community events. When such events are held on a recurring basis or are otherwise reasonably foreseeable at the time of the opening of Bids (or, if there were no Bids, on the Effective Date of the Contract), Contractor is not eligible for increases in Contract Price or Contract Time for delays or other inconvenience to the Work associated with this provision.
 5. In transporting spoil and waste materials from the Site and transporting materials and equipment to the Site, avoid creating or contributing to potential Hazardous Environmental Conditions. Properly secure loads to prevent airborne particulates, liquids, slurries, and solid matter from discharging from Contractor's vehicles along haul routes. Contractor's responsibilities for Hazardous Environmental Condition caused by Contractor are set forth in the General Conditions, as may be modified by the Supplementary Conditions, and may be further augmented elsewhere in the Contract Documents.
- B. Remedy of Damaged Existing Paving:
1. Comply with Section 01 71 33 - Protection of the Work and Property, and other applicable provisions of the Contract Documents.
 2. Contractor shall indemnify and hold harmless Owner, facility manager (if other than Owner), Engineer, and their respective consultants and subcontractors from expenses and losses caused by Contractor's operations on offsite haul routes.
- C. Project-Specific Haul Routes:
1. Contractor shall arrange offsite haul routes.

3.6 REMOVAL AND RESTORATION

- A. Removals: When no longer needed for the Project and prior to eligibility for final inspection:
1. Remove temporary access roads, walks, and parking areas that are not intended for, or acceptable for, integration into permanent pavement. Return areas of temporary access roads, walks, and parking to preconstruction condition unless otherwise required by the Contract Documents.
 2. Remove temporary gates, fencing, and traffic controls associated with Contractor's vehicular access and parking areas.
 3. Where areas of temporary access roads and parking will be permanently landscaped, remove pavement, granular subbase, geosynthetic materials, soil, and other materials that do not comply with the Contract Documents regarding fill, subsoil, and landscaping.
 4. Remove and properly dispose of all materials contaminated with oil, bitumen, or other petrochemical compounds resulting from Contractor's operations, and other substances. These substances are considered contaminants may impair growth of plants and lawns or quality of soil or groundwater.
- B. Restoration:
1. Restore to preconstruction conditions existing roads, walks, and parking areas damaged by Contractor, subject to approval of the owner of affected roads, walks, and parking areas. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

SECTION 01 55 26
TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for traffic control during construction, including:
 - a. Coordination with owners of streets, highways, and other travelled ways affected by the Project and coordination with owners of properties at or adjacent to the Site regarding traffic control.
 - b. Traffic controls for general vehicular traffic affected by the Work.
 - c. Traffic controls for pedestrians and other non-vehicular traffic affected by the Work.
 - d. Temporary bridging over excavations in travelled ways.
 - e. Traffic control personnel.
 - f. Maintenance of traffic controls.
 - g. Removal of traffic controls.

B. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, services, incidentals, and pay all expenses necessary and required to keep all streets, highways, and other travelled ways open for passage of traffic and pedestrians during the Project, unless: (1) otherwise approved by owner of the street, highway, or travelled way, and Engineer, or (2) as expressly allowed by the Contract Documents.

C. Related Requirements:

1. Include but are not necessarily limited to:
 - a. Section 01 55 13 - Vehicular Access and Parking.
 - b. Section 01 57 05 - Temporary Controls.
 - c. Section 01 71 33 - Protection of the Work and Property.
 - d. Section 01 74 00 - Cleaning.

1.2 REFERENCES

A. Terminology:

1. The following terminology, although not indicated with initial capital letters, has the following meaning in this Section:
 - a. "Maintenance and protection of traffic" and "traffic control":
 - 1) "Maintenance and protection of traffic" and "traffic control", whether singular or plural, have the same meaning and, unless expressly indicated otherwise, refer to temporary measures provided by Contractor to control, maintain, and safeguard vehicular traffic, pedestrians, bicycles, and other traffic during construction.
 - 2) "Traffic controls" are signage, barriers, barricades, signal and warning lights, and other measures provided by Contractor for controlling other than routine use of existing and temporary access roads and parking areas by construction traffic.
 - 3) "Traffic control" includes, but is not necessarily limited to, traffic controls for: (a) excavations, (b) construction vehicle parking areas, (c) storage and laydown areas for materials and equipment to be incorporated in the Work, and (d) other work-related areas; in, opening into, or adjacent to streets, highways, or other travelled ways.
 - b. "Traffic" means any and all users of the subject street, highway, or other travelled way, including sidewalks, bicycle paths, and similar facilities. "Traffic" includes motor vehicles of all types, including automobiles, motorcycles and similar vehicles, trucks,

buses, light rail, mobile equipment, and others; pedestrians; bicyclists; and others using the travelled way or right-of-way.

- B. Reference Standards: Standards referenced in this Section include, but are not necessarily limited to, the following:
1. Unless otherwise shown or indicated in the Contract Documents, traffic controls shall be in accordance with:
 - a. California Department of Transportation Traffic Manual.
 - b. Part 6 ("Temporary Traffic Control") of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA).
 2. In the event of conflict between the standard specifications referenced above and the MUTCD, the referenced standard specifications will govern.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Owner of Street, Highway, or Travelled Way:
 - a. Coordinate with owner of each street, highway, and other travelled way affected by the Work and the Project and obtain from such owner requirements for traffic control during construction.
 - b. Obtain and pay for work permits, street opening permits, and other permits required by the owner of the street, highway, or other travelled way.
 - c. Give written notices required by the owner of the street, highway, or other travelled way.
 2. Notice to Emergency Services:
 - a. Give required advance, oral and written notices to fire departments, police departments having jurisdiction, ambulance services, and other emergency services as applicable, of proposed construction operations that may impact or affect emergency services' ability to perform their respective functions.
 - b. Give such notices as indicated immediately below for notice to adjacent properties.
 3. Notice to Adjacent Properties:
 - a. Give reasonable advance, written notice to owners and occupants of private property directly affected by construction operations, including properties adjacent to the Site where such property's vehicular or pedestrian access will be affected by the Project.
 - b. Give such notice not less than five days prior to when such property will or may be affected by construction operations and again not less than 24 hours prior to such property being affected by construction operations.
 - c. Such notices to properties shall clearly indicate the intended dates the property will be affected and the scheduled end-date of such activity, and a brief summary of the ways the property will be affected during the Project's construction. Such notices shall be on Contractor's letterhead and shall indicate the Project name, Owner, Owner's project or contract number (if any), and Contractor's contact person with telephone number and office hours.
 4. Coordinate traffic controls with requirements of the following:
 - a. Section 01 55 13 - Vehicular Access and Parking.
 - b. Section 01 71 33 - Protection of the Work and Property, regarding temporary barriers.
 - c. Section 01 74 00 - Cleaning.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. California Air Resources Board (CARB).
- B. Qualifications:

1. Traffic controls shall be selected, installed, maintained, and removed by a licensed construction zone traffic control contractor, Class C-31, licensed by the Contractors State Licensing Board of the State of California Department of Consumer Affairs.
2. Flaggers:
 - a. Flaggers shall be properly trained and comply with minimum qualifications indicated in the MUTCD Section 6E.01.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT FOR TRAFFIC CONTROL DURING CONSTRUCTION

A. Materials and Equipment Used for Traffic Control:

1. Materials and equipment used for traffic control during construction shall comply with the reference specifications indicated in Paragraph 1.2.B of this Section and the MUTCD.
2. Materials and equipment used for traffic control shall include easily legible, weather-resistant text indicating contact information, including telephone number, for entity providing and maintaining traffic controls, for alerts of damage, mislocation, or apparent unsafe traffic control items.

PART 3 - EXECUTION

3.1 TRAFFIC CONTROL – GENERAL

A. General Provisions for Traffic Control:

1. Provide traffic controls, as necessary and required, prior to commencing work in, or adjacent to, streets, highways, and other travelled ways.
2. Provide traffic controls in accordance with the Contract Documents, applicable permits, requirements of authorities having jurisdiction, referenced standard specifications indicated in Paragraph 1.2.B of this Section, and the MUTCD.
3. Not less than once per month, check and ensure legibility of contract information on each traffic control device or item, as required in Article 2.1 of this Section.
4. Traffic controls such as temporary barriers and barricades; channelizing devices such as delineators, traffic cones, traffic barrels, temporary bollards, vertical panels, and similar items; signs (including reflective signs, mobile changeable-message signs, and temporary LED-illuminated signs), temporary signals; warning lights; and temporary illumination shall be prominently but safely positioned and located, be highly visible to traffic and pedestrians, and include provisions for visibility during periods of darkness, reduced light, and reduced visibility such as smoke and fog.
5. Supplement temporary traffic barriers and barricades with standard delineation pavement markings or channelizing devices for improved daytime and nighttime visibility, when traffic controls channel vehicular traffic.
6. Keep accessible for use permanent facilities such as hydrants, utility valves, fire alarm boxes, postal boxes, delivery service boxes, existing permanent traffic controls (including signs and signals) as appropriate, and other facilities that may require access or use during construction.
7. Do not block access to essential facilities including hospitals, emergency services, and the like, and public facilities such as public buildings, public schools, public event venues, recreational facilities open during construction, and similar facilities.
8. Coordinate traffic controls for commercial and residential access with their respective owners and occupants.
9. Provide traffic controls suitable for pedestrians and bicyclists with disabilities. Comply with the MUTCD, referenced specifications indicated in Paragraph 1.2.B of this Section, and Laws and Regulations, including the Americans with Disabilities Act (ADA).

B. Temporary Obstructions of Streets, Highways, and Other Travelled Ways:

1. Do not store materials or equipment to be incorporated into the Work; construction equipment, machinery, or tools; Contractor's vehicles, vehicles owned by construction workers and personnel; or other items, whether on short-term, infrequent basis or on a more-frequent basis, in streets, highways, and other travelled ways. Do not store or locate materials and equipment in rights-of-way or adjacent areas in positions that reduce traffic visibility or otherwise create or exacerbate traffic hazards.
 2. When construction activities necessitate a short-term obstruction of traffic, provide adequate traffic controls, flaggers, and other measures as appropriate. Have such obstructions in place for the shortest duration possible and do not leave such obstructions in place at the end of the work day.
 3. When construction activities necessitate a longer-duration obstruction or partial closure to traffic, provide appropriate temporary barriers and barricades, signage, warning devices, and other appropriate measures for traffic control.
 4. Obstruction of public parking shall be in accordance with requirements of authorities having jurisdiction.
- C. Temporary Closures of Streets, Highways, and Other Travelled Ways:
1. This provision applies to full closure of all traffic or partial closure.
 2. Do not close passage to traffic or pedestrians without approval of authorities having jurisdiction and obtaining necessary permits.
 3. Provide appropriate temporary signage, signals and warning devices, temporary barriers and barricades, detours, and temporary facilities (such as temporary bridges or covered walkways, and other temporary facilities) as necessary.
 4. Detours shall be as short as practicable but should generally avoid, when feasible, routing traffic through residential areas and other sensitive areas. Provide appropriate temporary signage to mark detours.
 5. Detours and temporary facilities shall be appropriate for the types of traffic (which may include heavy truck traffic or construction equipment), traffic volume, loading, and hours of the day.
 6. Closures shall be for shortest duration practical, and passage shall be restored immediately after completion of filling and temporary paving, bridging, or other Work.
 7. Obtain approvals and permits needed for full and partial lane closures.
 8. Provide all required temporary signage, signals, and warning devices prior to implementing each closure.

3.2 TRAFFIC SIGNS, SIGNALS, AND LIGHTS

- A. Provide and operate temporary traffic signs, signals, and warning lights necessary and required to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by the Project's construction.
- B. Provide temporary traffic signs, signals, and warning lights mounted on temporary barriers, barricades, or standard posts, at the following locations:
 1. Each change of direction of a roadway and at each crossroad.
 2. Detours and areas of hazard.
 3. Parking areas.
 4. Vehicular entrance and exit from each of the Project's construction work areas and construction vehicle and machinery parking and storage areas.
- C. Lighting and Flares: During periods of low visibility provide temporary lights and, where appropriate, flares for the following:
 1. To clearly delineate traffic lanes, to guide traffic, and to warn of hazardous areas.
 2. For use by traffic control personnel directing traffic.
 3. Provide adequate illumination of critical traffic and parking areas.
- D. Power and Fuel:

1. Provide appropriate power supply for temporary lighting and illuminated devices, whether battery-powered, solar-powered, or temporary generators.
2. At the end of each work day, check power supplies and fuel supplies and ensure sufficient power and fuel is in place and available for proper traffic control until Contractor's personnel return to the Site
3. Comply with noise control and air quality control Laws and Regulations and Section 01 57 05 – Temporary Controls.
4. Locate and position temporary generators to avoid nuisances, such as noticeable emissions, odors, noise, and vibration, and other nuisances, and hazards to traffic, pedestrians, adjacent occupants of buildings and structures, and the public.

3.3 TRAFFIC CONTROL PERSONNEL

A. Traffic Control Personnel – General:

1. When the Project's construction operations encroach on traffic lanes, furnish qualified, trained, suitably-equipped traffic control personnel as necessary and required for controlling traffic, in accordance with: requirements of authorities having jurisdiction, the referenced specifications indicated in Paragraph 1.2.B of this Section, and Section 6E of the MUTCD.
2. Traffic control personnel shall use appropriate flags, hand signs or mobile signs.
3. Equip traffic control personnel with appropriate personal protection equipment and appropriate communications devices. Traffic control personnel attire shall be highly-visible, suitable, and shall not create nuisances or distractions to vehicle occupants and pedestrians, and shall not give offense to vehicle occupants, pedestrians, and the public.
4. Conduct of traffic control personnel shall be professional, appropriate, and courteous to vehicle occupants, pedestrians, and the public.

3.4 PARKING CONTROL

A. Parking Control – General:

1. Comply with Section 01 55 13 - Vehicular Access and Parking.
2. Provide appropriate temporary parking for the public, as necessary and required because of the Project's construction operations.

B. Control parking of construction and private vehicles at the Site as follows:

1. Maintain free vehicular access to and through public and private parking areas.
2. Prohibit parking on or adjacent to access roads, and in non-designated areas.
3. Construction vehicles shall possess current vehicle registration and licensure. Do not park or store unregistered vehicles at or adjacent to the Site.

3.5 MAINTENANCE OF TRAFFIC CONTROLS

A. Maintenance of Traffic Controls – General:

1. Properly maintain traffic controls until removal.
2. Relocate traffic controls as the Work progresses.
3. Promptly replace or repair, as appropriate, damaged traffic controls.
4. Ensure adequate power supplies and fuel supplies for traffic controls.
5. Perform manufacturer's recommended routine and preventative maintenance on equipment used for temporary traffic control.
6. Where traffic controls have reduced efficacy or reduced visibility due to accumulations of dirt or foreign matter (including graffiti and vandalism), or exposure to the elements, promptly replace or remedy the subject traffic controls.
7. Maintain traffic controls in operation during adverse weather and climate conditions.

3.6 REMOVAL OF TRAFFIC CONTROLS

A. Duration of Traffic Controls:

1. Prior to Substantial Completion, provide traffic controls at the Site until no longer necessary or required due to the progress of the Work and the Project.
 2. After Substantial Completion, provide appropriate traffic controls when Contractor is onsite to perform punch list Work, correction period work, or warranty work.
- B. Prior to reopening to traffic, clean streets, highways, and travelled ways in accordance with Section 01 74 00 - Cleaning.
 - C. When traffic controls are no longer necessary or required, completely remove traffic controls and restore the Site to condition required by the Contract Documents or, when not indicated in the Contract Documents, restore the Site to pre-construction conditions.
 - D. Store unused traffic control items at an appropriate location that does not adversely affect public or private property or transportation.
 - E. Completely remove all traffic control items from the Site and adjacent areas prior to final inspection.

END OF SECTION

SECTION 01 57 05
TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for temporary controls during construction, including:
 - a. Noise control.
 - b. Temporary pest and rodent controls.
 - c. Pollution control, including solid waste, water pollution, atmospheric pollution, and other types of pollution.
 - d. Odor control.

B. Scope:

1. Contractor shall provide and maintain materials, equipment, labor, services, and temporary construction as necessary and required to control environmental conditions at the Site and adjacent areas during construction.
2. Contractor shall pay all costs, including fines and civil penalties, if any, for failure to implement and maintain temporary controls in accordance with the Contract Documents and Laws and Regulations. Contractor is not eligible for increase in Contract Price or Contract Times due to failure to comply with requirements for temporary controls.
3. Maintain temporary controls until no longer necessary or required. Provide temporary controls at all times when Contractor is working at the Site.

C. Related Requirements:

1. Include, but are not necessarily limited to, the following:
 - a. Section 01 35 43.13 - Environmental Procedures for Hazardous Materials.
 - b. Section 01 35 44 - Spill Prevention Control and Countermeasures Plan.
 - c. Section 01 74 00 - Cleaning.
 - d. Drawing G102.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with applicable provisions and recommendations of the following:
 - a. Town of Tiburon Municipal Code.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 NOISE CONTROL

A. Noise Control – General:

1. Contractor's vehicles, construction equipment, and machinery shall minimize noise emissions to greatest degree practicable. When necessary, provide mufflers and silencers on construction equipment, machinery, and vehicles, and provide temporary sound barriers sound-absorbing blankets, sound-reducing enclosures, modified backup alarms, and other mitigation measures when necessary.
2. Noise threshold levels shall comply with Laws and Regulations, including (a) OSHA requirements and recommendations, and (b) local ordinances or other Laws or Regulations.
3. Noise emissions shall not interfere with the work of Owner, facility manager (if other than Owner), or others. The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning and emergency purposes only.

4. Music or entertainment systems, including personal and vehicle radios, media players, and the like, when used, shall not be audible at the property line and shall not disturb others at the Site.
5. Field Quality Control of Noise:
 - a. If Owner or Engineer believes potential exists that allowable noise levels are being exceeded, Contractor will be required to, and shall promptly perform, appropriate noise monitoring in presence of Owner or Engineer and shall submit written results to Engineer.
 - b. Owner and Engineer reserve the right to perform independent noise monitoring at any time during the Work.
6. If noise level exceeds allowable maximum, Contractor shall immediately cease the activity emitting the excessive noise and promptly implement noise-mitigating measures to comply with noise limitations.

3.2 DUST CONTROL

A. Dust Control – General:

1. Control objectionable dust caused by Contractor's operation of vehicles and construction equipment and machinery, site clearing, demolition, cleaning, and other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of Engineer and approval of authorities having jurisdiction.
2. Contractor shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce onsite and off-Site damage, inconvenience, nuisances, and health hazards associated with dust emissions from Contractor's activities.

B. Dust Control Methods:

1. Dust control may be accomplished by irrigation in which the dust-prone work activity or area of the Site is sprinkled with water until the surface is moist.
2. Apply dust controls as frequently as necessary or required without creating inconveniences, nuisances, or hazards, such as excessive mud and ponding of water at or adjacent to the Site. Do not use water for dust control when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.
3. Provide dust control that is non-polluting and does not contribute to tracking-out of dirt, mud, and dust onto pavement.
4. Do not allow water used for dust control to discharge to storm water drainage system or surface waters.
5. Where appropriate, reduce travel speed of construction vehicles and construction equipment to reduce the potential for dust emissions arising from vehicle and equipment passage.
6. Where appropriate, apply gravel or other appropriate binder to access roads and parking areas.

C. Removal of Dust and Dirt from Pavement and Other Travelled Ways:

1. Remove dust, mud, and dirt from roads, parking areas, and other travelled ways not less than the frequency indicated in Section 01 74 00 - Cleaning.
2. Perform dust and dirt removal from travelled ways by mechanical wet vacuum sweeping or other method acceptable to Engineer.
3. Remove mud from roads, parking areas, and other travelled ways by appropriate means, including scraping. Avoid damaging surface of travelled way. Remedy damage to roads, parking areas, and travelled ways resulting from mud removal activities.

D. Removal of Dust and Dirt from Buildings and Structures:

1. When dust and dirt from Contractor's activities has accumulated to a noticeable or objectionable extent (compared with preconstruction conditions) on buildings or structures, remove the dust and dirt caused by Contractor's operations by appropriate methods, including power-washing using mild detergent. Remedy damage caused by dust, dirt, and power-washing.

2. Dust in sensitive equipment, such as electrical and control panels, instruments, HVAC systems and other equipment shall be cleaned by a Subcontractor specializing in cleaning such items.
3. During the Project, remove objectionable and noticeable dust, dirt, and mud in areas occupied by Owner or facility manager, and Contractor's work areas, resulting from Contractor's activities. Owner and facility manager will take reasonable measures to avoid tracking dust, dirt, and mud into their occupied areas.
4. Comply with Section 01 74 00 - Cleaning.

3.3 PEST AND RODENT CONTROL

A. Pest and Rodent Control – General:

1. Provide pest and rodent controls as necessary to prevent infestation of the Site, storage areas, and adjacent areas.
2. Pests and rodents include, but are not limited to: flies, mosquitoes, gnats, midges, stinging insects, other insects and the like, worms, rats, mice, moles, voles, and similar animals, objectionable numbers and species of birds, and others.
3. Implement appropriate pest and rodent controls when pests, rodents, or both are apparent at the Site or offsite storage, staging, or laydown areas.
4. Control or remove pests and rodents from adjacent properties when Contractor's activities have fostered or exacerbated pest or rodent problems. For example, ground vibration, such as that associated with horizontal directional drilling, may cause migrations of subterranean animals such as moles and voles. Coordinate with affected property owners regarding appropriate control methods, materials, equipment, and disposal techniques.

B. Methods, Materials, and Equipment for Pest and Rodent Control during Construction:

1. Employ methods and use materials and equipment for pest and rodent control that do not adversely affect conditions at the Site or on adjacent and nearby properties.
2. Do not use control methods or poisons injurious to household pets or animals other than targeted pests and rodents.
3. Avoid control methods that present hazards to humans, including children.

C. Disposal of Pests and Rodents:

1. In accordance with Laws and Regulations, promptly and properly dispose of pests and rodents trapped or otherwise controlled. Do not bury or dispose of deceased animals at the Site or in adjacent areas.

3.4 WATER CONTROL

A. Water Control – General:

1. During the Project, provide methods to appropriately control storm water, surface water, water from excavations and structures, groundwater flows altered by Contractor's activities, water or materials from process tanks, and groundwater discharges from the Site, to prevent damage to the Work, the Site, adjacent properties, and downstream properties.
2. Control trenching, filling, and grading to direct water away from excavations, pits, tunnels and other construction areas, and prevent water from entering existing buildings and structures.
3. Properly manage and control storm water, surface water, and groundwater entering the Site from upstream, where such flows or discharges have potential to affect the Work or to be exacerbated by Contractor's activities.
4. Avoid ponding of water onsite, except in specially-designated, temporary settlement basins. Where water ponding occurs during construction, perform rough grading to eliminate ponding.
5. Prevent water from discharging onto roads, parking areas, paved or finished areas, and other travelled ways. Prevent storm water runoff from discharging across access roads and parking areas.

B. Materials, Equipment, and Facilities for Water Control:

1. Provide, operate, and maintain materials, equipment, and facilities of adequate size, materials, and capacity to control storm water, surface water, groundwater, and discharges from tanks.

C. Discharge and Disposal of Water during Construction:

1. Discharge storm water, surface water, and groundwater from the Site, and discharges of clean water from tanks, to proper discharge locations, in accordance with Laws and Regulations and the Contract Documents.
2. Prevent damage and nuisances arising from water discharges on the Site and discharges from the Site.
3. Dispose of water in manner that avoids flooding, erosion, sediment transport, and other damage, in accordance with Laws and Regulations.
4. Avoid overland discharges from the Site and construction activities to adjacent properties,
5. Water discharges from the Site and construction activities shall be via a storm water drainage route or conduit with sufficient capacity for the flow under associated weather and flow conditions and in accordance with requirements of authorities having jurisdiction
6. Do not discharge storm water, surface water, groundwater, or clean water from tanks, into sanitary sewers. Obtain consent of sewerage system owner before discharging such flows into existing combined sewers.
7. Obtain sewerage system owner's consent and approval before discharging polluted water to sewerage system.

3.5 POLLUTION CONTROL

A. Pollution Control – General:

1. Provide means, methods, and facilities necessary and required to prevent contamination of soil, water, and atmosphere caused by accumulation or discharge of substances and materials that are either noxious, polluting, or both, from or caused by construction and related activities.
2. Construction equipment and machinery shall comply with Laws and Regulations.
3. Comply with Section 01 35 43.13 - Environmental Procedures for Hazardous Materials.

B. Spills and Contamination:

1. Perform emergency containment, cleanup, and remedy of spills and contamination resulting from construction and related activities. Promptly remove and properly dispose of contaminated soils and liquids.
2. Excavate contaminated material and properly dispose of off-Site, and replace with suitable compacted fill and appropriate cover.
3. Comply with Section 01 35 44 - Spill Prevention Control and Countermeasures Plan, and Owner's and facility manager's (if other than Owner) hazard control procedures as indicated in the Supplementary Conditions.

C. Protection of Surface Water and Groundwater:

1. Provide and maintain appropriate, temporary measures to prevent harmful substances from entering surface water, groundwater, and drinking water. Prevent disposal of wastes, effluents, chemicals, and the like into or adjacent to groundwater, surface water, drainage routes (including swales, ditches, and storm sewers) and drinking water.
2. Obtain sewerage system owner's consent and approval prior to discharging into sanitary sewers or combined sewers. Do not discharge pollutants not in accordance with Laws and Regulations into combined sewers, or sewers tributary to combined sewers, when wet weather overflows to receiving waters may occur.

D. Atmospheric Pollutants:

1. Provide and maintain temporary controls for atmospheric pollutants resulting from construction and related activities, whether to outdoor or indoor atmospheres.
2. Prevent harmful dispersal of pollutants into atmosphere.

3. Do not discharge exhaust from internal combustion engines or combustion operations into buildings, structures, or near ventilation intakes for buildings or structures.
 4. Prevent toxic and noxious concentrations of chemicals, fumes, and vapors.
- E. Solid Waste:
1. Provide and maintain temporary controls for managing solid waste related to the Work.
 2. Prevent solid waste from:
 - a. Becoming airborne or blowing in the wind.
 - b. Being inadvertently transmitted to adjacent, offsite properties, and areas of the Site not part of the Project.
 - c. Being deposited in or discharging to surface waters, and drainage routes.
 3. Properly handle and dispose of solid waste. Burning or burying solid waste, including unused materials, at the Site or adjacent areas is prohibited.
 4. Cleaning and Disposal of Debris: Comply with applicable requirements of the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 74 00 - Cleaning.
 5. Do not mix or store in the same container solid waste containing Constituents of Concern (and constitutes, or may constitute, a Hazardous Environmental Condition) with solid waste that does not contain Constituents of Concern.
 6. Store solid waste in appropriate, covered containers.
 7. Promptly, and at regular intervals, remove solid waste from the Site for transport and disposal in accordance with Laws and Regulations.

3.6 ODOR CONTROL DURING CONSTRUCTION

- A. Odors – General:
1. Avoid discharges of unpleasant or noxious odors from construction and related activities. Whether nature of the Work is such that odor generation is unavoidable, provide appropriate temporary controls for odors.
 2. Give priority to avoiding odor generation, followed by:
 - a. Counteracting (treating the cause of) odors.
 - b. Containing odors.
 - c. Odor masking as the last resort for odor control.

3.7 REMOVAL OF TEMPORARY CONTROLS

- A. Removals – General:
1. Unless otherwise indicated elsewhere in this Section in requirements for respective temporary controls, upon completion of the associated Work and when temporary controls are no longer necessary, remove temporary controls and restore the Site to condition in accordance with the Contract Documents; if condition is not shown or indicated, restore the Site to pre-construction condition.

END OF SECTION

SECTION 01 61 03
EQUIPMENT - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.

B. Related Sections include but are not necessarily limited to:

1. Section 01 81 10 - Wind and Seismic Design Criteria.
2. Section 03 15 19 - Anchorage to Concrete.
3. Section 05 50 00 - Metal Fabrications.
4. Section 09 96 00 - High Performance Industrial Coatings.
5. Section 10 14 00 - Identification Devices.
6. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
7. Section 46 24 23 – Sludge Grinders.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Bearing Manufacturers Association (ABMA).
2. American Gear Manufacturers Association (AGMA).
3. American Petroleum Institute
 - a. API 686 - Recommended Practice for Machinery Installation and Installation Design
4. ASTM International (ASTM):
 - a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.
 - b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
5. Hydraulic Institute (HI):
 - a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
6. International Electrotechnical Commission (IEC).
7. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
8. International Organization for Standardization (ISO):
 - a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.
 - b. 21940-11, Mechanical Vibration - Rotor Balancing - Part 11: Procedures and Tolerances for Rotors with Rigid Behavior.
9. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 6, Enclosures for Industrial Control and System.
 - c. MG 1, Motors and Generators.
10. InterNational Electrical Testing Association (NETA):

- a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
 - 11. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 - 12. National Institute for Certification in Engineering Technologies (NICET).
 - 13. National Institute of Standards and Technology (NIST).
 - 14. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 - 15. Underwriters Laboratories, Inc. (UL).
 - a. 508, Standard for Safety Industrial Control Equipment.
 - b. 508A, Standard for Safety Industrial Control Panels.
 - c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
 - 16. Vibration Institute.
- B. Supplier's Vibration Analyst:
- 1. Supplier's vibration analyst shall prepare pre-Shop Drawing vibration analysis of equipment.
 - 2. Where required, Supplier's vibration analyst shall be either equipment manufacturer's qualified employee or independent business entity whose sole business, or principal part of its business, is evaluating and determining natural frequencies of rotating equipment.
 - 3. Shall possess not less than 10 years' relevant experience.
 - 4. Supplier's Vibration Analyst's Professional Engineer:
 - a. Vibration analysis shall be performed by, or under the direct, personal supervision of, professional engineer licensed and registered in the same jurisdiction as the Site and experienced in preparing finite element analyses, rotordynamic analyses, and experimental modal analysis similar to that required for the Work.
 - b. Professional engineer shall possess not less than five years' combined experience in field testing and data analysis for vibration analysis.
 - c. Vibration analysis professional engineer's seal and signature, with indication of date seal and signature were applied to the subject document, shall clearly appear on all results and reports furnished as Submittals.
- C. Field Vibration Testing Subcontractor:
- 1. Field vibration testing Subcontractor shall, where required by the Contract Documents, perform vibration testing of equipment installed at the Site and perform associated vibration analyses.
 - 2. Vibration testing Subcontractor shall be an independent entity that has performed as its sole business, or principal part of its business, for not less than 10 years, inspection, testing, calibrating, adjusting equipment and systems, and performing vibration testing of equipment.
 - 3. Entities whose principal business is one or more of the following are not considered independent vibration testing entities and, therefore, shall not be field vibration testing Subcontractor:
 - a. Motor sales, service, or repairs.
 - b. Process equipment sales, service, or repairs.
 - 4. Acceptable entities include, but are not necessarily limited to :

- a. AVS Engineering: <https://www.avseengineering.net/>
 - b. Engineering Testing Services: <https://etestinc.com/>
 - c. Maritech, LLC: <http://www.maritech-llc.com/contact.html>
5. Field vibration testing Subcontractor must have an established program for monitoring and testing equipment calibration, with accuracy traceable in an unbroken chain, in accordance with NIST requirements.
 6. Field Personnel: Each person employed for field vibration testing on the Work shall possess not less than the following qualifications:
 - a. Three years' field experience covering all phases of field vibration testing and data gathering.
 - b. Current, valid Vibration Category II certification from Vibration Institute or a licensed, registered professional engineer.
 7. Analysis Personnel: Personnel performing analysis for field vibration testing Subcontractor shall possess not less than the following qualifications:
 - a. Five years' combined field testing and data analysis experience.
 - b. Current, valid Vibration Category III certification from the Vibration Institute or a professional engineer licensed and registered in in the same jurisdiction as the Site. Where required by Laws and Regulations, field vibration analysis report shall be sealed, signed, and dated by professional engineer who personally prepared, or exercised personal, supervisory control over subordinates in preparing, the field vibration analysis report.
 8. Analysis Equipment: Field vibration testing Subcontractor shall have access to and use, where appropriate, the following testing equipment, properly maintained and calibrated:
 - a. Impact Hammer:
 - 1) Frequency Range: 1 kHz.
 - 2) Range (5v output) 5,000 pounds-force (22,200 newtons).
 - 3) Hammer sensitivity (approx.) 1mV/lbf (0.23 mV/N)
 - b. Analyzer:
 - 1) Frequency Range: 1 Hz to 10,000Hz.
 - 2) Frequency Accuracy: 0.02 percent.
 - 3) Non-Integrated Spectral Amplitude Accuracy: 5 percent, 3 Hz to 65 Hz.
 - 4) Single Integrated Spectral Amplitude Accuracy: 5 percent, 10 Hz to 20 Hz.
 - 5) Supports measurements of acceleration, velocity, and displacement.
 - c. Vibration Sensor:
 - 1) Sensitivity: ± 5 percent = 100 mV/g
 - 2) Acceleration Range: ± 5 g.
 - 3) Amplitude Nonlinearity: ± 1 percent
 - 4) Frequency Response: ± 10 Hz to 7kHz (± 3 dB)
 - d. Data logging equipment for simultaneous recording of the following data points:
 - 1) Vibration in the X, Y, and axial planes (for all pumps pursuant to ANSI/HSI Standard).
 - 2) Digital tachometer recording RPM.
 - 3) Discharge Pressure Transmitter
 - a) Accuracy: 0.3 percent of range
 - b) Fluid Temperature Range: 32 to 100 DegF

- 4) Suction Pressure Transmitter (when other than submersible pump or vertical turbine (suspended) pump).
 - a) Accuracy 0.35 percent of range.
 - b) Fluid Temperature Range: 32 to 100 DegF.
 - c) For submersible pumps and vertical turbine (suspended) type pumps, suction liquid surface level signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).
- 5) For pumps, pumping rate (flow) signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)
- 6) Equipment/motor bearing temperature signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)).
- 7) Pump/motor vibration signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).

D. Infrared Thermography Testing Program:

1. Testing firm:
 - a. An independent firm performing, as the sole or principal part of its business for a minimum of 10 years, the inspection, testing, calibration, and adjusting of systems.
 - b. Must have an established monitoring and testing equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.
2. Field personnel:
 - a. Minimum of one year field experience covering all phases of field thermography testing and data gathering.
 - b. Supervisor certified by NETA or NICET.
3. Analysis personnel:
 - a. Minimum three years combined field testing and data analysis experience.
 - b. Supervisor certified by NETA or NICET.

E. Electrical Equipment and Connections Testing Program:

1. Qualification requirements as specified in section 26 08 13 - Acceptance Testing.

F. Miscellaneous:

1. A single manufacturer of a "product" shall be selected and utilized uniformly throughout Project even if:
 - a. More than one manufacturer is listed for a given "product" in Specifications.
 - b. No manufacturer is listed.
2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations and defined in the Electrical specifications.
3. Variable speed equipment applications: The driven equipment manufacturer shall have single source responsibility for coordination of the equipment and VFD system and verify their compatibility.

1.3 DEFINITIONS

A. Product: Manufactured materials and equipment.

B. Major Equipment Supports - Supports for Equipment:

1. Located on or suspended from elevated slabs with supported equipment weighing 2000 pounds or greater, or;

2. Located on or suspended from roofs with supported equipment weighing 500 pounds or greater, or;
 3. Located on slab-on-grade or earth with supported equipment weighing 5000 pounds or more.
- C. Equipment:
1. One or more assemblies capable of performing a complete function.
 2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
 3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.
- D. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.
- E. Baseplate or equipment base plate or machine base
1. Are fabricated frames of structural shapes and plates with enough strength and sturdiness to serve as the surface to which other equipment is attached to and supported by. Baseplates can be directly mounted and grouted to concrete equipment support bases or machined and bolted to a sole plate.
- F. Sole plate
1. A thick steel machined plate that is attached to and grouted to a concrete equipment support base.
 2. Base plates are bolted to a sole plate when a sole plate is specified and/or provide.

1.4 SUBMITTALS

- A. Shop Drawings:
1. General for all equipment:
 - a. Data sheets that include manufacturer's name and complete product model number.
 - 1) Clearly identify all optional accessories that are included.
 - b. Acknowledgement that products submitted comply with the requirements of the standards referenced.
 - c. Manufacturer's delivery, storage, handling, and installation instructions.
 - d. Equipment identification utilizing numbering system and name utilized in Drawings.
 - e. Equipment installation details:
 - 1) Location of anchorage.
 - 2) Anchorage setting templates.
 - 3) Manufacturer's installation instructions.
 - f. Equipment area classification rating.
 - g. Shipping and operating weight.
 - h. Equipment physical characteristics:
 - 1) Dimensions (both horizontal and vertical).
 - 2) Materials of construction and construction details.
 - i. Equipment factory primer and paint data.
 - j. Manufacturer's recommended spare parts list.

- k. Equipment lining and coatings.
- l. Equipment utility requirements include air, natural gas, electricity, and water.
- m. Ladders and platforms provided with equipment:
 - 1) Certification that all components comply fully with OSHA requirements.
 - 2) Full details of construction/fabrication.
 - 3) Scaled plan and sections showing relationship to equipment.
- 2. Mechanical and process equipment:
 - a. Operating characteristics:
 - 1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
 - 2) Brake horsepower requirements.
 - 3) Copies of equipment data plates.
 - b. Piping and duct connection size, type and location.
 - c. Equipment bearing life certification.
 - d. Equipment foundation data:
 - 1) Equipment center of gravity.
 - 2) Criteria for designing vibration, special or unbalanced forces resulting from equipment operation.
 - 3) Type, size, and materials of construction of anchorage.
 - 4) Data required by Section 03 15 19 Anchorage to Concrete for anchor rod design.
- 3. Systems schematics and data:
 - a. Provide system schematics where required in system specifications.
 - 1) Acknowledge all system components being supplied as part of the system.
 - 2) Utilize equipment, instrument and valving tag numbers defined in the Contract Documents for all components.
 - 3) Provide technical data for each system component showing compliance with the Contract Document requirements.
 - 4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.
- 4. For factory painted equipment, provide paint submittals in accordance with Section 09 96 00.
- 5. Qualifications for:
 - a. Natural frequency analysis firm and personnel.
 - b. Vibration testing firm and personnel.
 - c. Infrared thermography testing firm and personnel.
 - d. Electrical equipment and connections testing firm and personnel.
- 6. Equipment Monitoring and Testing plans, in accordance with PART 3 of this Specification Section:
 - a. Natural frequency analysis and calculations.
 - b. Vibration testing.
 - c. Thermography testing.
 - d. Electrical equipment and connection testing.

B. Factory Test Reports:

- 1. Natural frequency bump test reports where required for rotating equipment.
 - a. Minimum characteristics of impact hammer.

- 1) Frequency Range 1 kHz.
 - 2) Range (5v output) 5,000 pounds-force (22,200 N).
 - 3) Hammer Sensitivity (7pprox.) 1 mV/lbf (0.23 mV/N).
 - 4) Resonant Frequency 12 kHz
2. Motor, equipment and final assembled equipment including motor.
 - a. Determine natural frequency of assembled motor prior to shipping to equipment manufacturer or job site.
 - 1) Individual motor fastened to an "infinitely rigid" mass at the same bolt circle as the final assembled equipment.
 - b. Determine natural frequency of the pump.
 - 1) Pump fastened to an "infinitely rigid" mass at the same bolt circle as the final assembled equipment.
 - c. Determine natural frequency of the pump/motor assembly.
 - 1) Pump/motor assembly fastened to an "infinitely rigid" mass at the same bolt circle as the final field assembled equipment.
 - d. For this use, the "infinitely rigid" mass shall be at least 10 times the weight of the equipment being tested.
 3. Submit natural frequency report(s) for approval prior to shipment.
 4. Equipment performance tests.
 - a. As listed in individual equipment specifications.
- C. Contract Closeout Information:
1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Informational Submittals:
1. Notification, at least one week in advance, that testing will be conducted at factory.
 2. Certification from equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
 3. Submit sample Manufacturer's Field Service Report (MFSR). Report shall use manufacturer's standard report or use the form in the Exhibits and have at least the following information:
 - a. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
 - b. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.
 - c. Motor test reports.
 - d. Field noise testing reports if such testing is specified.
 - e. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
 - f. Provide three bound final written reports documenting natural frequency testing, vibration monitoring and testing for specified equipment.
 - 1) Include the acceptance criteria of all equipment tested.

- 2) Provide individual tabbed sections for information associated with each piece of tested equipment.
- g. Certification prior to Project closeout that electrical panel drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
- h. Testing and monitoring reports in accordance with PART 3 of this Specification Section.
- i. Certification that driven equipment and VFD are compatible.
- 4. Submit completed Manufacturer's Field Service Report (MFSR) for each piece of equipment supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Motors:
 - a. ABB Baldor-Reliance.
 - b. General Electric.
 - c. Hyundai Heavy Industries.
 - d. Marathon Electric.
 - e. Siemens.
 - f. TECO-Westinghouse.
 - g. Toshiba U.S.
 - h. U.S. Motors, Nidec Motor Corporation.
 - i. WEG.
 - 2. Mechanical variable speed drives:
 - a. Reeves.
 - b. U.S. Motors (VariDrive).

2.2 MANUFACTURED UNITS

- A. Electric Motors:
 - 1. Where used in conjunction with adjustable speed AC or DC drives, provide motors that are fully compatible with the speed controllers.
 - 2. Design for frequent starting duty equivalent to duty service required by driven equipment.
 - 3. Design for full voltage starting.
 - 4. Design bearing life based upon actual operating load conditions imposed by driven equipment.
 - 5. Size for altitude of Project.
 - 6. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
 - 7. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
 - 8. AC electric motors less than 1/3 hp:
 - a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.

- c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.
9. AC electric motors 1/3 to 1 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - 1) For single phase motors, provide built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element.
 10. AC electric motors 1-1/2 to 10 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
 11. AC electric motors greater than 10 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Oil or grease lubricated antifriction bearings conforming to ABMA standards.
 - 1) Design bearing life for 90 percent survival rating at 50,000 hours of operation for motors up to and including 100 hp.
 - 2) For motors greater than 100 hp, design bearing life for 90 percent survival rating at 100,000 HRS of operation.
 - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
 - d. Thermal protection:
 - 1) For motors 50 hp and above controlled from a variable frequency drive and for all other motors 100 hp and above, provide one of the following:
 - a) Integral thermal detectors (thermostat) per phase with normally closed contacts wired in series that will open on overtemperature
 - b) Resistance type temperature detector (RTD) complete with monitor and alarm panel having a normally closed contact that will open on overtemperature.
 - (1) Two thermal sensing devices per phase in each phase hot-spot location.
 - (2) Monitor and alarm panel:
 - (a) For constant speed motors, install panel in and energize from the motor starter equipment.
 - (b) For variable speed motors, install panel in and energize from the variable speed drive equipment.
 12. Severe duty motor to have the following minimum features:
 - a. All cast iron construction.
 - b. Gasketed conduit box.
 - c. Epoxy finish for corrosion protection.
 - d. Hydrosopic varnish on windings for corrosion protection.
 - e. Drain plug and breather.
- B. NEMA Design Squirrel Cage Induction Motors:
1. Provide motors designed and applied in compliance with NEMA and IEEE for the specific duty imposed by the driven equipment.
 2. Motors to meet NEMA MG 1 (NEMA Premium) efficiencies.

3. Do not provide motors having a locked rotor kVA per HP exceeding the NEMA standard for the assigned NEMA code letter.
4. For use on variable frequency type adjustable speed drives, provide:
 - a. Induction motors that are in compliance with NEMA MG 1, Part 31.
 - b. Nameplate identification meeting NEMA MG 1 Part 31 requirements.
 - c. Insulated drive end bearing on all motors.
 - d. Insulated non-drive end bearings, at a minimum, on all motors with horizontal shaft 100 hp and larger.
 - e. An insulated bearing carrier on the non-drive end for vertical shaft motors 100 hp and larger.
 - f. Shaft grounding ring on all motors:
 - 1) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
 - 2) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
 - g. Have the following minimum turndown ratio without the use of additional cooling, such as a blower, to provide continuous supply of cooling air over the motor.
 - 1) Variable torque: 10:1.
 - 2) Constant torque: 6:1.
5. Design motor insulation in accordance with NEMA standards for Class F insulation with Class B temperature rise above a 40 degrees C ambient.
6. Design motors for continuous duty.
7. Size motors having a 1.0 service factor so that nameplate HP is a minimum of 15 percent greater than the maximum HP requirements of the driven equipment over its entire operating range.
 - a. As an alternative, furnish motors with a 1.15 service factor and size so that nameplate HP is at least equal to the maximum HP requirements of the driven equipment over its entire operating range.
8. Motor enclosure and winding insulation application:
 - a. The following shall apply unless modified by specific Specification Sections:

| MOTOR LOCATION | MOTOR ENCLOSURE / WINDING INSULATION |
|---------------------------|--------------------------------------|
| Unclassified Indoor Areas | TEFC, Standard Insulation |

NOTE: Provide TENV motors in the smaller horsepower ratings where TEFC is not available.

9. Provide oversize conduit box complete with clamp type grounding terminals inside the conduit box.
10. Balance motors to ISO G2.5 level.
 - a. Submit prior to shipping to equipment manufacturer or job site.
- C. Submersible Motors: Refer to individual narrow-scope Specification Sections for submersible motor requirements.
- D. V-Belt Drive:
 1. Provide each V-belt drive with sliding base or other suitable tension adjustment.
 2. Provide V-belt drives with a service factor of at least 1.6 at maximum speed.
 3. Provide staticproof belts.
- E. Vibration Isolators:

1. Provide all equipment subject to vibration with restrained spring type vibration isolators or pads according to the manufacturer's written recommendation.

F. Space Heaters:

1. Silicone rubber strip type, 120 V rated.
2. Provided on:
 - a. All motors 10 hp and larger mounted outdoors.
 - b. Indoor motors in humid environments as indicated.

2.3 COMPONENTS

A. Gear Drives and Drive Components:

1. Size drive equipment capable of supporting full load including losses in speed reducers and power transmission.
2. Provide nominal input horsepower rating of each gear or speed reducer at least equal to nameplate horsepower of drive motor.
3. Design drive units for 24 hour continuous service, constructed so oil leakage around shafts is precluded.
4. Utilize gears, gear lubrication systems, gear drives, speed reducers, speed increasers and flexible couplings meeting applicable standards of AGMA.
5. Gear reducers:
 - a. Provide gear reducer totally enclosed and oil lubricated.
 - b. Utilize antifriction bearings throughout.
 - c. Provide worm gear reducers having a service factor of at least 1.20.
 - d. Furnish other helical, spiral bevel, and combination bevel-helical gear reducers with a service factor of at least 1.50.

2.4 ACCESSORIES

A. Guards:

1. Provide each piece of equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
2. Interior applications:
 - a. Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
 - b. Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 inches spacing.
 - c. Connect to equipment frame with hot-dip galvanized bolts and wing nuts.
3. Exterior applications:
 - a. Construct from 16 GA stainless steel or aluminum.
 - b. Construct to preclude entrance of rain, snow, or moisture.
 - c. Roll to conform to shaft or coupling surface.
 - d. Connect to equipment frame with stainless steel bolts and wing nuts.

B. Anchorage:

1. Cast-in-place anchorage:
 - a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
 - b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
 - c. Provide two nuts for each bolt.

2. Drilled anchorage:
 - a. Adhesive anchors per Section 03 15 19.
 - b. Threaded rods same as cast-in-place.
- C. Data Plate:
 1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
 2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.

2.5 FABRICATION

- A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.
- B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.
- C. Furnish like parts of duplicate units to be interchangeable.
- D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.
- E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
 1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.
- F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.
 1. Provide drain connection for 3/4 inches PVC tubing.
- G. Machine the mounting feet of rotating equipment.
- H. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that cannot be properly prepared and painted.
 1. When such back to back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
- I. Natural frequency/critical Speed:
 1. All rotating parts accurately machined and in as near perfect rotational balance as practicable.
 2. Excessive vibration is sufficient cause for equipment rejection.
 3. Ratio of all rotative speeds to natural frequency/critical speed of a unit or components: Greater than 1.2.
- J. Equipment Base
 1. Adequate grout and vent openings to allow grout to flow under entire base.
- K. Control Panels Engineered and Provided with the Equipment by the Manufacturer:
 1. Manufacturer's standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
 2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer's standard engineered design, unless specific requirements are required in the specific equipment Specification Section.

3. Affix entire assembly with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to delivery.
 - a. Control panels without an affixed UL 508A or UL 698A label shall be rejected.
4. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - a. Determine the SCCR rating by one of the following methods:
 - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
 - c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

2.6 SHOP OR FACTORY PAINT FINISHES

- A. Electrical Equipment:
 1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified in Section 09 96 00 to receive field painting.
 - a. Field painted equipment: See Section 09 96 00 for factory applied primer/field paint compatibility requirements.
- B. Field paint other equipment in accordance with Section 09 96 00.
 1. See Section 09 96 00 for factory applied primer/field paint compatibility requirements.

2.7 SOURCE QUALITY CONTROL

- A. Motor Tests:
 1. Test motors in accordance with NEMA and IEEE standards.
 2. Provide routine test for all motors.
 3. The Owner reserves the right to select and have tested, either routine or complete, any motor included in the project.
 - a. The Owner will pay all costs, including shipping and handling, for all motors successfully passing the tests.
 - b. Pay all costs, including shipping and handling, for all motors failing the tests.
 - c. If two successive motors of the same manufacturer fail testing, the Owner has the right to reject all motors from that manufacturer.
- B. Balance:
 1. Unless specified otherwise, for all equipment 10 hp or greater, all rotating elements in motors, pumps, blowers, and centrifugal compressors shall be fully assembled, including coupling hubs, before being statically and dynamically balanced. Balance all rotating elements to the following criteria, per ISO 21940-11:

$$U_{per} = \frac{G \times 6.015 \times W/2}{N}$$

Where:

U_{per} = Permissible residual unbalance for each correction plane in ounce-inches (OZ-IN). See ISO 21940-11 for acceptable values.

G = ISO Balance Quality Grade Number, per ISO 21940-11

W = Rotor weight in pounds

N = Maximum continuous operating RPM

- a. Where specified, balancing reports, demonstrating compliance with this requirement, shall be submitted as product data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment as shown on the Drawings and other Contract Documents, in accordance with manufacturer's written instructions, and in accordance with Laws and Regulations. Where the Contract Documents, manufacturer's written instructions, or Laws and Regulations conflict, obtain interpretation or clarification from Engineer before proceeding.
- B. Utilize appropriate templates for anchorage placement for equipment installed on concrete.
- C. Equipment Drainage Discharges:
 1. For equipment having drainage requirements, such as seal water, provide 3/4-inch copper, PVC, or clear plastic tubing from drainage discharge at equipment base to nearest floor drain or equipment drain. Do not discharge liquid across floors.
 2. Furnish and install bell up at each equipment base.
 3. Route equipment drainage piping clear of major traffic areas, to discharge to locations approved by Engineer. To extent practical, avoid creating tripping hazards.
- D. Coordination of Equipment Supports and Bases with Structures:
 1. Do not construct foundations until major equipment supports are approved by Engineer.
- E. Equipment Lubrication Points:
 1. Extend all non-accessible or difficult-to-access lubrication fittings to reasonably accessible locations to facility operation and maintenance personnel without use of ladders or elevating devices, by providing stainless steel tubing (of appropriate wall thickness for the service and application) to a location which allows easy access of fittings from closest operating floor level.
- F. Concrete Equipment Support Bases:
 1. Install level in both directions, with acceptable vertical tolerance of 1/4-inch±.
 2. At anchorage locations, install bases flat and level.
- G. Machine Bases / Sole Plates:
 1. Grease or tape anchorages and jack screws to inhibit grout from adhering to bolts and other anchors.
 - a. Jack screws number and size by equipment manufacturer.
 - 1) Jack screw
 - a) 304 Stainless Steel minimum
 - b) 0.5 inches diameter minimum

- 2) Jack Screw Pad
 - a) 2 inch diameter minimum
 - b) Anchored in place with a structural epoxy adhesive.
 2. Install machine base of rotating equipment on equipment base.
 3. Level in both directions using jack screws, with a machinist level, according to machined surfaces on base. Base shall be level within vertical tolerance of the lesser of (a) 0.005 inch per foot with no more than 0.0005 inches difference between any two points, or (b) equipment manufacturer's written instructions.
 4. Level machine base on equipment base and align couplings between driver and driven equipment.
- H. Couplings for Rotating Equipment:
1. Align in annular and parallel positions.
 - a. For equipment rotating at 1200 rpm or less, align both annular and parallel within 0.001 inch tolerance for couplings four-inch size and smaller.
 - b. Couplings larger than four-inch size: Increase tolerance 0.0005 inch per inch of coupling diameter above four-inch; for example: for six-inch coupling, tolerance is 0.002 inch. For 10 inch coupling, required tolerance is 0.004 inch.
 - c. For equipment rotating at speeds greater than 1200 rpm, tolerance for both annular and parallel positions shall be rate of 0.00025 inch (or less) per inch of coupling diameter.
 2. If equipment is furnished by manufacturer as mounted unit, verify factory alignment after installation at the Site. Realign if necessary, in accordance with equipment manufacturers' written instructions, to provide required factory tolerance.
 3. Inspect surfaces for runout before attempting to trim or align units.
- I. Grouting:
1. Level onto equipment base with jack screws in accordance with the Contract Documents, provide a dam or formwork around base to contain grout between equipment base and equipment support pad.
 2. Preparation:
 - a. Extend dam or formwork to cover leveling shims and blocks.
 - b. Anchor sleeves:
 - 1) Required for equipment (Pumps, Mixers, Blowers) greater than 50 hp
 - 2) If anchor sleeves were used, fill voids in anchor sleeves with foam or room temperature vulcanizing (RTV) silicone to keep grout from filling sleeves.
 - c. Do not use nuts below the machine base to level the unit.
 - d. Saturate top of roughened concrete surface with water before grouting.
 3. Grout Installation:
 - a. Install grout until entire space under machine base is completely filled to underside of base. Voids are unacceptable.
 - b. Puddle grout by working a stiff wire through the grout and vent holes, to ensure grout is installed properly and to release air entrained in grout or base cavity.
 4. After Grout Installation:
 - a. When grout is sufficiently hardened, remove dam or formwork and finish exposed grout surface to fine, smooth surface.
 - b. Completely cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too-rapid evaporation of water from grout.

- c. Check for voids by tapping along the top deck of the mounting plate. A solid thud indicates grout-filled areas while a drum-like hollow sound indicates a void requiring filling.
 - 1) Void areas are to be filled by drilling 1/8 inches NPT holes in opposite corners of each void area. Grout to be pumped into one void with a grout gun until grout emerges from the other vent hole.
- d. When grout is fully hardened (after not less than seven days), remove jack screws, and tighten nuts on anchor bolts and similar anchors to required torque.
- e. Inspect and verify levelness of machine base and, if not in accordance with requirements, remedy by removing base and reinstalling in accordance with the Contract Documents.
- f. Inspect driver-driven equipment for proper alignment. When not in accordance with requirements, remedy so that the Work is not defective.

3.2 INSTALLATION CHECKS

- A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
 - 1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.
- B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
 - 1. Has been properly installed and lubricated.
 - 2. Is in accurate alignment.
 - 3. Is free from any undue stress imposed by connecting piping or anchor bolts.
 - 4. Has been operated under full load conditions and that it operated satisfactorily.
 - a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.
- C. No separate payment shall be made for installation checks.
 - 1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

- A. Identify equipment and install hazard warning signs in accordance with Section 10 14 00.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

- A. For required field painting and protective coatings, comply with Section 09 96 00, High Performance Industrial Coatings.

3.5 WIRING CONNECTIONS AND TERMINATION

- A. Clean wires before installing lugs and connectors.
- B. Coat connection with oxidation eliminating compound for aluminum wire.
- C. Terminate motor circuit conductors with copper lugs bolted to motor leads.
- D. Tape stripped ends of conductors and associated connectors with electrical tape.
 - 1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.

- E. Connections to carry full ampacity of conductors without temperature rise.
- F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

A. General:

- 1. Furnish equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
- 2. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.
- 3. Provide testing for all equipment furnished or installed as part of the Work.
- 4. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptable standards.
- 5. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
 - a. Contract Drawings and Specifications.
 - b. Related construction change documentation.
 - c. Approved Shop Drawings.
 - d. Approved Operation and Maintenance Manuals.
 - e. Other pertinent information as required.

B. Equipment Monitoring and Testing Plans:

- 1. Approved in accordance with Shop Drawing submittal schedule.
- 2. Included as a minimum:
 - a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
 - b. List and description of testing and analysis equipment to be utilized.
 - c. List of all equipment to be testing, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,

C. Instruments Used in Equipment and Connections Quality Control Testing:

- 1. Minimum calibration frequency:
 - a. Field analog instruments: Not more than 6 months.
 - b. Field digital instruments: Not more than 12 months.
 - c. Laboratory instruments: Not more than 12 months.
 - d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
- 2. Carry current calibration status and labels on all testing instruments.
- 3. See individual testing programs for additional instrumentation compliance requirements.

D. Testing and Monitoring Program Documentation:

- 1. Provide reports with tabbed sections for each piece of equipment tested.
- 2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
 - a. Include legible copies of all forms used to record field test information.

3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment
 - a. Include data gathering and sample test report forms that will be utilized.
 4. In the final report, include as a minimum, the following information for all equipment tested:
 - a. Equipment identification, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
 - b. Date and time of each test.
 - c. Ambient conditions including temperature, humidity, and precipitation.
 - d. Visual inspection report.
 - e. Description of test and referenced standards, if any, followed while conducting tests.
 - f. Results of initial and all retesting.
 - g. Acceptance criteria.
 - h. "As found" and "as left" conditions.
 - i. Corrective action, if required, taken to meet acceptance.
 - j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
 - k. Instrument calibration dates of all instruments used in testing.
 5. Provide three (3) bound final reports prior to Project final completion.
- E. Electrical Equipment and Connections Testing Program:
1. Perform testing on Electrical equipment, connections, and motors in accordance with 26 08 13 - Acceptance Testing.
- F. Other Testing:
1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.
 2. Subbase that supports the equipment base and that is made in the form of a cast iron or steel structure that has supporting beams, legs, and cross members that are cast, welded, or bolted shall be tested for a natural frequency of vibration after equipment is mounted.
 - a. The ratio of the natural frequency of the structure to the frequency of the disturbing force shall not be between 0.5 and 1.5.
- G. Infrared Thermography Testing Program:
1. Perform infrared thermography testing for equipment specified in other Divisions during the Equipment Demonstration Period.
 - a. Perform on all rotating and reciprocating equipment having drivers 25 hp or greater.
 2. Additional requirements for infrared thermography monitoring and testing equipment:
 - a. Temperature range: -10 to 350 degrees C.
 - b. Accuracy: ± 2 percent or 2 degrees C, whichever is greater.
 - c. Repeatability: ± 1 percent or 1 degree C, whichever is greater.
 - d. Temperature indication resolution: 0.1 degrees C.
 - e. Minimum focus distance: 0.3 meters.

- f. Output in color palettes: JPEG, BMP, or other digital format compatible with Windows.
 - 3. Perform inspection per ASTM E1934.
 - a. Operate VFD driven equipment at 100 percent speed during thermographic inspection.
 - 4. Acceptability of electrical connections and components based on temperature comparison between components and ambient air temperatures not greater than 10 degrees C per ASTM E1934.
 - 5. Acceptability of motors and equipment bearings based on temperature rise not greater than 5 DEGC above the equipment and/or bearing manufacturers published criteria.
- H. Equipment Field Vibration Monitoring and Testing Program:
- 1. Perform vibration monitoring and testing for equipment specified in other Divisions during the Equipment Demonstration Period.
 - 2. Perform field vibration testing on each item of rotating and reciprocating equipment having driver 50 HP and greater
 - 3. Acceptability of equipment conditions, except pumps, based on ISO 1940-1 Balance Quality Grade G6.3 criteria.
 - 4. Acceptability of pumping equipment to be based on current ANSI/HI criteria:
 - a. ANSI/HI 11.6-2012 for Submersible Pumps in a Wet-pit or Dry-pit configuration.
 - b. ANSI/HI 9.6.4-2016 for all other centrifugal pumps.
 - 5. Utilize an Engineer approved 3rd party testing agency to perform vibration monitoring and testing on equipment.
 - 6. For variable speed equipment provide vibration testing at no more than 3 percent increments of maximum speed throughout entire operating range.
 - 7. Provide machinery condition diagnosis based on an acceptable machinery vibration severity guide or machinery fault guide analysis provided by the testing agency.
 - 8. Tolerances for pumping equipment shall be per HI published standards.
 - 9. Repair or replace equipment shown to be out of range of the specified tolerance until the equipment meets the specified normal operation range required in the machinery fault guide analysis.
 - 10. Document testing with written report.
 - a. Report to include initial testing results, acceptance criteria, corrective action taken to meet acceptance, verification of corrective action and acceptance report and baseline.
 - b. Natural frequency of installed equipment utilizing an impact hammer.
 - c. Report to include graphical plots of vibration signature for each test point at a scale which illustrates all vibration levels greater than 0.025 ips RMS.

3.7 DEMONSTRATION

- A. Demonstrate equipment in accordance with equipment's specific specification.

3.8 ABBREVIATION TABLE

- A. As indicated on the Drawings.

END OF SECTION

EXHIBIT A
MANUFACTURER FIELD SERVICE REPORT

This field service report is generic in nature. An electronic copy of this form or manufacturer's equivalent will be furnished upon request from the Engineer. This report is to reflect that all requirements of the Operations and Maintenance Manual and the individual equipment specification requirements have been performed for the installation and operation and also to provide a baseline for amperage draw for each phase, vibration readings, rotation, alignment and all other applicable tests required to insure that the equipment has been installed properly. A MFSR will be required for each individual piece of equipment requiring a MFSR.

Definitions of Reports:

Initial service report: Required for construction preparations. Equipment delivered to site is in good condition and conforms to specification requirements. Anchor bolts, hardware and ancillary items (piping, flanges, conduits, fuel/power supply) are compatible with equipment.

Interim service report: Required for equipment installation onto base or foundation. Piping connections, electrical and control connections or structural attachment are complete. For equipment stored on site over four weeks, interim service report will document that manufacturer's long-term storage procedures have been incorporated and equipment has not been damaged, nor coatings deteriorated.

Final service report is to be completed when equipment can be started, electrical amperage and voltage draw measured, cold and hot alignments performed, vibration testing and monitoring performed and the equipment is found to be in compliance with Manufacturer's operating parameters and the requirements of the individual equipment specifications.

PROJECT: _____

Report Status:

Initial Service Report completed and submitted on _____

Interim Service Report completed and submitted on _____

Final Service Report completed and submitted on _____

Commencement of Warranty _____

I Description

A. Equipment Name and Identification: _____

B. Serial Number: _____

C. Specification Section Number: _____

D. Manufacturer: _____

E. Representative: _____

F. Type of Service: Initial [_____] Interim [_____] Final [_____]

II General Review

A. The above referenced equipment/material/supplies have been inspected, checked, and adjusted. Yes [_____] No [_____]

Summary: _____

B. The above referenced equipment/material/supplies were placed upon properly prepared or suitable substrate. N/A [_____] Yes [_____] No [_____]

Summary: _____

C. The above referenced equipment/material/supplies are free from any undue stress imposed by any connected piping, anchor bolts or any other load. N/A [_____] Yes [_____] No [_____]

Summary: _____

D. The above referenced equipment/material/supplies have operated under design conditions.
 N/A [_____] Yes [_____] No [_____]

Summary: _____

E. The above referenced equipment/material/supplies have been installed in accordance with the manufacturer's recommendations and the Procurement Documents, require no corrective work, and are hereby approved. Yes [_____] No [_____]

Summary: _____

F. The above referenced equipment/material/supplies are acceptable to the manufacturer as installed providing the following corrective action(s) are performed:

1. _____
2. _____
3. _____
4. _____
5. _____

III Inspection Checklist

| Item | Acceptable (Yes/No) | Readings/Comments |
|-----------------------------------|---------------------|-------------------|
| Bearings (1) | | |
| Belts (tension reading) | | |
| Lubrication Levels | | |
| Vibration (1) (2) (MILS/SEC) | | |
| Infrared Thermography (1) (2) | | |
| Starting AMPS | | |
| Full Load AMPS | | |
| Volts | | |
| Rotation | | |
| Jacket Temperature (DEGF) | | |
| Seal Water Flow Rate (GPH or GPM) | | |
| Seal Water Pressure (PSI) | | |
| O-rings/Packing | | |
| Alignment (1) | | |
| Anchor Bolts | | |
| Anchor Bolt Torque | | |
| Grout | | |
| Substrate Approval | | |

| Item | Acceptable (Yes/No) | Readings/Comments |
|---|---------------------|-------------------|
| Sound level (4 feet from unit) (1) (dB) | | |
| Other | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

(1) Inspection or testing reports must be attached.

(2) Provide vibration testing and monitoring procedures for Engineer's review and approval prior to testing.

IV O&M Manuals

A. The O&M manual as presented contains all information required for proper operation, maintenance, and instruction of this system. N/A [____] Yes [____] No [____]

Summary: _____

V Preventive Maintenance

A. The preventive maintenance summary outlined in the O&M manual is acceptable for operation of the system throughout the warranty period. N/A [____] Yes [____] No [____]

Summary: _____

VI Operator Training/Classroom Instruction

A. Training and instruction have been performed in accordance with the requirements of the Procurement Documents. N/A [____] Yes [____] No [____]

B. Final Training/Classroom Instruction Completed on: _____

Summary: _____

VII Remarks

VIII Certification

I hereby certify, that I, [____], am a duly authorized representative of the manufacturer, that I am empowered by the manufacturer to inspect, approve, and operate his equipment, and that I am

authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as modified herein. I also certify that all information contained herein is true and accurate.

By: _____
(Authorized Representative)

For: _____

Date: _____

IX Acknowledgments

By: _____

For: _____
(Contractor)

Date: _____

By: _____

For: _____
(Engineer)

Date: _____

SECTION 01 62 00
PRODUCT OPTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Contractor's options for selecting materials and equipment.
 2. Requirements for consideration of "or equal" materials and equipment.

1.2 CONTRACTOR'S PRODUCT OPTIONS

- A. For materials and equipment specified only by reference standard or description, without reference to Supplier, furnish materials and equipment complying with such reference standard and descriptive requirements in the Contract Documents, by a Supplier or from a source that complies with the Contract Documents.
- B. For materials and equipment specified by naming one or more items or Suppliers, furnish the named materials and equipment that comply with the Contract Documents, unless an "or equal" or substitute item is approved by Engineer.
- C. For materials and equipment specified by naming one or more items or Suppliers and the term, "or equal", when Contractor proposes a material or equipment item or Supplier as an "or equal", submit to Engineer a request for approval of an "or equal" item or Supplier.
- D. For materials and equipment specified by naming only one item or manufacturer and followed by words indicating that no substitution or "or equal" is allowed, there is no option and no "or equals" or substitutes will be allowed or approved.

1.3 "OR EQUAL" ITEMS

- A. Procedure: The following augments the requirements of the General Conditions, as may be modified by the Supplementary Conditions:
1. For proposed materials and equipment, whether or not indicated by name in the Contract Documents, and considered by Contractor as an "or equal" in accordance with the General Conditions, Contractor shall request in writing Engineer's approval of each proposed "or equal".
 2. Request for approval of an "or equal" item shall accompany the Shop Drawing, product data Submittal, or Sample for the proposed item. Engineer may reject or otherwise not approve or accept any such request or Submittal that is incomplete.
 3. Indicate on the Schedule of Submittals which Submittals were for proposed "or equals" and which were approved as "or equals".
 4. Clearly indicate in the associated Submittal transmittal whether the Submittal includes request for approval of a proposed "or equal".
 5. Comply with the Contract Documents' requirements to clearly indicate all proposed deviations from the requirements of the Contract Documents. Where the Contract Documents do not otherwise require such indication, Contractor shall indicate in detail, both in the Submittal for the "or equal" item and in separate, written correspondence, each proposed deviation from the requirements of the Contract Documents.
 6. Requirements for furnishing information and documents related to proposed "or equals" shall be furnished with the initial Submittal for that item and for all subsequent re-Submittals, if any.
 7. Engineer's approval, if any, of a proposed "or equal" will be indicated by the Engineer's approval of the associated Shop Drawing, product data Submittal, or Sample, as applicable, unless otherwise indicated on the associated Submittal.

8. Should Engineer reject or otherwise not approve a proposed “or equal”, Contractor may propose the item as a substitute, subject to the Contract Documents’ requirements concerning requests for approval of substitute items or procedures.
- B. Contractor’s request for approval of each proposed “or equal” shall include:
1. Contractor’s written request that the proposed item be considered as an “or equal” in accordance with the General Conditions and this Specifications section.
 2. Contractor’s certifications required in the General Conditions.
 3. Documentation adequate to demonstrate to Engineer that proposed item does not require extensive revisions to the Contract Documents, that proposed item is consistent with the Contract Documents, and that proposed item will produce results and performance required in the Contract Documents, and that proposed item is compatible with other portions of the Work.
 4. Detailed comparison of significant qualities of proposed item with the materials and equipment and Suppliers named in the Contract Documents. Significant qualities include attributes such as performance, weight, size, durability, corrosion resistance in the service environment, visual and textural effect and attributes, and specific features and requirements shown or indicated.
 5. Evidence that proposed item’s manufacturer will furnish warranty equal to or better than that specified, if any.
 6. List of similar installations for completed projects with project names and addresses, and names, address, telephone number, and e-mail address of design professionals and owners, when requested by Engineer.
 7. Samples, when requested by Engineer.
 8. Other information requested by Engineer.
- C. When used in the Contract Documents, the terms “or equal”, “or-equal”, and “or approved equal” have the same meaning and refer to materials or equipment proposed by Contractor for Engineer’s approval as equivalent to materials or equipment indicated in the Contract Documents using the name of specific manufacturers or products. Such materials or equipment shall be incorporated into the Work only after being duly approved in writing by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 64 00
OWNER-FURNISHED PRODUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements and procedures for Owner-furnished materials and equipment to be installed by Contractor, including:
 - a. Items in Owner's existing stock to be installed or relocated by Contractor.
 - b. Handling and storage of Owner-furnished items.

B. Scope:

1. Contractor shall provide labor, materials, tools, equipment, services, and incidentals shown, specified, and necessary for accepting, handling, insuring, storing, and maintaining as required, installing, checking out, starting-up, and completing Owner-furnished materials and equipment in accordance with the Contract Documents.

1.2 OWNER FURNISHED MATERIALS AND EQUIPMENT

1. Materials and equipment currently in Owner's stock or possession to be installed or relocated by Contractor:
 - a. Existing thirty 8" diameter and six 6" diameter plug valve, currently in Owner's inventory on Site. Rehabilitation and refurbishment is required in accordance with the associated Specifications. Install at the location shown on the Drawings.
 - b. Existing 8" diameter EBAA-Iron double ball expansion joint, currently in Owner's inventory on Site. Rehabilitation and refurbishment is required in accordance with the associated Specifications. Install at the location shown on the Drawings.

B. Availability of Owner-Furnished Materials and Equipment:

1. Owner-furnished materials and equipment will be available to Contractor starting on:
 - a. Existing Items Already in Owner's Possession: Available on the date the Contract Times start to run, and as necessary thereafter to maintain the Progress Schedule accepted by Engineer.

C. Owner's Responsibilities:

1. Within 10 days after the Effective Date of the Contract, Owner will arrange for and deliver to Contractor an electronic copy (in portable document format; PDF) of each of seller's shop drawings, and other submittals as reviewed by Engineer or Owner. Such submittals, whether approved or otherwise, are not part of the Contract Documents.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review installation procedures for Owner-furnished materials and equipment and coordinate installation of items to be installed with or before Owner-furnished materials and equipment.

1.4 HANDLING AND STORAGE

A. Handling:

1. Handle Owner-furnished materials and equipment in accordance with the Contract Documents and the item manufacturer's written instructions. Handle so that warranties in effect are not voided.

B. Storage:

1. Store Owner-furnished materials and equipment in accordance with the Contract Documents and the item manufacturer's instructions. Store so that warranties in effect are not voided.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 71 33
PROTECTION OF THE WORK AND PROPERTY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for protecting the Work and property, including:
 - a. Accessing or entering property.
 - b. Temporary barricades and temporary warning lights and signs.
 - c. Responsibility to remedy damaged property.
 - d. Protecting natural habitats, including trees, plants, lawns and meadows, and wildlife.
 - e. Protecting Underground Facilities.
 - f. Protecting existing surface structures.
 - g. Protecting floors, walls, and roofs.
 - h. Protecting other installed items and landscaping.
- B. Scope:
 - 1. This Section augments requirements of the General Conditions as may be modified by the Supplementary Conditions regarding protection of the Work and property, including Underground Facilities.
 - 2. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required for protecting the Work and property in accordance with the Contract Documents.

1.2 PROTECTION – GENERAL

- A. Contractor shall provide all precautions and programs and perform all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, in accordance with the Contract Documents, Laws and Regulations, and other applicable requirements.
- B. To prevent damage, injury, and loss, Contractor's actions shall include the following:
 - 1. Providing measures for safety of all personnel at and adjacent to the Site, whether engaged in performing the Work, operating or maintaining the facility, or performing other functions for Owner or others.
 - 2. Storing construction equipment, machinery, tools, and similar items, materials and equipment to be incorporated into the Work, supplies, and other items in an orderly, safe manner that does not unduly interfere with progress of the Work or work of others, including Owner and facility manager (if other than Owner).
 - 3. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction and facilities.

PART 2 - PRODUCTS

2.1 TEMPORARY BARRICADES

- A. Materials and Construction:
 - 1. Temporary barricades shall be of materials that are either new or of good quality and sufficient for the intended purpose, exposure, and duration of use.
 - 2. Provide temporary barricades of sturdy materials of grade, thickness, and durability sufficient for the probable loads to which they will be subject. Temporary barricades intended for fall prevention, such as railings and handrails on temporary stairs and temporary walkways and at openings, shall be in accordance with Laws and Regulations, including the applicable building and safety codes.

3. Color: Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night and during periods of low visibility.
4. Where owner of transportation right-of-way or transportation facility having jurisdiction or other authority having jurisdiction requires compliance with standards more stringent than the Contract Documents, comply with both the Contract Documents and requirements of the authorities having jurisdiction.

PART 3 - EXECUTION

3.1 ACCESSING OR ENTERING PROPERTY

- A. Accessing or Entering Property – General:
1. Use and occupy only lands and easements furnished by Owner, unless appropriate consent from property owner and occupants is obtained by Contractor.
 2. The foregoing applies to personnel, construction equipment and machinery, tools, vehicles, materials or equipment to be incorporated into the Work, supplies, temporary facilities, and other items or obstructions.

3.2 BARRICADES

- A. Temporary Barricades and Temporary Warning Lights and Signs – General:
1. All Work Areas:
 - a. Provide temporary barricades, warning lights, and warning signs for both indoor and outdoor Work, in accordance with Laws and Regulations and requirements of owners of affected property and facilities.
 - b. Warning Lights and Signage: From 30 minutes before terrestrial sunset to 30 minutes after terrestrial sunrise, provide and maintain not less than one temporary flashing light at each vehicle barricade and at other barriers and barricades as necessary.
 - c. Promptly replace temporary barricades that are damaged or are otherwise no longer capable of serving their intended function.
 2. Where the Work is performed on or adjacent to roadway, access road, other area travelled by motor vehicles, railroad, or similar transportation right-of-way, or public place:
 - a. Provide temporary barricades, temporary fences, temporary guard rails, temporary lights and warning signs, temporary danger signals, and other precautions for protecting persons, property, vehicles, and the Work.
 - b. Provide sufficient temporary barricades to keep vehicles from being driven on or into excavations and the Work under construction.
 3. Temporary Barriers for Areas Not Subject to Vehicular Traffic:
 - a. Provide temporary barriers around:
 - 1) Openings.
 - 2) Scaffolding.
 - 3) Temporary stairs and ramps.
 - 4) Around excavations.
 - 5) Around elevated walkways, slabs, and platforms.
 - 6) Other areas that may present a fall-hazard or hazard to persons and property.
 - b. Provide appropriate temporary barriers, warning signs and, where necessary, warning lights, at ground level and other low elevations, and at higher elevations. Protect persons and property from fall-hazards and protect persons and property at lower elevations from falling objects.
 4. Duration of Temporary Barriers, Barricades, Signs, and Warning Lights:
 - a. Contractor's responsibility for maintaining temporary barriers, barricades, signs, warning lights shall continue until the associated Work is substantially complete in accordance with the Contract Documents, unless other provision for protection are agreed to by the parties.

- b. After Substantial Completion, protect Work and property during periods when Contractor is onsite: completing the remaining Work, performing correction period work, and performing warranty work.

3.3 RESPONSIBILITY TO REMEDY DAMAGED PROPERTY

- A. Contractor to Remedy Damage:
 1. Contractor has full responsibility for preserving public and private property and facilities on and adjacent to the Site.
 2. Direct or indirect damage done by, or on account of, any act, omission, neglect (including inadvertent acts), or misconduct by Contractor (including any person or entity for whom contractor is responsible) in performing the Work, shall be promptly remedied by Contractor, at Contractor's expense, in accordance with the Contract Documents.
 3. If the Contract Documents do not show or indicate the required restoration, or remedy, restore or remedy the damage to condition equal or better than that existing before damage was done.
- B. Owner May Remedy:
 1. Should Contractor fail to protect and safeguard property and the Work after requests from Engineer or Owner, Owner reserves the right to implement measures to protect property and the Work.
 2. Cost of such Owner-implemented measures shall be paid by Contractor. Owner may deduct from payments due Contractor such amounts as set-offs in accordance with the Contract Documents.
 3. Such right, however, does not obligate Owner or Engineer to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively Contractor's.
 4. In exercising its rights under this provision, Owner will endeavor to give Contractor sufficient notice to allow Contractor to remedy the damage or defect within a reasonable time. However, if Owner or Engineer deems that the situation requires prompt remedy, Owner may act as quickly as Owner deems appropriate, without infringing on or mitigating Owner's rights under this provision and elsewhere in the Contract Documents

3.4 PROTECTION OF NATURAL HABITATS

- A. Tree and Plant Protection – General:
 1. Protect existing trees, shrubs, and plants on or adjacent to the Site, against unnecessary cutting, breaking, damage, and skinning of trunk, branches, bark, and roots.
 2. Protect irrigation servicing existing trees, shrubs, and plants on or adjacent to the Site that remain in place.
 3. Do not store materials or equipment or park construction equipment, machinery, or vehicles within foliage drip lines.
 4. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
 5. Burning is not allowed at or adjacent to the Site, including burning, in open fires or otherwise, trees, plants, debris, or other combustible materials.
 6. Within the limits of the Work, water trees and plants that are to remain, to maintain their health during construction operations.
 7. Cover exposed roots with burlap and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by storm water runoff, erosion, flooding, and noxious materials in solution.
- B. Remedy of Damaged Trees:
 1. If branches are damaged, prune branches immediately and protect as indicated below.

2. If bark on trunk or major branches is scraped or damaged, using a sharp knife or other suitable cutting implement, clean the edge of the wound, leaving the bark smooth and tight against the wood. Avoid exposing more live tissue and do not remove too much healthy bark. Apply material indicated below.
 3. After pruning and cutting back damaged wood and bark, protect cut or damaged wood by applying emulsified asphaltic sealant specifically manufactured for sealing pruned and damaged trees. Apply sealant in accordance with sealant manufacturer's instructions, in manner acceptable to Engineer and tree owner.
 4. When directed by Engineer, remove and dispose of (at location away from the Site) damaged trees and plants (and parts thereof) that die or suffer permanent injury, and replace each such damaged tree and plant with new tree or plant of equal or better species and quality.
- C. Protection of Lawns and Meadows:
1. Protect lawns and meadows from unnecessary damage during performance of the Work.
 2. To extent practicable, do not drive vehicles, construction equipment, machinery, or wheeled items such as carts and wheelbarrows, across lawns and meadows.
 3. Remedy damaged lawns and meadows in accordance with the Contract Documents. If not otherwise addressed in the Contract Documents, restore to preconstruction condition or better with the same or substantively similar species.

3.5 PROTECTION OF UNDERGROUND FACILITIES

- A. Underground Facilities – General:
1. Underground Facilities known to Owner and Engineer, except laterals or services to individual structures or properties, such as water, wastewater, storm water, gas and fuel, hydronic, steam, electric, and communications laterals or services, are shown on the Drawings. Information shown for Underground Facilities is the best available to Engineer but, in accordance with the General Conditions, as may be modified by the Supplementary Conditions, is not guaranteed to be correct or complete.
 2. Comply with Laws and Regulations regarding notification of utility owners prior to performing the Work, including necessary "call before you dig" notifications.
 3. Contractor shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities.
 4. If Contractor damages an Underground Facility, Contractor shall promptly restore the damaged Underground Facility in accordance with requirements of the owner of the damaged facility and the Contract Documents. If the Contract Documents do not address repair or remedy of the damaged facility, restore to not less than preconstruction condition.
 5. Necessary changes in the location of the Work may be directed by Engineer to avoid Underground Facilities not shown or indicated on the Contract Documents.
 6. If permanent relocation of an existing Underground Facility is required and is not otherwise shown or indicated in the Contract Documents, Contractor may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, or both, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.
- B. Protection of Underground Facilities under Roads and Parking Areas:
1. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to, or visible at, the ground surface.

2. Avoid imparting heavy loads, especially transitory loading (such as heavy truck traffic), vibration forces, and impact loads on Underground Facilities that are close to the ground surface and below-grade work areas. Provide temporary bridging or other appropriate protection where traffic must pass over Underground Facilities in close proximity to the ground surface.
- C. Temporary Support of Underground Facilities:
1. Where Contractor exposes or excavates around or under one or more existing Underground Facilities, provide appropriate and adequate temporary supports for the associated Underground Facilities.
 2. Do not allow Underground Facilities exposed by Contractor's operations to remain exposed without temporary support necessary to properly protect the Underground Facility. Where joint of Underground Facility is exposed by excavation, provide temporary support for each exposed joint and other temporary support as necessary.
 3. Design of Temporary Supports:
 - a. Where necessary or where expressly required by the Contract Documents, retain services of professional engineer to design the temporary supports. Such professional engineer shall be experienced with the type and size of subject Underground Facility, structural engineering, and geotechnical engineering sufficient for the foundations of the temporary supports.
 - b. Temporary supports are not delegation of professional design responsibility unless expressly so indicated in the Contract Documents.
 - c. Responsibilities of Contractor's professional engineer shall include, but are not necessarily limited to, the following:
 - 1) Advising Contractor on investigations necessary to obtain information for design of temporary supports. Reviewing and considering results of such investigations in the design of temporary supports.
 - 2) Visiting the Site to make personal observations as needed.
 - 3) Identify appropriate design criteria for temporary supports.
 - 4) Preparing necessary calculations, design drawings, and design specifications (sealed and signed when required by Contract or Laws or Regulations), appropriately based on the associated soil conditions and subsurface conditions, considering the consequences of failure of the temporary supports and associated potential for damage or failure of the existing subject Underground Facility.
 - 5) Design temporary supports with a safety factor of not less than 2.0.
 - 6) Review and approve or take other appropriate action on submittals of shop drawings and product data for the temporary supports and related materials.
 - 7) Make periodic visits to the Site during erection of the temporary supports and at appropriate intervals thereafter to inspect the temporary supports during performance of other, adjacent Work.
 - 8) Issue to Contractor written recommendations for repairs and improvements necessary for the proper protection of the associated Underground Facility.
 - 9) Submit to Contractor detailed, written recommendations for backfilling the excavation underneath and adjacent to the Underground Facility and for removing the temporary supports.
 - d. Contractor shall comply with the professional engineer's design of the temporary supports.

- e. Owner may require and, in such event, Contractor shall submit, design documents, shop drawings, product data, and reports by Contractor-hired professional engineer. Do not submit such documents to Engineer. When such documents are furnished to Owner, the Owner has no obligation to perform any review of such documents and Owner's possession of such documents does not impart on Owner or Engineer any responsibility for or professional liability associated with design of such temporary supports and consequences of implementing such designs. Owner and Engineer are not obligated in any way to implement recommendations of Contractor's professional engineer.

3.6 PROTECTION OF EXISTING SURFACE STRUCTURES

A. Surface Structures – General:

1. Surface structures are existing buildings, structures, and other facilities at or extending above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires and cabling, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
2. Protect surface structures as necessary and promptly remedy damage and defects resulting or arising from Contractor's operations. Unless expressly shown or indicated otherwise in the Contract Documents, protect such items regardless of whether shown or indicated on the Drawings or elsewhere in the Contract Documents.
3. Protection of Overhead Utilities:
 - a. Protect visible, overhead utilities, including electrical power, communications, and piped utilities, and related supports, regardless of whether such items are shown or indicated in the Contract Documents.
 - b. When required by the Contract Documents or when acceptable to owner of such utility or facility, temporarily relocate overhead utilities or facilities as necessary perform the Work.
 - c. Provide temporary barriers, barricades, and warning signs identifying overhead utilities within reach of Contractor's construction equipment, machinery, or operations...

B. Temporary Removals of Surface Structures:

1. Existing surface facilities, including but not limited to guard rails, handrails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored promptly after the associated Work is performed.
2. Replace and restore such items in accordance with the Contract Documents. If not addressed in the Contract Documents, replace and restore such items to preconstruction condition or better.
3. Remedy damage to all items temporarily removed and later replaced and restored.
4. All such temporary relocations, replacement, and restoration is at Contractor's cost.

C. Protection of Surface Structures:

1. Sustain in their original location and protect from direct and indirect injury all surface structures located within or adjacent to the Site. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
2. Before proceeding with the Work of sustaining and supporting such structure or facility, Contractor shall, upon Engineer's request, promptly satisfy Engineer that methods and procedures to be used have been approved by party owning the surface structure or facility.
3. Regardless of approval or acceptance by owner of property, structure, or facility, responsibility for protecting the Work and property is solely Contractor's.

3.7 PROTECTION OF FLOORS, WALLS, AND ROOFS

- A. Protection of Floors, Walls, and Roofs – General:
 - 1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.
 - 2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
 - 3. Maintain at the Site and use spill kits and absorbent pads for remedying spills.
 - 4. Do not load concrete floors less than 28 days after concrete placement without Engineer's written permission.
 - 5. Do not load slabs, floors, walls, or roofs in excess of design loading.
 - 6. Do not load roofs without Engineer's written permission.
 - 7. Restrict access to roofs, and keep Contractor's workers and personnel off existing roofs, except as necessary for the Work.
 - 8. If access to roofs is necessary, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood, barricades, or other appropriate means.

3.8 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

- A. General:
 - 1. Protect existing facilities and installed Work to prevent damage from subsequent operations.
 - 2. Remove protective items when no longer needed, prior to Substantial Completion of the associated Work.
 - 3. Where work will continue in adjacent area(s) after Substantial Completion of a portion of the Work, protect the substantially completed Work until all work in the area is complete.
- B. Control traffic (foot traffic, wheeled items such as carts, vehicles, and other traffic) to prevent damage to equipment, materials, and surfaces.
- C. Coverings:
 - 1. Provide temporary coverings to protect materials and equipment from damage.
 - 2. Cover: projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.
 - 3. Fasten protective items without harming the Work. Use tape or adhesives that do not leave residue when removed.

END OF SECTION

SECTION 01 74 00
CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for keeping the Site free of accumulations of waste materials during construction (“progress cleaning”).
 - 2. Cleaning for Substantial Completion and prior to final inspection (collectively, “closeout cleaning”).
- B. Scope:
 - 1. Contractor shall perform cleaning during the Project, including progress cleaning, as condition precedent to Substantial Completion, upon completion of the Work, and as required by the General Conditions, as may be modified by the Supplementary Conditions, this Specifications section, and elsewhere in the Contract Documents.
 - 2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. Progress Cleaning – General:
 - 1. Clean the Site, work areas, and other areas occupied by Contractor not less than weekly. Dispose of waste materials in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and the following:
 - a. Comply with NFPA 241 for removing combustible waste materials and debris.
 - b. Do not hold non-combustible materials at the Site more than three days if the ambient air temperature is expected to rise above 80 degrees F. When ambient air temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.
 - c. Provide suitable containers for storage of waste materials and debris. Avoid generation of odors and creation of nuisances.
 - d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.
- B. Progress Cleaning – Site:
 - 1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
 - 2. Not less than weekly, brush-sweep roadways and paved areas at the Site and adjacent areas used by construction vehicles or otherwise affected by construction activities.
 - 3. Comply with dust control requirements of Section 01 57 05 - Temporary Controls.
- C. Progress Cleaning – Work Areas:
 - 1. Clean areas where the Work is in progress to maintain an extent of cleanliness necessary for proper execution of the Work and safety of personnel.

2. Remove liquid spills promptly. Where spills may have harmful effects on health, safety, protection of facilities, or the environment, immediately report spills to Owner, Engineer, and authorities having jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
 3. Where dust would impair proper execution of or quality of the Work, broom-clean or vacuum entire work area, as necessary.
 4. Concealed Spaces: Remove waste material and debris from concealed spaces before enclosing the space.
- D. Progress Cleaning – Installed Work:
1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of installed materials and equipment, using only cleaning agents and methods specifically recommended by material or equipment Supplier.
 2. If Supplier does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage or mar exposed surfaces.
- E. Progress Cleaning – Exposed Surfaces:
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.
- F. Progress Cleaning – Cutting and Patching:
1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings and cuttings, and similar materials.
 2. Thoroughly clean piping, ductwork, conduits, and similar features before applying patching material, paint, or other finishing materials.
 3. Restore damaged insulation and coverings on piping, cutwork, and similar items to its pre-construction condition.
- G. Cleaning of Hydraulic Structures:
1. Clean hydraulic structures that will contain fluid, such as tanks and channels, in accordance with this Specifications section.
 2. Do not perform field quality control activities such as testing tanks, channels, and other hydraulic structures for leakage or disinfecting (where applicable), and do not apply for inspection for Substantial Completion for hydraulic structures, until the associated hydraulic structures are clean and free of all waste materials, and ready for intended use.
- H. Waste Disposal:
1. Properly dispose of waste materials (including surplus materials, debris, rubbish, and other waste) off the Site.
 2. Do not burn or bury waste materials at the Site.
 3. Remove waste material and rubbish from excavations before backfilling.
 4. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers, gutters, sanitary sewers, or other location in the environment. Dispose of such materials in accordance with Laws and Regulations.
 5. Do not discharge wastes to surface waters, drainage routes, or groundwater.
 6. Contractor is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by Contractor's operations or brought to the Site by Contractor.
- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where necessary or required for protection from damage or deterioration, until Substantial Completion.
- J. Clean completed construction as frequently as necessary throughout the construction period.

3.2 CLOSEOUT CLEANING

- A. Complete the following prior to requesting inspection for Substantial Completion:
1. Clean and remove from the Site waste material (including rubbish and debris) and other foreign and undesirable items and substances.
 2. Sweep broom-clean paved areas suitable for access by vehicles.
 3. Remove spills and stains or petroleum, oils, solvents, other chemicals, and other foreign and undesirable deposits.
 4. Hose-clean sidewalks and loading areas.
 5. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 6. Surface waterways and drainage routes (including storm sewers, gutters, and ditches) shall be open and clean.
 7. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to preconstruction condition.
 8. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign and undesirable substances.
 9. Clean, wax, and polish wood, vinyl, and painted floors.
 10. Remove waste material and surface dust from limited-access spaces, including roofs, plenums, shafts, trenchway, equipment vaults, manholes, and similar spaces.
 11. In unoccupied spaces, sweep concrete floors broom-clean.
 12. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 13. Remove non-permanent tags and labels.
 14. Surface Finishes:
 - a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
 - b. Do not paint over "UL" or similar labels, including mechanical and electrical nameplates.
 15. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign or undesirable substances.
 16. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
 17. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 18. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 19. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner and Engineer.
- B. Complete the following prior to requesting final inspection:
1. After Substantial Completion of all the Work, following completion of items of incomplete or damaged Work ("punch list Work"), clean "punch list Work areas in accordance with Paragraph 3.2.A of this Specifications Section.
 2. Remove field offices, Contractor's storage sheds, and remaining stockpiles and clean all such areas in accordance with Paragraph 3.2.B of this Specifications Section, and in accordance with Contract Documents for landscaping and restoration.

END OF SECTION

SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for:
1. Substantial Completion.
 2. Final inspection.
 3. Request for final payment and acceptance of the Work.

1.2 SUBSTANTIAL COMPLETION

- A. Substantial Completion – General:
1. Prior to requesting inspection for Substantial Completion, perform the following for the substantially completed Work:
 - a. Materials and equipment for which Substantial Completion is requested shall be fully ready for their intended use, including full operating and monitoring capability in automatic, manual, and other operating modes set forth in the Contract Documents.
 - b. Permanent provisions for safety and protection, shown and indicated in the Contract Documents and associated with the substantially completed Work or for personnel accessing and using the substantially completed Work, shall be in place and ready for their intended use.
 - c. Complete field quality control Work, including inspections and testing at the Site, indicated in Specifications sections for individual materials and equipment items and related Contract Documents. Submit results of, and obtain Engineer's acceptance of, field quality control tests and inspections required by the Contract Documents.
 - d. Complete checkout and startup in accordance with equipment specifications, requirements of the Specifications for the various materials and equipment in the substantially completed Work, and related Contract Documents.
 - e. Cleaning for Substantial Completion shall be completed in accordance with Section 01 74 00 - Cleaning.
 - f. Spare parts, tools, and extra materials shall be delivered and accepted in accordance with the Contract Documents and documentation of Owner's acceptance thereof has been submitted to Engineer in acceptable form.
 - g. Training of the facility's operations and maintenance personnel shall be completed in accordance with the Contract Documents.
 - h. Submit and obtain Engineer's acceptance of final operations and maintenance manuals in accordance with Section 01 78 23 - Operation and Maintenance Data.
 - i. Obtain and submit to Engineer all required permits, inspections, and approvals of authorities having jurisdiction for the substantially completed Work to be occupied and used by Owner.
 - j. Complete other tasks that the Contract requires be completed prior to Substantial Completion.
 - k. All work shown in Contract Drawings needs to be completed and the Primary Digester, Secondary Digester, and inline sludge grinder need to be online and in working order.
 2. Procedures for requesting and documenting Substantial Completion are in the General Conditions, as may be modified by the Supplementary Conditions.

3. Sample letter for Contractor's request for inspection for Substantial Completion is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project and the needs of Contractor's request.
4. Unless decided otherwise by Owner and Engineer, form of certificate of Substantial Completion will be EJCDC C-625, "Certificate of Substantial Completion" (2018 edition or later), prepared by Engineer.
5. Refer to the Agreement and Section 01 29 76 - Progress Payment Procedures, for requirements regarding consent of surety to partial release of or reduction in retainage.

1.3 FINAL INSPECTION

A. Final Inspection – General:

1. Prior to requesting final inspection, verify that all the Work is fully complete and ready for final payment. Partial checklist for this purpose is attached to this Specifications section.
2. Sample letter for Contractor to request final inspection is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project.
3. Procedures for requesting and documenting the final inspection are in the General Conditions, as may be modified by the Supplementary Conditions, and as augmented in this Specifications section.

1.4 REQUEST FOR FINAL PAYMENT AND ACCEPTANCE OF THE WORK

A. Procedure:

1. After successful completion of the final inspection, submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions, and using procedure specified in Section 01 29 76 - Progress Payment Procedures, and this Specifications section.
2. Acceptance of the Work:
 - a. Upon Engineer's concurrence that the Work is complete and ready for final payment (as a result of the final inspection and other communications between the parties and Engineer) and receipt of the final Application for Payment, accompanied by other required Contract closeout documentation, all in accordance with the Contract Documents, Engineer will issue to Owner and Contractor a notice of acceptability of the Work, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - b. Unless decided otherwise by Owner and Engineer, form of acceptance will be EJCDC C-626, "Notice of Acceptability of Work", (2018 edition or later).
 - c. Nothing other than receipt of such notice of acceptability from Engineer constitutes acceptance of the Work.
 - d. Receipt of Engineer's notice of acceptability of the Work does not relieve Contractor of Contractor's continuing obligations under the Contract, including correction period obligations, warranty obligations, indemnification obligations, insurance requirements, and Contractor's other obligations following acceptance of the Work by Engineer and final payment. Such obligations shall commence and remain in effect as indicated elsewhere in the Contract Documents.

B. Request for final payment shall include:

1. Documents required for progress payments in Section 01 29 76 - Progress Payment Procedures.
2. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.

3. List, on Contractor's letterhead, of all Change Proposals, Claims, and disputes that Contractor believes are unsettled. If there are no such Change Proposals, Claims, or disputes, so indicate in writing.
4. Consent of Surety to Final Payment:
 - a. Acceptable form includes AIA G707, "Consent of Surety to Final Payment" (1994 or later edition), or other form acceptable to Owner.
5. Releases of Liens:
 - a. Submit complete and legally effective releases (satisfactory to Owner) of all Liens filed in connection with the Work, regardless of whether such Lien was filed by Contractor, Subcontractor, or Supplier.
 - b. Each release of Lien shall be signed by an authorized representative of the entity submitting the release of Lien, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
6. Waivers of Lien Rights:
 - a. Submit legally-binding waivers of rights to file Liens, acceptable to Owner, as required in the General Conditions (as may be modified by the Supplementary Conditions) from Contractor and each Subcontractor and Supplier that furnished or provided labor, material, or equipment totaling \$1,000 or more for the Work.
 - b. Furnish final list of Subcontractors and Suppliers indicating final amount of the associated subcontract or purchase order for each. Include on the list all lower-tier Subcontractors and Suppliers retained by higher-tier Subcontractors and Suppliers. Prepare the list using the form included in Section 01 29 76 - Progress Payment Procedures.
 - c. Each waiver of Lien rights shall be signed by an authorized representative of the entity submitting waiver of Lien rights, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
 - d. Waiver of Lien rights may be conditional upon receipt of final payment.
 - e. Required Affidavits: Submit the following:
 - 1) Affidavit of payment of debts and claims, submitted by Contractor. Acceptable form includes AIA G706, "Contractor's Affidavit of Payment of Debts and Claims" (1994 or later edition), or other form acceptable to Owner, and;
 - 2) Affidavit of release of Liens, submitted by Contractor. Acceptable form includes AIA G706A, "Affidavit of Release of Liens" (1994 or later edition).
 - 3) Each affidavit shall be signed by an authorized representative of Contractor and shall bear Contractor's corporate seal, as applicable.
 - f. In the event Contractor is unable to obtain one or more required waivers of Lien rights, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification section's "End of Section" designation, are part of this Specifications section:
 1. Sample letter for Contractor's use in requesting inspection for Substantial Completion (two pages).
 2. Sample partial checklist to identify readiness for final inspection (four pages).
 3. Sample letter for Contractor's use in requesting final inspection (one page).

- B. In the model language of the attached sample letters for Contractor to request inspection for Substantial Completion and the final inspection, italicized language in brackets, e.g., “[*insert date*]” indicates instructions to the drafter of the letter and often indicates specific information to be inserted by Contractor; do not include bracketed, italicized text in the final version of the letter(s) prepared for the Project. Non-italicized language in brackets is optional language; use the appropriate language to complete the actual letter for the Project and edit where required to suit the specific circumstances.

END OF SECTION

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING INSPECTION FOR SUBSTANTIAL COMPLETION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Inspection for Substantial Completion

Dear [addressee]:

In our opinion, [all of] [or] [a portion of] the Work under the above-referenced Contract is substantially complete as of [insert month, day, year on which Substantial Completion was achieved]. [The specific portion of the Work that we believe is substantially complete is [insert identification of that portion of the Work that is substantially complete].]

Enclosed is our listing of uncompleted Work items ("punch list"). In accordance with Paragraph 15.03.A of the General Conditions, we hereby request: (1) That the Engineer schedule and perform the inspection for Substantial Completion as soon as possible, and (2) Issuance of the certificate of Substantial Completion.

In accordance with Paragraph 15.03.D of the General Conditions, upon Substantial Completion, we propose the following relative to apportionment of responsibilities between the Owner and the Contractor:

1. Security, Protection, Insurance:
 - a. Site Security: [insert proposal; address whether Owner or Contractor will be responsible for security of the Site].
 - b. Protection of the Substantially Completed Work: [insert proposal; address whether Owner or Contractor will be responsible for protection].
 - c. Property Insurance: [insert proposal; typically Owner assumes responsibility for property insurance upon Substantial Completion]
2. Operation and Maintenance:
 - a. Operation: [insert proposal; address whether Owner or Contractor will be responsible for operating the substantially completed Work].
 - b. Maintenance: [insert proposal; address whether Owner or Contractor will be responsible for maintaining the substantially completed Work].
3. Utilities: [for each of the following, indicate whether Owner or Contractor will be responsible for utilities and services, or whether responsibility will be shared; if shared, indicate proposed cost-sharing]
 - a. Electricity: [insert proposal].
 - b. Natural Gas/Fuel/Heating: [insert proposal].
 - c. Water Supply: [insert proposal].
 - d. Wastewater: [insert proposal].

e. Communications (Telephone, Internet, Video): *[insert proposal]*.

In accordance with Paragraph 15.08.A of the General Conditions, we understand that the Contract's correction period for the Work covered by the certificate of Substantial Completion commences on the Substantial Completion date documented in said certificate. *[Drafter: Also see Paragraph 15.04 ("Partial Utilization") of the General Conditions and, where necessary, edit this paragraph of the letter accordingly.]*

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] *[insert other contact person's name]*, at *[insert telephone number and e-mail address]*.

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

Preliminary list of uncompleted Work items ("punch list"; [##] pages)

Copies:

[Owner's project manager]

SAMPLE PARTIAL CHECKLIST TO IDENTIFY READINESS FOR FINAL INSPECTION

Project: [_____]

Contract: [_____]

Contractor: [_____]

| Item No./Description | Completed/Date | In Progress | Not Started | Not Applicable | Target Date | Responsible Entity/Person |
|---|--------------------------|--------------------------|--------------------------|--------------------------|-------------|---------------------------|
| 1. All Submittals, including all Shop Drawings and Samples, approved or accepted by Engineer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 1. Final services completed by Suppliers, including submittal of "Manufacturer Field Service Report" in Section 01 61 03 Equipment - Basic Requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 2. Final Work completed by Subcontractors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 3. Permits closed out and regulatory compliance transitioned from construction to operations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 4. All outstanding change issues are addressed and all Change Proposals submitted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |

| Item No./Description | Completed/Date | In Progress | Not Started | Not Applicable | Target Date | Responsible Entity/Person |
|---|--------------------------|--------------------------|--------------------------|--------------------------|-------------|---------------------------|
| 5. All Change Proposals and Claims are resolved | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 6. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 7. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 8. All spare parts, tools, and extra materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 9. All final operations & maintenance manuals have been submitted and accepted by Engineer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 10. Manufacturer warranties and software license(s) furnished | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |

| Item No./Description | Completed/Date | In Progress | Not Started | Not Applicable | Target Date | Responsible Entity/Person |
|--|--------------------------|--------------------------|--------------------------|--------------------------|-------------|---------------------------|
| 11. Instruction and training of operations and maintenance personnel is complete and records of training submitted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 12. MBE/WBE/DBE/VBE compliance report(s) submitted (when applicable) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 13. All field engineering Submittals, including survey data, furnished | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 14. All Work on "punch list" is complete in accordance with the Contract Documents | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 15. All record documents submitted to and accepted by Engineer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 16. Contractor is fully demobilized from the Site | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 17. All Site restoration is complete | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 18. Final cleaning of all work areas is complete | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |

| Item No./Description | Completed/Date | In Progress | Not Started | Not Applicable | Target Date | Responsible Entity/Person |
|---|--------------------------|--------------------------|--------------------------|--------------------------|-------------|---------------------------|
| 19. Releases of Liens and waivers of Lien rights (or acceptable alternative) obtained from Subcontractors and Suppliers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 20. Evidence of Contractor liability insurance furnished for correction period | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| 21. All other required Contract closeout documents obtained | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| <i>Remarks:</i> | | | | | | |
| 22. All other Work and documentation required prior to final payment is complete and provided in accordance with the Contract Documents | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| <i>Remarks:</i> | | | | | | |
| <i>Remarks:</i> | | | | | | |

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING FINAL INSPECTION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Final Inspection

Dear [addressee]:

The Work under the above-referenced Contract is complete and ready for final payment as of [insert month, day, year on which final completion was achieved]. In accordance with Paragraph 15.05 of the General Conditions, we hereby request that the Engineer schedule and perform the final inspection as soon as possible. Upon successful completion of the final inspection, we will submit our final Application for Payment accompanied by the required Contract closeout documentation in accordance with the Contract Documents.

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

None

Copies:

[Owner's project manager]

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
 - a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
 - b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
 - c. Content of operation and maintenance data Submittals.

B. Scope:

1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: (a) Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
 - a. All equipment and systems, including facility equipment, electrical equipment, process equipment, and other equipment.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control devices and systems.
 - d. Building materials, systems, and finishes that need post-construction troubleshooting, cleaning, or maintenance, such as paint and coatings, other finishes, and other items.

C. Related Requirements:

1. Section 01 31 26 - Electronic Communication Protocols.
2. Section 01 33 00 - Submittal Procedures.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data:
 - a. Submit operation and maintenance data, required by the Contract Documents, grouped into operation and maintenance manual Submittals indicated in Table 01 78 23-A.
 - b. Where operation and maintenance data required by the Contract Documents, is not expressly indicated in table 01 78 23-A, obtain written clarification or interpretation from Engineer prior to preparing and transmitting such Submittal.
 - c. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Section.

Table 01 78 23-A
Required Groupings of Operation and Maintenance Data Submittals

| Name of O&M Manual/Data | For Materials or Equipment Specified in Section(s) |
|----------------------------|--|
| Sludge Grinder O&M Manual | 46 24 23 – Sludge Grinders |
| Digester Valves O&M Manual | 40 05 62 – Plug Valves |

B. Timing of Submittals and Quantity Required:

1. Preliminary Operation and Maintenance Manual Submittals:
 - a. Paper Copies: None, exclusive of copies required for Contractor’s use.
 - b. Electronic Documents: One pdf copy, in accordance with Section 01 31 26 - Electronic Communication Protocols.
 - c. Submit to entity indicated in Section 01 33 00 – Submittal Procedures, by the earlier of: 90 days following approval of Shop Drawings and product data Submittals, or 14 days prior to starting training of operation and maintenance personnel, or 14 days prior to field quality control testing at the Site.
 - d. Do not perform checkout, startup, and training without Engineer’s acceptance of preliminary operation and maintenance data Submittals for the associated Work.
2. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
 - a. Paper Copies: Three copies, exclusive of copies required for Contractor’s use.
 - b. Electronic Documents: One pdf copy, in accordance with Section 01 31 26 - Electronic Communication Protocols.
 - c. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.
 - d. If Contractor (whether or not via Subcontractor or Supplier), revises program code or configuration files between acceptance of Submittal by Engineer and end of the Contract’s correction period and Contractor’s general warranty obligation, furnish updated program code and configuration files to Owner. Before modifying program code and configuration files after Substantial Completion, verify with facility manager that Owner- or facility manager modifications of program code or configuration files were incorporated into the modified files, subject to the provisions of this Section.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
3. Binders shall be locking three-ring (“D”-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
4. Do not overfill binders.
5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
6. Indicate the following information on cover of each volume:
 - a. Title: “OPERATING AND MAINTENANCE INSTRUCTIONS”. For submittal of preliminary operation and maintenance data, include the word, “PRELIMINARY” in the title.
 - b. Name or type of material or equipment covered in the manual.

- c. Volume number, if more than one volume is submitted, listed as "Volume [_____] of [_____]"; with appropriate volume-designating numbers filled in.
 - d. Name of Project and, when applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
7. Provide the following information on spine of each volume:
- a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, when more than one volume is submitted, listed as "Volume [_____] of [_____]"; with appropriate volume-designating numbers filled in.
 - d. Project name and building or structure name.
- B. Pages:
- 1. Print pages in paper copies of operation and maintenance manuals on 30-pound (minimum) paper, 8.5-inch by 11-inch size.
 - 2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
 - 3. Furnish each page with binding margin not less than 3/4-inch wide.
 - 4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8-inch of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
 - 5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder's rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.
- C. Drawings:
- 1. Bind into operation and maintenance manuals drawings, diagrams, and illustrations up to and including 11-inch by 17-inch size, with reinforcing and punched holes specified for paper pages.
 - 2. Drawings or sheets larger than 11-inch by 17-inch shall be:
 - a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and drawing numbers. Include not more than two drawings or sheets per pocket.
 - b. Electronic Documents Copies: Included in electronic file at appropriate location.
- D. Copy Quality and Document Clarity:
- 1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable.
 - 2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.
- E. Organization:

1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENTS O&M MANUALS

A. Electronic Documents of Operation and Maintenance Manuals:

1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
2. Submit Electronic Documents operation and maintenance data in accordance with Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures.
3. File Format:
 - a. Unless otherwise required by Section 01 31 26 - Electronic Communication Protocols, or Section 01 33 00 - Submittal Procedures, operation and maintenance data Electronic Documents shall be "portable document format" (PDF) files.
 - b. Electronic Documents shall be electronically searchable upon delivery.
 - c. Electronic Documents shall not be password-protected and shall not be protected against Owner's or facility manager's copying and printing such files for Owner's or facility manager's use in operating and maintaining the facility.
 - d. Electronic Documents shall open to its first page.
 - e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
 - f. Within each Electronic Document, provide bookmarks for the following:
 - 1) Each chapter and subsection indicated in the corresponding printed copy document's table of contents.
 - 2) Each figure.
 - 3) Each table.
 - 4) Each appendix and attachment.

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manual Content – General:

1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-constructed drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.
2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
3. Completeness and Accuracy:
 - a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
 - b. Operation and maintenance manuals shall be complete and accurate.

- c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.
 - 4. Provide dividers and Include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
 - 5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
 - 6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
 - 7. Include copy of warranty in accordance with the Contract Documents.
 - 8. Include copy of proposed service contract, when applicable.
 - 9. When copyrighted material is used in operation and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.
- B. Differences Between Preliminary and Final Operation and Maintenance Manuals:
- 1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
 - 2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
 - a. Equipment data that requires collection after startup, for example: (1) system and equipment balancing reports, including those for HVAC systems; and (2) final settings for electrical switchgear, automatic transfer switches, and circuit breakers; and (3) materials and equipment field testing results.
 - b. Equipment startup reports and Suppliers' field service reports.
- C. Initial Documents in Operation and Maintenance Manuals:
- 1. Table of Contents:
 - a. Provide table of contents in each volume of each operation and maintenance manual.
 - b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
 - 2. Equipment Record:
 - a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).
 - b. Provide "Equipment Record" on forms included as this Section's Attachments 1, 2, and 3.
 - c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Section's Attachments 1, 2, and 3.

- d. This Section's Attachments 1, 2, and 3 are available from Engineer as "fillable PDF forms".
 - e. Complete in detail each section of "Equipment Record". Merely referencing the associated equipment's operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
 - f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed "Equipment Record" is required for each component.
 - g. Operation and maintenance data Submittals without complete and accurate "Equipment Record" sheets are unacceptable.
3. Supplier's Field Service Reports:
- a. Include in final operation and maintenance manuals copies of associated Supplier's field services reports.
 - b. Include Supplier's completed field service reports in operation and maintenance manual in section immediately following "Equipment Record" section.
- D. Operation and Maintenance Instructions:
- 1. Safety Considerations:
 - a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
 - b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
 - c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer's recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
 - d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.
 - e. Include in appendix to operation and maintenance manual manufacturers' relevant "safety data sheets" (SDS), formerly "material safety data sheets" (MSDS).
 - f. Engineer's review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.
 - 2. Operation:
 - a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
 - b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
 - c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
 - d. Explain available controls and instrumentation and associated function(s).
 - e. Indicate required shutdown checklists and procedures for: normal shutdown, emergency shutdown, and long-term shutdowns.
 - f. Troubleshooting instructions.
 - 3. Maintenance – General:

- a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
 - b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
 - c. Include exploded diagram with part numbers.
 - d. Tools: Include list of required maintenance tools and equipment.
 - e. Spare Parts and Extra Materials:
 - 1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
 - 2) Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
 - 3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.
4. Routine and Preventative Maintenance:
- a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
 - 1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, anchor bolt torque checks, lubrication, calibration, cleaning, replacement of filters, and the like.
 - 2) Recommended schedule for each routine and preventive maintenance task.
 - 3) Lubricants:
 - a) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 - b) Table of alternative lubricants.
5. Major Maintenance:
- a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
 - b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.
6. Special Maintenance:
- a. Include maintenance instructions for long-term shutdowns and storage.
- E. Bills of Materials:
- 1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:

2. Manufacturer's name, physical address, telephone number, internet website address.
 3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
 4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
 5. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.
 - e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.
- F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:
1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- G. Electrical Schematics, Diagrams, and Information:
1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
 2. Include as-constructed drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.
- H. NFPA 70 (National Electric Code) Documentation:
1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Section:
1. Attachment 1 - Equipment Data and Spare Parts Summary form (one page)
 2. Attachment 2 - Recommended Maintenance Summary form (one page)
 3. Attachment 3 - Lubrication Summary form (one page)

END OF SECTION



Equipment Data and Spare Parts Summary

| | |
|----------------|------------------------|
| Project Name | Specification Section: |
| Equipment Name | Year Installed: |

Project Equipment Tag No(s).

| | |
|------------------------|-------------------|
| Equipment Manufacturer | Project/Order No. |
| Address | Phone |

| | | |
|---------|----------|--------|
| Website | Web Site | E-mail |
|---------|----------|--------|

| | |
|-------------------------------------|-------|
| Local Representative/Service Center | Phone |
| Address | |

| | |
|---------|--------|
| Website | E-mail |
|---------|--------|

MECHANICAL NAMEPLATE DATA

| | |
|--------|------------|
| Equip. | Serial No. |
|--------|------------|

| | |
|------|-----------|
| Make | Model No. |
|------|-----------|

| | | | | |
|--------|-----------|----|-----|------|
| ID No. | Frame No. | HP | RPM | Cap. |
|--------|-----------|----|-----|------|

| | | | | |
|------|-----|-----------|-----|-----|
| Size | TDH | Imp. Size | CFM | PSI |
|------|-----|-----------|-----|-----|

Other:

ELECTRICAL NAMEPLATE DATA

| | |
|--------|------------|
| Equip. | Serial No. |
|--------|------------|

| | |
|------|-----------|
| Make | Model No. |
|------|-----------|

| | | | | | | | | |
|--------|-----------|----|----|------|-------|----|-----|----|
| ID No. | Frame No. | HP | V. | Amp. | Hertz | PH | RPM | SF |
|--------|-----------|----|----|------|-------|----|-----|----|

| | | | | | | | |
|------|------|----------|------|------|--------|------------|--------|
| Duty | Code | Ins. Cl. | Type | NEMA | C Amb. | Temp. Rise | Rating |
|------|------|----------|------|------|--------|------------|--------|

Other:

SPARE PARTS PROVIDED PER CONTRACT

| Part No. | Part Name | Quantity |
|----------|-----------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

RECOMMENDED SPARE PARTS

| Part No. | Part Name | Quantity |
|----------|-----------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

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Lubrication Summary

| | |
|-----------------------|---------------------------|
| Equipment Description | Project Equip. Tag No(s). |
|-----------------------|---------------------------|

| Lubricant Point | | | | | | |
|-----------------|---|--------------|---------|--------|-------|-----|
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| Lubricant Point | | | | | | |
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| Lubricant Point | | | | | | |
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| Lubricant Point | | | | | | |
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| Lubricant Point | | | | | | |
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| Lubricant Point | | | | | | |
| | | Manufacturer | Product | AGMA # | SAE # | ISO |
| Lubricant Type | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |

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SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for Project record documents, to supplement record documents requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, and services to establish, maintain, continuously update, and submit to Engineer Project record documents in accordance with the Contract Documents.
- C. Related Sections include but are not necessarily limited to:
 - 1. Section 01 29 73 - Schedule of Values.
 - 2. Section 01 29 76 - Progress Payment Procedures.
 - 3. Section 01 31 26 - Electronic Communication Protocols.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain necessary field measurements and record all data required for Project record documents before covering up the Work or building on subsequent phases of the Work.
 - 2. Promptly after obtaining measurements and information, record the data and information on Project record documents.
 - 3. Where a licensed, registered professional land surveyor is retained on the Project, whether by Contractor or others, to perform field measurements and record other data for as-constructed Project or Site conditions, coordinate with such entity and schedule and perform the Work accordingly. Allow surveyor sufficient time and proper conditions for performing surveyor's work. Assist the surveyor as necessary in performance of surveyor's responsibilities.
- B. Monthly Status Evaluation:
 - 1. Not less than once per month, as a condition precedent to submitting Application for Payment, Contractor's site superintendent will meet with either Engineer or Resident Project Representative (RPR) at the Site to review status of Contractor's Project record documents.
 - 2. When Engineer or RPR directs corrections to Project record documents, promptly make such corrections on the Project record documents. Engineer's or RPR's directions or lack thereof do not in any way relieve or mitigate Contractor's sole responsibility for the accuracy, completeness, and clarity of Project record documents.
 - 3. Requirements for review of record documents status as a condition precedent to progress payments is in Section 01 29 73 - Schedule of Values, and Section 01 29 76 - Progress Payment Procedures.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Recorder of Changes and Field Conditions on Project Record Documents:
 - a. Contractor's staff at the Site shall include not less than one person with suitable training and drafting (drawing) experience to record on the Project record documents changes made and field conditions encountered.

- b. Recorder of changes and field conditions on the Project record documents shall possess not less than two semesters of drafting (drawing) training in a classroom, either in high school, college, or bona-fide vocational school.
- c. Upon Engineer's request, submit name of proposed recorder at the Site, resume', or list of relevant experience, and copy of credentials of completion of such drafting (drawing) course(s).
- d. If original recorder of changes and field conditions is replaced, promptly advise Engineer and RPR in writing and submit to Engineer qualifications of proposed replacement.

B. Samples of Similar Prior Work:

- 1. Submit Samples of the personal work of Contractor's designated recorder of changes and field conditions on the Project record documents from not less than two prior projects of similar type(s) of work at the Work. Submit copies of not less than two marked-up drawings from each prior project and copies of two pages of marked-up specifications from each prior project.
- 2. Samples shall be in the same form as proposed for the Project record documents. For example, where Contractor intends to submit hand-drawn mark-ups of the Drawings and Specifications, Samples shall be copies of hand-drawn markups. Where Contractor intends to submit Project record documents in native (executable) file format (such as CAD files), Samples shall be developed using the same software to be used in preparing the Project record documents.
- 3. If original recorder of changes and field conditions is replaced by Contractor, replacement recorder shall provide the same standard of work on Project record documents as indicated in the approved Samples.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

- 1. Samples:
 - a. Sample of field-recorded project record documents from prior projects, in accordance with this Specifications section's "Quality Assurance" Article, to establish quality and style for markups of Project record documents. Submit within 15 days of the date the Contract Times commence running.

B. Informational Submittals: Submit the following:

- 1. Qualifications Statements:
 - a. When requested by Engineer, submit qualifications of proposed recorder of changes and field conditions for Project record documents at Contractor's field office at the Site. Qualifications shall comply with the "Quality Assurance" Article of this Specifications section.

C. Closeout Submittals: Submit the following:

- 1. Record Documentation:
 - a. Prior to readiness for final payment, submit to Engineer one copy of Project's final record documents and obtain Engineer's acceptance of same. Submit complete record documents; do not make partial Submittals without Engineer's concurrence.
 - b. Submit the following Project record documents:
 - 1) Record Drawings, including those issued via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - 2) Record project manual, including Specifications, indicating changes made via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - c. Submit record documents with transmittal letter on Contractor's letterhead in accordance with requirements in Section 01 33 00 - Submittal Procedures.
- 2. Certifications:

- a. Record documents Submittal shall include certification, with original signature of official authorized to sign legally binding contracts on behalf of Contractor, reading as follows:
 - 1) (Contractor's legal/contractual entity name) has maintained, continuously updated, and submitted Project record documentation in accordance with the General Conditions and Supplementary Conditions, Section 01 78 39 - Project Record Documents, and other elements of Contract Documents, for the Sanitary District No. 5 of Marin County, California, Tiburon-Belvedere Wastewater Treatment Plant Digester Cleaning and Rehabilitation Project. We certify that each record document submitted is complete, accurate, and legible relative to the Work performed under our Contract, and that the record documents comply with the requirements of the Contract Documents.

By: [_____] (signature)

Print Name: [_____] _____

Title: [_____] _____

1.5 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintain in Contractor's field office, in clean, dry, legible condition, complete sets of the following record documents:
 1. Drawings, Specifications, and Addenda;
 2. Shop Drawings, Samples, and other Submittals, including records of test results, approved or accepted as applicable, by Engineer;
 3. Change Orders, Work Change Directives, Field Orders, allowance authorizations;
 4. copies of all interpretations and clarifications issued;
 5. photographic documentation;
 6. survey data; and
 7. all other documents pertinent to the Work.
- B. Provide files and racks for proper storage and easy access to Project record documents. File record documents in accordance with the edition of the Construction Specification Institute's *MasterFormat* used for organizing the project manual, unless otherwise accepted by Engineer or RPR.
- C. Promptly make Project record documents available for observation and review upon request of Engineer, RPR, or Owner.
- D. Do not use Project record documents for any purpose other than serving as Project record. Do not remove Project record documents from Contractor's field office without Engineer's approval.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- A. Recording Changes, Field Conditions, and Other Information – General:
 1. At the start of the Project, label each record document to be submitted as, "PROJECT RECORD" using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.
 2. Keep record documents current consistent with the progress of the Work. Make entries on record documents within two working days of receipt of information required to record the change, field condition, or other pertinent information.
 3. Do not permanently conceal the Work until required information has been recorded for Project record documents.
 4. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from Engineer-accepted Project record documents.
 5. Marking of Entries:

- a. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to Project record documents.
- b. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files in "portable document format" (.PDF) files.
- c. Date each entry on record documents.
- d. Indicate changes by drawing a "cloud" around the change(s) indicated.
- e. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

B. Drawings:

1. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced drawings as a substitute for recording changes on a copy of the Drawings is unacceptable.
2. Record changes on plans, sections, elevations, schematics, schedules, and details as required for clarity, accuracy, and completeness, making reference dimensions and elevations (to Project datum) for complete record documentation.
3. Record actual construction including:
 - a. Depths of various elements of foundation relative to Project datum.
 - b. Horizontal and vertical location of Underground Facilities referenced to permanent surface improvements and Project elevation datum. For each Underground Facility, including pipe fittings, show and indicate dimensions to not less than two permanent, visible surface improvements.
 - c. Location of exposed utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure and, where applicable, to Project elevation datum.
 - d. Changes in structural and architectural elements of the Work, including changes in reinforcing.
 - e. Field changes of dimensions, arrangements, and details.
 - f. Changes made in accordance with Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - g. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document such changes.
4. Recording Changes for Schematic Layouts:
 - a. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.
 - b. Record on the Project record documents all revisions to schematics on the Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Drawings. Show and indicate actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
 - c. When dimensioned plans and dimensioned sections or elevations on the Drawings show the Work schematically, indicate on the Project record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items
 - 1) Clearly identify each item of the Work by accurate notations such as "cast iron drain", "rigid electrical conduit", "copper waterline", and similar descriptions.
 - 2) Show by symbol or by note the vertical location of each item of the Work; for example, "embedded in slab", "under slab", "in ceiling plenum", "exposed", and

similar designations. For piping not embedded, also indicate elevation dimension relative to Project elevation datum.

- 3) Descriptions shall be sufficiently detailed to be related to the Specifications.
 - d. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans, sections, and elevations when, in Engineer's judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on such waiver(s) being issued.
5. Supplemental Drawings:
- a. In some cases, drawings produced during construction by Engineer or Contractor supplement the Drawings and shall be included with Project record documents submitted by Contractor. Supplemental record drawings shall include drawings or sketches that are part of Change Orders, Work Change Directives, Field Orders, and allowance authorizations and that cannot be incorporated into the Drawings because of space limitations.
 - b. Supplemental drawings submitted with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
 - c. When supplemental drawings developed by Contractor using computer-aided drafting/design (CAD), building information models (BIM), or civil information models (CIM) software are to be included in record drawings, submit electronic files for such drawings in accordance with Section 01 31 26 – Electronic Communication Protocols, as part of record drawing Submittal. Label such files, "Supplemental Record Drawings", including with Contractor's name, Project name, and Contract designation.

C. Specifications and Addenda:

1. Mark each Specifications section to record:
 - a. Manufacturer, trade name, catalog number, and Supplier of each material and equipment item actually furnished.
 - b. Changes made by Addendum, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.

1.7 ELECTRONIC DOCUMENTS FURNISHED BY ENGINEER

A. CAD, BIM, or CIM files of the Drawings will be furnished by Engineer upon the following conditions:

1. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CAD, BIM, or CIM files of the Drawings and indicating specific definition(s) or description(s) of how such Electronic Documents will be used by Contractor, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.
2. Engineer does not guarantee that Electronic Documents are available in the format(s) requested by Contractor. Some projects may have Drawings developed using only CAD software instead of BIM or CIM software. Engineer will not create BIM or CIM files for Contractor if such files do not already exist.
3. Contractor shall sign Engineer's standard agreement with Contractor for release of Electronic Documents and shall abide by the provisions of such agreement for release of Electronic Documents.
4. Layering system incorporated in CAD, BIM, and CIM files shall be maintained as transmitted by Engineer. CADD, BIM, and CIM files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor shall restore all layers and cross-references prior to submitting Project record documents to Engineer.
5. Contractor shall submit Project record drawings to Engineer in same CAD, BIM, or CIM format that files were furnished to Contractor.

B. Microsoft Word files of Specifications:

1. Requirements for Engineer's potential release of word processing files of the Specifications or other written documents in native format are the same as those for Drawings.
2. When Specifications are released in native format, Contractor shall submit record specifications in the same format, with all changes tracked using Microsoft Word's "track changes" feature.
3. Do not modify the formatting of the native files furnished by Engineer. If formatting changes are made without Engineer's authorization, remedy the formatting to the same condition and status as when the files were first delivered to Contractor. Such remedy shall be at Contractor's expense.
4. Comply with all requirements of this Specifications section regarding record specifications.
5. After delivery of record specifications Submittal to Engineer, delete from Contractor's files the native word processing files. Contractor may retain a PDF version of such files for Contractor's records.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 81 10
WIND AND SEISMIC DESIGN CRITERIA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. The following types of design criteria for the Project, including Work designed by (a) Engineer and (b) delegated design professional(s) retained by Contractor, Subcontractor, or Supplier and submitted for Engineer's approval under the Contract:
 - a. Wind loading.
 - b. Seismic.
- B. Scope:
1. Certain Work, expressly indicated, shall be designed, fabricated, and installed in accordance with the wind and seismic requirements of this Section and Laws and Regulations (including applicable building codes).
 2. This Section applies to all the Work. Where wind and seismic design criteria indicated in this Section conflict with wind and seismic design criteria set forth elsewhere in the Contract Documents, the more-stringent loading and requirements shall govern, unless clarified in writing by Engineer. Obtain Engineer's written interpretation or clarification of conflicts prior to performing the subject design and other associated Work.
 3. Contractor shall provide all labor, materials, equipment, tools, professional services, and incidentals to provide wind and seismic design for the Work.
 4. Such Work includes, but is not necessarily limited to, the following:
 - a. Anchorage of mechanical and electrical equipment and systems.
 - b. Anchorage of supports for piping, electrical conduits and cable trays, and similar Work.
 - c. Work requiring delegated professional design for the final, completed Project.
- C. Related Requirements: Include but are not necessarily limited to:
1. Section 01 35 73 - Delegated Design Procedures.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate all wind and seismic design required of Contractor for the Work.

1.3 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Society of Civil Engineers / Structural Engineering Institute (ASCE/SEI):
 - a. 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
 2. When referenced standards conflict, the most-stringent governs, unless specifically indicated otherwise in the Contract Documents or unless approved otherwise in writing by the Engineer.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following as part of the Submittals required in Divisions 02-49 Specifications that require wind and seismic delegated designs:
1. Delegated Design Professional's "Instruments of Service" Submittals:
 - a. Delegated design professional's "certification of compliance" required by Section 01 35 73 - Delegated Design Procedures, regarding structural calculations:

- 1) Indicate compliance with performance and design criteria indicated in the Contract Documents.
 - 2) Indicate compliance with specific reference standards indicated in the building code and the associated Contract Documents.
 - 3) Indicate other information required for "certification of compliance" in accordance with Section 01 35 73 - Delegated Design Procedures.
- B. Informational Submittals: Submit the following as part of the Submittals required in Divisions 02-49 Specifications that require wind and seismic delegated designs:
1. Delegated Design Professional's Calculations:
 - a. Such calculations shall include delegated design professional's seal, signature, and date and are to indicate the following, which will not be reviewed by Engineer except for the limited purposes indicated in Section 01 35 73 - Delegated Design Procedures:
 - 1) Indicate basis of design and lateral analysis as necessary and required to derive each loading and to indicate system stability, including compatibility of deflections and compatibility with allowable soil parameters, as applicable.
 - 2) Indicate design load to each connection to structure (where connection will attach to or interface with, or supported by, elements designed by Engineer).
 - 3) Indicate and provide complete lateral load resisting system that transfers all wind and seismic loads through load path to ground.
 2. Shop Drawings and Product Data Approved by Delegated Design Professional: The following are required but will be reviewed by Engineer only for the limited purposes indicated in Section 01 35 73 - Delegated Design Procedures:
 - a. Shop Drawings showing and indicating proposed wind and seismic controls Work designed by delegated design professional.
 - b. Product data showing and indicating proposed wind and seismic controls Work designed by delegated design professional.

PART 2 - PRODUCTS

2.1 GENERAL DESIGN CRITERIA FOR WIND AND SEISMIC

- A. This Article 2.1 applies to wind and seismic design criteria.
- B. Design by delegated design professional retained by Contractor, Subcontractor, or Supplier shall comply with:
 1. Performance and design criteria indicated in the applicable Contract Documents, including this Section.
 2. Laws and Regulations, including applicable building code.
 3. Applicable reference standards indicated in the Contract Documents.
- C. Risk Category: III.
 1. Design in accordance with building code load combinations for, at Contractor's option, either service level or factored level.
 2. Mechanical and electrical equipment and systems loads are dead loads, except where mechanical elements, such as piping and tanks, are filled with material such as liquid or slurry (in which case the dead load of the pipe's or vessel's contents shall also be included).

2.2 WIND DESIGN CRITERIA

- A. Wind Design Load Criteria:
 1. Basic Wind Speed: $V_{ult} = 97$ miles per hour.
 2. Exposure Category: D.
 3. Topographic Factor: $K_{zt} = 1.0$.
 4. Wind Importance Factor: $I_w = 1.00$.

- B. Wind forces must be resisted by direct load transfer through fasteners to wind-resisting elements. Do not use connections that employ friction to transfer wind forces.

2.3 SEISMIC DESIGN CRITERIA

- A. Seismic Design Load Criteria:
1. Design spectral acceleration at short period: $S_{DS} = 1.2$.
 2. Design spectral acceleration at 1-second period: $S_{D1} = 0.7$.
 3. Importance Factor: $I_e = 1.25$.
 4. Seismic Design Category: D.
 5. Component or system amplification factor, (a_P) and component response modification factor (R_P): In accordance with ASCE 7-16, Tables 13.5-1 and 13.6-1.
 6. Component Importance Factor:
 - a. All Components: $I_P = 1.00$.
- B. Seismic forces must be resisted by direct load transfer through fasteners to seismic-resisting elements. Do not use connections that employ friction to transfer seismic forces.

PART 3 - EXECUTION - (NOT USED)

END OF SECTION



DIVISION 02

EXISTING CONDITIONS



SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General provisions applicable to all demolition and removals.
2. Civil/site demolition and removals.
3. Architectural and structural demolition and removals.
4. Mechanical demolition and removals
5. Electrical demolition and removals.
6. Disposal of demolition debris, materials, and equipment.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, and incidentals as shown, specified and required for demolition, removals, and disposal Work.
2. The Work under this Specifications section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, foundations, walls, piping, electrical and mechanical systems and equipment, and similar existing materials, equipment, and items.
3. Demolitions and removals indicated in other Specifications sections shall comply with requirements of this Specifications section.
4. Perform demolition Work within areas shown or indicated.
5. Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition and removals Work.

C. Related Requirements:

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Fire Protection Association (NFPA):
 - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

B. Regulatory Requirements:

1. Demolition, removals, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T – Demolition), and all other Laws and Regulations.
2. Comply with requirements of authorities having jurisdiction.

C. Qualifications:

1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician(s) legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Comply with Section 01 14 16 - Coordination with Owner's Operations.
2. Review procedures under this and other Specifications sections and coordinate the Work that will be performed with or before demolition and removals.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) Other proposed procedures as applicable.
 - 3) Equipment proposed for use in demolition operations.
 - 4) Recycling/disposal facility(ies) proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 5) Planned demolition operating sequences.
 - 6) Detailed schedule of demolition Work in accordance with the Schedule accepted by Engineer.
2. Notification of Intended Demolition Start: Submit in accordance with Paragraph 3.1.A of this Specifications Section.
3. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.

1.5 SITE CONDITIONS

- A. Owner makes no representation of condition or structural integrity of area(s) to be demolished or where removals are required by the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notification:
 1. Not less than 48 hours prior to commencing demolition or removal, advise Engineer in writing of planned start of demolition Work. Do not start removals without permission of Engineer.
 2. Where demolition or removals has potential to affect adjacent properties, occupants, streets, or other public thoroughfare, transportation facilities, and utilities, furnish required notices to owners and occupants of properties, buildings, and structures that may be affected by the demolition of removal.
 3. In accordance with Laws and Regulations, furnish to authorities having jurisdiction, including emergency services as necessary, appropriate notices of planned demolition and removals.
 4. Submit to Engineer copies of notices furnished to adjacent property owners, occupants, and authorities having jurisdiction.
- B. Protection of Adjacent Areas and Facilities:
 1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties unless allowed by the Contract Documents otherwise allowed in writing by Owner.
 2. Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.
 3. Provide temporary partitions between demolition work areas and (a) areas that will be occupied during demolition and removals, and (b) areas accessible to the public or visitors. Temporary partitions shall be sturdy, braced plywood in good condition, of dimensions sufficient to adequately screen demolition work from view of occupants, public, and visitors.

Maintain temporary partitions in place until demolition and removals work in the subject area is complete or until other Work requires removal of temporary partitions.

4. Provide appropriate temporary barriers, lighting, sidewalk sheds, and other necessary protection.
5. Repair damage to facilities that are to remain which such damages results from Contractor's operations.

C. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, perform the following:

1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
2. Sanitary Sewerage: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.
3. Storm Water Sewerage: Existing storm water system shall remain in place until demolition of existing building or structure is complete. Upon completing demolition, cut and cap storm sewerage at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities in accordance with the Contract Documents.
4. Water Piping and Related Facilities: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished. Ensure compliance with Laws and Regulations regarding water quality.
5. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; compressed air; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
6. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.

D. Remediation:

1. If unanticipated Hazardous Environmental Condition is believed to be encountered during demolition and removals, comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

3.2 DEMOLITION - GENERAL

A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.

B. Pollution Controls:

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level. Comply with Section 01 57 05 - Temporary Controls, and Laws and Regulations.
2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions and Section 01 74 00 - Cleaning.

C. Explosives:

1. Explosives are not allowed at the Site. Do not use explosives for demolition and removal Work.

D. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals,

and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to Owner.
- B. Recycling and Reuse of Demolition Materials:
 - 1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in or upon building or structure to be demolished shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.
 - 2. Do not use demolished materials as fill or backfill adjacent to structures, in pipeline trenches, or as subbase under structures or pavement.
- C. After removing concrete and masonry walls or portions thereof, mats, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
 - 1. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended.
 - 2. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 - 3. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair the resulting hole, with repair mortar for concrete and grout for masonry, to be flush with the surface.
 - 4. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Removal of Anchorages and Protruding Metals:
 - 1. Where equipment or material anchored to concrete or masonry are removed and anchors are not to be re-used, and where existing metals (and to be removed) protrude from concrete, remove the anchors and other metal to not less than 1.5 inches beneath surface of concrete or masonry member. Repair the resulting hole, using repair mortar for concrete and grout for masonry, to be flush with the surface.
 - 2. Alternately, when the anchor is stainless steel, the anchor may be cut flush with the surface of the concrete or masonry, when so approved by Engineer.
- F. Jambs, sills and heads of windows, passageways, doors, or other openings (as applicable) cut-in to the Work or to existing construction shall be dressed with masonry, concrete, or metal to provide smooth, finished appearance.
- G. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Specifications section, unless specified elsewhere in the Contract Documents.

3.4 MECHANICAL REMOVALS

- A. Mechanical demolition and removal Work includes dismantling and removing existing:
 - 1. Piping systems and ductwork systems.
 - 2. Mechanical equipment and appurtenances.

3. Mechanical elements of instrumentation and control systems, such as sensors and transmitters and similar items.
 4. Mechanical removals include cutting and capping as required; Specifications sections in which requirements for coordination with Owner's operations are indicated; and applicable Specifications of Division 21 - Fire Suppression, Division 22 - Plumbing, Division 23 - Heating, Ventilating, and Air Conditioning, Division 40 - Process Interconnections, and others as applicable.
 5. Mechanical removals as required herein apply to systems exposed to view, hidden from view, and Underground Facilities. Mechanical removals may require work in spaces that may be classified confined spaces.
- B. Life-Safety Systems:
1. Retain existing life-safety systems, including but not limited to fire suppression systems, in place for as long as possible prior to performing associated demolition and removals.
 2. Where demolishing buildings or structures equipped with life-safety systems, remove or deactivate life-safety systems only in the area where active demolition operations are in progress.
- C. Demolition and Removals of Piping, Ductwork, and Similar Items:
1. Scope:
 - a. Safety purge piping and tanks (as applicable) of chemicals, fuel, solids, liquids, and gases (as applicable) and make safe for removal and capping. Discharge contents of existing piping appropriately while avoiding damaging property; restricting access to or use of property; and cresting unsafe, unsanitary, nuisances, and noisome conditions.
 - b. To the extent shown or indicated, remove existing piping conveying water (potable and non-potable), waste and vent, fuel (liquids and gases), heating fluids (such as water-glycol solutions), chemicals, solids and slurries, sludge, wastewater, other fluids, and processes gases, and other piping.
 - c. Remove piping to the nearest structurally sound (or "solid") piping support, and provide caps on ends of remaining piping.
 - d. Where piping to be demolished passes through existing walls to remain, cut off and cap pipe on each side of the wall.
 2. Caps, Closures, Blind Flanges, and Plugs – General (All Piping and Ducts):
 - a. Provide closure pieces, such as blind flanges and caps, where shown or required to complete the Work.
 - b. Where used in this Specifications section, the term "cap" means the appropriate type closure for the piping or ductwork being closed, including caps, blind flanges, and other closures.
 - c. Caps shall be compatible with the piping or ductwork on which the cap is installed, fluid-tight and gastight, and appropriate for the fluid or gas conveyed in the pipe or duct.
 - d. Unless otherwise shown or indicated, caps shall be mechanically fastened, fused, or welded to pipe or duct. Plug piping with means other than specified in this Specifications section only when expressly so shown or indicated in the Contractor Documents or when allowed by Engineer.
 3. Underground Facilities:
 - a. When Underground Facilities are altered or removed, properly cut and cap piping left in place, unless otherwise shown or indicated.
 4. Waste and Vent Piping; Ductwork:
 - a. Remove waste and vent piping, and ductwork to extent shown and cap as required.
 - b. Where demolished vent piping, stacks, and ductwork passes through existing roofing, patch the roof with the same or similar materials as existing, and fully compatible with ensign materials. Completed patch shall be watertight and comply with roofing manufacturer's recommendations.
 5. Potable Water Piping; Plumbing; Fire Suppression Piping and Systems; Heating Piping:

- a. Modifications to potable water piping, fire suppression systems, other plumbing piping, and heating system piping shall comply with Laws and Regulations.
- b. All portions of potable water systems that have been modified or opened shall be hydrostatically tested and disinfected in accordance with the Contract Documents, and Laws and Regulations. Hydrostatically test other, normally-pressurized, plumbing and fire suppression piping and heating piping systems.

D. Equipment Demolition and Removals:

1. To the extent shown or indicated and as required for the Work, remove existing mechanical equipment, including (but not limited to):
 - a. Flow control valves.
 - b. Process equipment, including purification equipment, pollution control and solid waste equipment, and treatment process equipment.
 - c. Appurtenances (including motors, drive systems, controls, cooling water and seal water systems) as shown, indicated, and required for completion of the Work.
2. Where required, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as required for access through and egress from building or structure. Disassembly and removal shall comply with Laws and Regulations. Provide required means to remove equipment from building or structure.
3. Remove control panels, operator stations, and instruments associated with equipment being removed, unless shown or indicated otherwise.
4. Tanks and Equipment Containing Process Material:
 - a. Purge contents in accordance with Paragraph 3.5.A of this Specifications Section and other requirements of the Contract Documents, as applicable.
 - b. When removing generators, remove associated fuel storage tanks unless otherwise indicated to remain.
 - c. Where contents of tank or equipment item may pose a potential hazard, such as hydrocarbon fuels or chemicals, properly dispose of contents in accordance with Laws and Regulations and the Contract Documents.
 - d. Where tank or equipment contains wastewater or liquid sludge, and the Site is a wastewater treatment facility, transport and dispose of stored contents onsite at location acceptable to Owner and facility manager (if other than Owner) unless otherwise indicated in the Contract Documents. If Site is other than a wastewater treatment facility, dispose of contents appropriately in accordance with Laws and Regulations.
 - e. Where tank or equipment contains solid or slurry-type material, remove, handle, and transport the contents and appropriately dispose of the materials offsite in accordance with Laws and Regulations, unless otherwise indicated in the Contract Documents.
5. Remove equipment supports as applicable, anchorages, base, grout, and piping. Remove anchorage systems in accordance with the "Structural Removals" Article in this Specifications section.
6. Remove small-diameter piping back to header unless otherwise indicated.
7. Remove access platforms, ladders, and stairs related to equipment being removed, unless otherwise shown or indicated.
8. Instrumentation and Control Systems Removal:
 - a. Remove instrumentation and controls equipment in accordance with this Specifications section's requirements for mechanical removals and electrical removals.

3.5 ELECTRICAL REMOVALS

A. Electrical demolition Work includes removing existing:

1. Disconnecting cabling from motors, electrical sources, control panels, control stations, instrumentation and control items, and similar devices and equipment.
2. Appurtenances and miscellaneous electrical equipment, as shown, specified, or required.

B. Electrical Removals – General:

1. Comply with Laws and Regulations, including the National Electric Code.
 2. Lock Out and Tagging:
 - a. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cabling are de-energized to ground potential before commencing electrical removals Work.
 - b. Upon completion of electrical removals Work, remove the locks and tags and promptly advise Resident Project Representative (RPR) or Engineer and Owner that existing facilities are available for use.
 3. Remove existing electrical equipment, fixtures, and systems to avoid damaging systems to remain, to keep existing systems in operation, and to maintain integrity of grounding systems.
 4. Disconnect and remove motors, control panels, and other electrical gear where shown or indicated.
 5. Store removed motors, microprocessors and electronics, and other electrical gear to be reused in accordance with its manufacturer's recommendations and requirements of the Contract Documents.
- C. Motor Control Centers and Switchgear:
1. Remove or modify motor control centers and switchgear as shown or indicated.
 2. Modified openings shall be cut square and dressed smooth to dimensions required for installation of equipment.
- D. Removal of Cabling, Conduits, Raceways and Similar Items:
1. Verify the function of each cable before disconnecting and removing.
 2. Remove cabling, conduits, hangers and supports, and similar items back to the power source or control panel, unless otherwise shown or indicated.
 3. Remove cabling, conduits, and similar items where shown or indicated for removal. Abandoned conduits concealed in floor, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to Engineer.
 4. Disassemble and remove exposed conduits, junction boxes, other electrical appurtenances, and their supports.
 5. Repair all areas of the Work to prevent rusting on exposed surfaces.
 6. Underground Electric:
 - a. Conduits in Underground Facilities not scheduled for reuse shall be suitably capped watertight where each enters building or structure to remain.
 - b. Where shown or indicated, remove direct-burial cabling. Openings in buildings for entrance of direct-burial cabling shall be patched with repair mortar or other material approved by Engineer for such purpose, and made watertight.

3.6 DEMOLITION OF SITE IMPROVEMENTS

- A. Pavement, Sidewalks, Curbs, and Gutters:
1. Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.
 2. To cut pavement, sidewalks, curbs, and gutters, use machinery or tools that provides a smooth-cut edge, appropriate for the required. Where cut edges are not smooth, repair the cut edge to remain to provide a smooth, even appearance.
- B. Other Site Improvements: When the Contract Documents require removal of other site improvements not addressed above, copy with Contract requirements for removal of buildings or structures.

3.7 DISPOSAL OF DEMOLITION DEBRIS

- A. Disposal – General:

1. Promptly remove from the Site all debris, waste, rubbish, material, and equipment resulting from demolition and removal operations. Promptly upon completion of demolition and removal operations, remove from the Site construction equipment used in demolition Work.
 2. Do not sell at the Site demolition materials or removed equipment. If materials, equipment or debris will be sold by Contractor, remove the items from the Site and perform the sale or transaction elsewhere, in accordance with Laws and Regulations.
 3. Cleaning and Removal of Debris: Comply with the General Conditions, Supplementary Conditions, and Section 01 74 00 - Cleaning.
- B. Transportation and Disposal:
1. Non-Hazardous Materials, Equipment, and Debris: Properly transport and dispose of non-hazardous demolition materials, equipment, and debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Constituents of Concern such as (but not limited to) asbestos, PCBs, petroleum, hazardous waste, radioactive material, or other material designated as hazardous in Laws or Regulations.
 2. Hazardous Materials, Equipment, and Debris: When handling and disposal of items containing Constituents of Concern is included in the Work, properly transport and dispose of such items in accordance with the Contract Documents and Laws and Regulations.
- C. Submit to Engineer information required in this Specification Section on proposed facility(ies) where demolition materials, equipment, and debris will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

END OF SECTION



DIVISION 03

CONCRETE



SECTION 03 00 05
CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete and grout.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 03 15 19 - Anchorage to Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305.1, Hot Weather Concreting.
 - g. 306.1, Cold Weather Concreting.
 - h. 318, Building Code Requirements for Structural Concrete.
 - i. 347, Guide to Formwork for Concrete.
 - j. CT-13, Concrete Terminology.
 - 2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.
 - e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - f. C33, Standard Specification for Concrete Aggregates.
 - g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - h. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
 - k. C150, Standard Specification for Portland Cement.
 - l. C172, Standard Practice for Sampling Freshly Mixed Concrete.
 - m. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

- n. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - o. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - p. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - q. C494, Standard Specification for Chemical Admixtures for Concrete.
 - r. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - s. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - t. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - u. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - v. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - w. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - x. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - y. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - z. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - aa. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
3. Corps of Engineers (COE):
 - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
 4. National Ready Mixed Concrete Association (NRMCA).
- B. Quality Control:
1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - b. Concrete testing agency to meet requirements of ASTM E329.
 2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
 - a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Engineer.
- C. Qualifications:
1. Ready mixed concrete batch plant certified by NRMCA.

1.3 DEFINITIONS

- A. Per ACI CT-13 except as modified herein:

1. Concrete fill: Non-structural concrete.
2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
3. Exposed concrete: Exposed to view after construction is complete.
4. Indicated: Indicated by Contract Documents.
5. Nonexposed concrete: Not exposed to view after construction is complete.
6. Required: Required by Contract Documents.
7. Specified strength: Specified compressive strength at 28 days.
8. Submitted: Submitted to Engineer.

1.4 SUBMITTALS

A. Shop Drawings:

1. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for deleterious aggregate per ASTM C1293.
 - 4) Proportioning of all materials.
 - 5) Type of cement with mill certificate for cement.
 - 6) Type of fly ash with certificate of conformance to specification requirements.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Chemical sealer.
 - 4) Bonding and patching mortar.
 - 5) Construction joint bonding adhesive.
 - 6) Nonshrink grout with cure/seal compound.
3. Reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
 - c. Obtain approval of Shop Drawings by Engineer before fabrication.
 - d. Mill certificates.
4. Scaled (minimum 1/8 inches per foot) drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint dimensions.
5. Strength test results of in place concrete including slump, air content and concrete temperature.

6. Shrinkage testing results.
7. Certifications:
 - a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
 - b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.
8. Test reports:
 - a. Cement mill reports for all cement to be supplied.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Material:
 1. Cement and pozzolan:
 - a. Store in moistureproof, weathertight enclosures.
 - b. Do not use if caked or lumpy.
 2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.
 - c. Do not use frozen or partially frozen aggregates.
 - d. Do not use bottom 6 inches of stockpiles in contact with ground.
 - e. Allow sand to drain until moisture content is uniform prior to use.
 3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
 4. Reinforcing steel: Support and store all rebars above ground.
- B. Delivery:
 1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.
 - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification mark.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.
 - 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.
 - 6) Numerical sequence of the delivery.
 - 7) Amount of water added.
 2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:

1. Nonshrink, nonmetallic grout:
 - a. Sika "SikaGrout 212."
 - b. Euclid Chemical "NS Grout."
 - c. Master Builders Solutions "Masterflow 713."
2. Chemical sealer:
 - a. L&M Construction Chemicals, Inc.
 - b. Euclid Chemical Company.
 - c. Dayton Superior.
3. Bonding agent:
 - a. Euclid Chemical Co.
 - b. Master Builders Solutions.
 - c. L&M Construction Chemicals Inc.

2.2 MATERIALS

- A. Portland Cement: Conform to ASTM C150 Type I.
- B. Fly Ash:
 1. ASTM C618, Class F or Class C.
 2. Nonstaining.
 - a. Hardened concrete containing fly ash to be uniform light gray color.
 3. Maximum loss on ignition: 6%.
 4. Compatible with other concrete ingredients.
 5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
- C. Admixtures:
 1. Air entraining admixtures: ASTM C260.
 2. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.
 - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.
 - d. Follow manufacturer's instructions.
 - e. Use chloride free admixtures only.
 3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
 - a. 0.10 all concrete.
 4. Do not use calcium chloride.
 5. Pozzolanic admixtures: ASTM C618.
 6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
 1. Normal weight concrete: ASTM C33, except as modified below.
 2. Fine aggregate:
 - a. Clean natural sand.
 - b. No manufactured or artificial sand.

3. Coarse aggregate:
 - a. Crushed rock, natural gravel, or other inert granular material.
 - b. Maximum amount of clay or shale particles: 1%.
 4. Gradation of coarse aggregate:
 - a. Lean concrete and concrete topping: Size #7.
 - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
1. Nonshrink, nonmetallic grout:
 - a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.
 - b. Grout to produce a positive but controlled expansion.
 - c. Mass expansion not to be created by gas liberation.
 - d. Minimum compressive strength of nonshrink grout at 28 days: 6500 psi.
 - e. In accordance with COE CRD-C621.
 2. Epoxy grout:
 - a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.
 - 2) One inert aggregate filler component.
 - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
1. Reinforcing bars: ASTM A615, Grade 60.
 2. Welded wire reinforcement:
 - a. ASTM A185 or ASTM A1064.
 - b. Minimum yield strength: 60,000 psi.
 3. Column spirals: ASTM A82 or ASTM A1064.
- H. Chairs, Runners, Bolsters, Spacers, and Hangers:
1. Stainless steel, epoxy coated, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- I. Chemical Floor Sealer:
1. Colorless low VOC water-based solution containing acrylic copolymers.
 - a. ASTM C1315, Class B, minimum 30% solids.
 2. L&M Construction Chemicals Inc. Dress & Seal WB 30.
- J. Cementitious Concrete Coating:
1. Polymer modified Portland cement based coating for concrete and masonry.
 - a. Waterproof.
 - b. Resistant to both positive and negative hydrostatic pressure.
 - c. Breathable.
 2. Master Builders Solutions "Masterseal 581 Thoroseal".
 - a. Color:
 - 1) Interior surfaces: Standard gray.
 - 2) Exterior surfaces: Custom color to match concrete surface.
 - 3) Texture: Fine.
- K. Membrane Curing Compound:
1. ASTM C309, Type 1D, Class A or B.
 2. Fugitive dye shall dissipate over time and exposure.

3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.

L. Bonding Agent:

1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
2. Euclid Chemical Co. "Flex-Con."
3. Master Builders Solutions "Acryl-Set."
4. L&M Construction Chemicals "Everbond."

2.3 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.
4. Provide pozzolan content for all cast-in-place construction.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

| TYPE | WEIGHT | SPECIFIED STRENGTH* |
|----------------------|---------------|---------------------|
| General use concrete | Normal weight | 4000 PSI |

* Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

| MAX AGGREGATE SIZE | TOTAL AIR CONTENT PERCENT |
|------------------------|---------------------------|
| 1 inches or 3/4 inches | 6 ±1-1/2 |
| <3/4 inches | 6-1/2 ±1-1/2 |

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 inches maximum, 1 inch minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 inches maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
 - a. Provide additional water at batch plant to allow for slump loss due to pumping.
 - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.
5. Slump may be adjusted in the field through the use of water reducers.
 - a. Coordinate dosage and mixing requirements with concrete supplier.

6. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
 2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

| SPECIFIED STRENGTH | TARGET CEMENT, MAXIMUM AGGREGATE SIZE | | | MAXIMUM WATER CEMENT RATIO BY WEIGHT |
|--------------------|---------------------------------------|------------|----------|--------------------------------------|
| | 1/2 inches | 3/4 inches | 1 inches | |
| 4000 | 564 | 564 | 564 | 0.45 |

3. Fly ash:
 - a. For cast-in-place concrete only, a maximum of 25% by weight of Portland cement content per cubic yard may be replaced with fly ash at rate of 1 pound fly ash for 1 pound of cement.
 - b. When fly ash is used, the water to cementitious materials ratio shall not exceed the maximum value specified herein.
4. Concrete mix proportioning methods for normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:
 - 1) Method 1 (Trial Mix):
 - a) Per ACI 318, Chapter 5, except as modified herein.
 - b) Air content within range specified above.
 - c) Record and report temperature of trial mixes.
 - d) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience):
 - a) Per ACI 318, Chapter 5, except as modified herein:
 - b) Field test records must be acceptable to Engineer to use this method.
 - c) Test records shall represent materials, proportions and conditions similar to those specified.
 5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 5 of ACI 318 using the standard deviation of the proposed concrete production facility.

F. Allowable Shrinkage: 0.048% at 28-days per ASTM C157.

PART 3 - EXECUTION

3.1 PLACING CONCRETE

- A. Reinforcement:
1. Position, support and secure reinforcement against displacement.
 2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.

3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
 4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
 5. Extend reinforcement to within 2 inches of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 inches of the edge.
 6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
 7. Unless otherwise indicated, provide minimum concrete cover as follows:
 - a. Concrete deposited against earth: 3 inches.
 - b. Formed surfaces exposed to weather or in contact with earth: 2 inches for reinforcing bars #6 or larger; 1-1/2 inches for reinforcing bars less than #6.
 - c. Formed surfaces exposed to or located above any liquid: 2 inches.
 - d. Interior surfaces: 1-1/2 inches for beams, girders and columns; 3/4 inches or bar diameter, whichever is greater, for slabs, walls and joists.
 8. Do not weld reinforcing bars.
 9. Welded wire reinforcement:
 - a. Install welded wire reinforcement in maximum practical sizes.
 - b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
 - 1) One spacing of cross wires plus 2 inches.
 - 2) 1.5 x development length.
 - 3) 6 inches.
 - c. Development length: ACI 318 basic development length for the specified fabric yield strength.
- B. Embedments:
1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
 2. See Specification Section 03 15 19 - Anchorage to Concrete.
 3. Use setting diagrams, templates and instructions for locating and setting.
- C. Placing Concrete:
1. Place concrete in compliance with ACI 304R and ACI 304.2R.
 2. Place in a continuous operation within planned joints or sections.
 3. Begin placement when work of other trades affecting concrete is completed.
 4. Place concrete by methods which prevent aggregate segregation.
 5. Do not allow concrete to free fall more than 4 feet.
 6. Where free fall of concrete will exceed 4 feet, place concrete by means of tremie pipe or chute.
- D. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.
- E. Protection:
1. Protect concrete from physical damage or reduced strength due to weather extremes.
 2. In cold weather comply with ACI 306.1 except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Do not place heated concrete that is warmer than 80 degrees F.

- c. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 degrees F for seven days or 70 degrees F for 3 days.
 - d. Do not allow concrete to cool suddenly.
3. In hot weather comply with ACI 305.1 except as modified herein.
 - a. At air temperature of 90 degrees F and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 90 degrees F at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
 - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 pounds/SF/HR as determined from ACI 305.1, Figure 2.1.5.
- F. Curing:
1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
 2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
 3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
 4. Provide curing for minimum of seven days.
 5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
 6. In hot weather follow curing procedures outlined in ACI 305.1.
 7. In cold weather follow curing procedures outlined in ACI 306.1.
 8. Curing vertical surfaces with a curing compound:
 - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
 - b. Allow the preceding coat to completely dry prior to applying the next coat.
 - c. Apply the first coat of curing compound immediately after form removal.
 - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

3.2 CONCRETE FINISHES

- A. Tolerances:
1. Class A: 1/8 inches in 10 feet.
 2. Class B: 1/4 inches in 10 feet.
- B. Surfaces Exposed to View:
1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.
 - b. Scheduled for grout cleaned finish.
 2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
 3. Cementitious concrete coating:
 - a. Form facing material shall produce a smooth, hard, uniform texture.
 - 1) Use forms specified for surfaces exposed to view.
 - b. Prepare the surface in accordance with manufactures printed installation instructions.
 - c. Brush on coating to entire surface.

- 1) As a mixing liquid for the coating, use bonding agent and water mixture as recommended by the manufacture.
 - 2) Apply two (2) coats at 2 pound/SQYD per coat.
 - d. When second coat is set, float to a uniform texture with a sponge coat.
 - e. Provide this finish at the following locations:
 - 1) Walls, columns, exposed to view.
- C. Surfaces Not Exposed to View:
1. Patch voids, air pockets and honeycomb areas with cement grout.
 2. Fill tie holes with nonshrink, nonmetallic grout.
- D. Slab Float Finish:
1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
 2. Do not use water to aid in finishing.
 3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
 4. During or after first floating, check planeness of entire surface with a 10 feet straightedge applied at not less than two different angles.
 5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
 6. Refloat slab immediately to a uniform sandy texture.
- E. Troweled Finish:
1. Float finish surface.
 2. Next power trowel, and finally hand trowel.
 3. Do not use water to aid in finishing.
 4. Produce a smooth surface which is relatively free of defects with first hand troweling.
 5. Perform additional trowelings by hand after surface has hardened sufficiently.
 6. Final trowel when a ringing sound is produced as trowel is moved over surface.
 7. Thoroughly consolidate surface by hand troweling.
 8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
 9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.
- F. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

3.3 GROUT

- A. Preparation:
1. Nonshrinking, nonmetallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 hours prior to grouting.
- B. Application:
1. Nonshrinking, nonmetallic grout:
 - a. Mix in a mechanical mixer.
 - b. Use no more water than necessary to produce flowable grout.
 - c. Place in accordance with manufacturer's instructions.
 - d. Completely fill all spaces and cavities below the bottom of baseplates.

- e. Provide forms where baseplates and bedplates do not confine grout.
- f. Where exposed to view, finish grout edges smooth.
- g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
- h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
- i. Wet cure grout for seven days, minimum.

3.4 FIELD QUALITY CONTROL

- A. Owner will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
 - 1. Contractor to cooperate with Owner in obtaining and testing samples.
- B. Tests During Construction:
 - 1. Strength test:
 - a. For each strength test, mold and cure cylinders from each sample in accordance with ASTM C31.
 - 1) Cylinder size: Per ASTM C31.
 - a) 4 inches cylinders may not be used for concrete mixes with concrete aggregate size larger than 1 inch.
 - 2) Quantity:
 - a) 6 inches diameter by 12 inches high: Four cylinders.
 - b) 4 inches diameter by 8 inches high: Six cylinders.
 - b. Field cure one (1) cylinder for the seven day test.
 - 1) Laboratory cure the remaining.
 - c. Test cylinders in accordance with ASTM C39.
 - 1) 6 inches diameter cylinders:
 - a) Test two cylinders at 28 days for strength test result and the one field cured sample at seven days for information.
 - b) Hold remaining cylinder in reserve.
 - 2) 4 inches diameter cylinders:
 - a) Test three cylinders at 28 days for strength test result and the one field cured cylinder at seven days for information.
 - b) Hold remaining cylinders in reserve.
 - d. Strength test result:
 - 1) Average of strengths of two 6 inches diameter cylinders or three 4 inches diameter cylinders from the same sample tested at 28 days.
 - 2) If one cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder(s); average strength of remaining cylinders shall be considered strength test result.
 - 3) Should all cylinders in any test show any of above defects, discard entire test.
 - e. Frequency of tests:
 - a) One strength test to be taken not less than once a day, nor less than once for each 60 cubic yards or fraction thereof placed in any one day.
 - b) Once for each 5000 square feet of slab or wall surface area placed each day.

- c) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five strength tests for each concrete mix, tests shall then be made from at least five randomly selected batches or from each batch if fewer than five batches are provided.
 - 2. Slump test:
 - a. Per ASTM C143.
 - b. Determined for each strength test sample.
 - c. Additional slump tests may be taken.
 - 3. Air content:
 - a. Per ASTM C231, ASTM C173, and ASTM C138.
 - b. Determined for each strength test sample.
 - 4. Temperature: Determined for each strength test sample.
- C. Evaluation of Tests:
 - 1. Strength test results:
 - a. Average of 28-day strength of two cylinders from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.
 - 2) If both cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
 - 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
 - b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
 - 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.
- E. Concrete tolerances per ACI 117.

3.5 SCHEDULES

- A. Form Types:
 - 1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
 - 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
 - 3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.
- B. Grout:
 - 1. Nonshrinking, nonmetallic grout: General use.

C. Concrete:

1. General use concrete: All locations.

D. Concrete Finishes:

1. Slab finishes:

- a. Use following finishes as applicable, unless otherwise indicated:

- 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
 - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
 - 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

END OF SECTION

SECTION 03 01 30

REPAIR AND REHABILITATION OF EXISTING CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation and assessment of existing concrete for repair and rehabilitation:
 - a. Concrete removal for repairs.
 - b. Preparation of exposed reinforcing steel.
 - 2. Repair of damaged (and deteriorated) concrete.
 - a. Application of repair mortar.
 - b. Repair of exposed items embedded in concrete.
- B. Scope:
 - 1. Contractor shall provide all materials, equipment, labor, tools, services, and incidentals necessary to repair and rehabilitate existing concrete, whether damaged or deteriorated, at locations shown on the Drawings or at locations indicated by Engineer, in accordance with the Contract Documents.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Unit Prices:
 - 1. The Work of this Section is Unit Price Work unless otherwise shown or indicated. Work covered by this Section but not eligible for payment under Unit Price Work bid/pay items shall be performed at Contractor's expense.
 - 2. Bid/pay item classifications of Unit Price Work addressed in this Section are indicated in the Bid Form, the Agreement (or an exhibit thereto), and Section 01 22 00 - Measurement and Payment.
 - 3. Unit Price Work of this Section is classified as follows:
 - a. Concrete Spall Repair with no exposed rebar.
 - b. Concrete Spall Repair with exposed rebar.
- B. Measurement:
 - 1. Quantities of this Section's Unit Price Work:
 - a. Unit Price Work of this Section shall be measured for payment prior to commencement of the associated Work in each work area.
 - b. Work not measured in advance for payment will not be eligible for payment by Owner.
 - c. Engineer will observe the associated concrete repair and rehabilitation Work performed. Such Work shall be in accordance with the Contract Documents for to such Work to be eligible for payment by Owner, even when such Work was measured (for payment) in advance.
 - 2. Repair of new concrete Work provided by Contractor is not eligible for payment under the Unit Price Work bid/pay items covered by this Section. Such repairs are included in the Work of the associated bid/pay item under which the subject new concrete Work was provided.

1.3 REFERENCES

- A. Terminology:
 - 1. This provision indicates terminology used in this Section and in other Contract Documents that coordinate with this Section. Such terminology may or may not be indicated using initial capital letters and, when used in relation to the Work of this Section, have the meanings indicated below.

2. "Existing concrete damage" means damage to existing concrete surfaces deeper than 1/8 inches, such as:
 - a. Concrete corrosion.
 - b. Corroded items embedded within concrete or through the concrete surface.
 - c. Spalls.
 - d. Cracking at depth and arrangement that, in Engineer's sole opinion, cannot be repaired in accordance with Section 03 64 23 - Crack Repair and Injection.
 3. "Installer" means the entity installing or applying repair materials at the Site. The terms "installer" and "applicator" have the same meaning. Installer or applicator may be Contractor or Subcontractor.
 4. "MPII" means, "manufacturer's printed installation instructions".
 5. "Rehabilitation" means repairing and restoring concrete to structurally-sound, durable condition suitable for the structure's intended purpose as determined by Engineer, including repair of existing concrete damage in accordance with this Section and other applicable provisions of the Contract Documents.
 6. Other terminology used in this Section is consistent with terminology of ACI CT.
- B. Reference Standards:
1. American Concrete Institute (ACI):
 - a. CT, Concrete Terminology.
 - b. 117, Specification for Tolerances for Concrete Construction and Materials.
 - c. 308, Standard Practice for Curing Concrete.
 2. ASTM International (ASTM):
 - a. C150, Standard Specification for Portland Cement.
 - b. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - c. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - d. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - e. D1682, Breaking Load and Elongation of Textile Fabric.
 - f. D1876, Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
 - g. D4060, Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - h. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - i. D4259, Standard Practice for Abrading Concrete.
 - j. D4263, Indicating Moisture in Concrete by the Plastic Sheet Method.
 - k. D7234, Standard Test Method for Pull-off Adhesion Strength of Coatings on Concrete Using Portable Pull-off Adhesion Tests.
 3. International Concrete Repair Institute (ICRI).
 - a. 310.1R, Guide for Surface Preparation.
 - b. 310.1R, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Steel Corrosion.
 4. Society for Protective Coatings/NACE International (SSPC/NACE):
 - a. SP 13/NACE No. 6, Surface Preparation of Concrete.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Installer:
 - a. Installer of materials for rehabilitation of existing concrete shall possess not less than five years of relevant experience performing concrete rehabilitation of similar type, scope, and complexity to that required for this Project.
 - b. Certification or Approval by Materials Manufacturer:
 - 1) Installer (as either business entity or individual) of materials associated with rehabilitation of existing concrete shall be certified or expressly approved in writing, by manufacturer of materials to be provided.

- 2) As an option, installer may be certified or approved, in writing, at the Site during initial Work of this Section, in accordance with this Section's Paragraph 3.4.D.
- c. Submit documentation of qualifications and experience in sufficient detail to demonstrate to Engineer's satisfaction compliance with requirements of this Section's qualifications requirements.
- 2. Structural Concrete Repairer:
 - a. This provision is in addition to qualifications requirements applicable to installers of the Work under this Section. This provision applies to business entities physically performing rehabilitation of structural concrete.
 - b. Structural concrete repairer shall have not less than five years' current, relevant experience in repairing and rehabilitating concrete structures in facilities of generally similar environmental exposures as the Work of this Section for this Project
 - c. Submit documentation of qualifications and experience in sufficient detail to demonstrate to Engineer's satisfaction compliance with requirements of this Section's qualifications requirements.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Schedule (table) indicating, for each type of concrete rehabilitation Work required by this Section, the material type and product manufacturer proposed for each application.
 - 2. Product Data:
 - b. Manufacturer's published, technical data for each manufactured material proposed for use in the Work of this Section.
 - c. Manufacturer's written certification that proposed materials comply with associated reference standards cited in this Section.
- B. Informational Submittals: Submit the following:
 - 1. Certifications:
 - a. Laboratory test reports (for previously tested materials identical to those to be furnished) and material manufacturer's certificates verifying that ingredients comply with the Contract Documents and have a minimum of six months' residual shelf life at the time of shipment to the Site.
 - b. Certification from Supplier stating that material is suitable for the intended use on this Project.
 - c. Certification that materials proposed for use are compatible with each other, when such materials will contact each other, and will not interfere with bonding of future floor or wall finishes.
 - 2. Manufacturer's Instructions:
 - a. Manufacturer's instructions for all concrete rehabilitation materials, for handling, storing, and installing materials.
 - 3. Qualifications Statements:
 - a. Installer: Documentation of qualifications in accordance with this Section's "Quality Assurance" Article.
 - b. Manufacturer's written approval of installer or certification of training performed at the Site in accordance with Paragraph 3.4.D of this Section.
 - 1) Affidavit, signed by either materials manufacturer or by installer's business entity, indicating that manufacturer of rehabilitation materials has instructed installer in proper handling and installation of each rehabilitation material to be used in the Work.
 - c. Entity performing structural concrete repair Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with material manufacturer's written instructions and recommendations regarding delivery, handling, and storage or materials to be incorporated into the Work.
- B. Storage:
 - 1. Store materials in tightly-sealed, original containers, off the ground and in dry location with humidity controls.
 - 2. Do not store in direct sunlight.
 - 3. Protect materials from temperature extremes and avoid freezing temperatures.

PART 2 - PRODUCTS

- A. Subject to compliance with Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Anti-Corrosion Bonding Agent:
 - a. Sika Corporation.
 - b. Euclid Chemical Company.
 - c. Master Builders Solutions.
 - d. Or equal.
 - 2. Epoxy Bonding Adhesive:
 - a. Sika Corporation.
 - b. Euclid Chemical Company.
 - c. Or equal.
 - 3. Repair Mortar:
 - a. Master Builders Solutions.
 - b. Euclid Chemical Company.
 - c. Five Star Products, Inc.
 - d. Sika Corporation.
 - e. Or equal.

2.2 MATERIALS

- A. Bonding Agents:
 - 1. Bonding agents and adhesives shall have pot life that allows proper placement of new material against existing material in accordance with manufacturer's written instructions.
 - 2. For repair of existing concrete damage, when no reinforcing steel is exposed, and where specifically shown or indicated on the Drawings, use epoxy bonding adhesive.
 - 3. For repair of existing concrete damage, when reinforcing steel is exposed, and where specifically shown or indicated on the Drawings, use anti-corrosion bonding agent.
- B. Water:
 - 1. Potable.
 - 2. Clean and free from deleterious substances.
 - 3. Free of oils, acids and organic matter.
- C. Anti-Corrosion Bonding Agent:
 - 1. Three-component, moisture tolerant, cementitious bonding agent manufactured for purpose of bonding fresh concrete to hardened concrete and providing anti-corrosion coating to embedded reinforcing materials.
 - a. Sika Armatec 110 EpoCem by Sika Corporation.
 - b. Duralprep A.C. by Euclid Chemical Company.
 - c. Or equal.
- D. Epoxy Bonding Adhesive:
 - 1. For use where bonding new concrete or patch material to existing concrete.

2. Two-component, moisture insensitive adhesive manufactured for purpose of bonding fresh concrete to hardened concrete.
 - a. Sikadur 32 Hi-Mod LPL by Sika Corporation.
 - b. Euco No. 452 MV by Euclid Chemical Company.
 - c. Or equal.
- E. Repair Mortar:
1. Pre-packaged cement-based, modified (polymer or latex) product specifically formulated for repair of concrete surface defects, with the following properties:

| Physical Property | Value | ASTM Standard |
|--------------------------------|----------|---------------|
| Compressive strength (minimum) | | C109 |
| at one day | 2000 psi | |
| at 28 days | 6000 psi | |
| Bond strength (minimum) | | C882 (*) |
| at 28 days | 1800 psi | |

(*) Modified for use with repair mortars.

2. Trowelable, selection based on horizontal, vertical, or overhead application.
3. Where the least dimension of the placement, in width or thickness, exceeds 1.5 inches, repair mortar shall be extended by addition of aggregate per MPII.
4. Acceptable Products:
 - a. Five Star Structural Concrete by Five Star Products, Inc.
 - b. SikaRepair SHA, SikaTop 123 Plus, SikaTop 111 Plus by Sika Corporation.
 - c. Verticoat by Euclid Chemical Company.
 - d. Emaco S88-CI, Emaco S66-CI by BASF Corporation.
 - e. Or equal.

PART 3 - EXECUTION

3.1 PREPARATION AND ASSESSMENT

- A. Concrete Removal:
1. Remove all loose and unsound concrete from areas to be repaired, in accordance with ICRI Guideline 310.1R, as modified by the Contract Documents.
 2. Removals:
 - a. At areas of damage or deterioration of existing concrete, saw-cut the perimeter of unsound concrete surface areas, to depth of not less than 1/2 inches.
 - b. Saw-cuts to be perpendicular to or slightly undercutting existing concrete surface. Concrete removal boundaries shall be straight and aligned parallel to opposite boundary edges resulting in repair areas that are approximately rectangular.
 - c. Remove all existing concrete from within the saw-cut repair boundary to of not less than 1/2 inches.
 - d. Feathered edges are unacceptable.
 3. Clean surfaces of repair areas in accordance with ASTM D4258 to remove dust, dirt, grease, and other contaminants prior to abrasive blasting, chipping, grinding or wire brushing.
 4. Abrasive-blast surfaces in accordance with ASTM D4259 and SSPC SP 13/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
 5. Chip concrete substrate to obtain a surface profile of 1/16 inches to 1/8 inches deep with new fractured aggregate surface. The area to be repaired shall not be less than 1/2 inches in depth.

6. Concrete removal shall extend along any exposed existing reinforcing to locations along the bar that are free of bond inhibiting corrosion and where the bar is well-bonded to surrounding concrete.
 7. Rinse surface with clean water and allow surface water to evaporate prior to repairing the surface.
- B. Preparing Exposed Steel Reinforcing:
1. Clean and prepare exposed embedded steel reinforcing in accordance with ICRI Guideline 310.1R and the Contract Documents.
 2. Where one-half or more of the steel reinforcing diameter is exposed, either by existing conditions or concrete removal, bond between concrete and steel reinforcing is inhibited or lost completely, or corrosion is present, remove concrete to provide not less than 1 inch clearance around the entire perimeter and along the entire exposed length of the steel reinforcing.
 3. If existing, exposed steel reinforcing is cut through, cracked, or cross-sectional area is reduced by more than 20%, provide new steel reinforcing bar the same size as existing steel reinforcing. Lap the new bar with existing in accordance with ACI requirements. Coat all new and existing steel reinforcing with anti-corrosion bonding agent, as specified in this Section. Abrasive-blast exposed reinforcing to remove contaminants and corrosion to provide white-metal, bright steel finish.

3.2 INSTALLATION AND APPLICATION

- A. Environmental Conditions for Installation:
1. Comply with material manufacturer's written instructions for substrate temperature and moisture content, ambient temperature, and ambient humidity, ventilation, and other conditions affecting performance of concrete repair materials.
 2. Do not repair existing concrete damage when ambient temperature is or is expected to be below 50 degrees F. If necessary to maintain the progress Schedule, enclose and heat area to between 50- and 70-degrees F during repair of surface defects and curing of patching material. Use only indirect fired heating using clean-burning fuel.
 3. If proper environmental conditions do not comply with the Contract Documents and manufacturer's instructions, do not perform the Work until such conditions are acceptable. Provide means to bring conditions into compliance by providing temporary environmental controls, enclosures, and other temporary construction and temporary facilities.
 4. Contractor is not eligible for changes in Contract Times or Contract Price for delays or costs incurred to bring environmental conditions for installation into compliance.
- B. Existing Concrete Damage Repair:
1. Concrete spall repair with no exposed rebar:
 - a. Provide epoxy bonding adhesive if no reinforcing steel is exposed. Use anti-corrosion bonding agent, if reinforcing steel is exposed.
 - b. Prepare exposed reinforcing steel in accordance with Paragraph 3.1 of this Section.
 - c. Provide repair mortar:
 - 1) Provide 3/8 inches aggregate in accordance with MPII.
 2. Concrete spall repair with exposed rebar:
 - a. Provide anti-corrosion bonding agent.
 - b. Prepare exposed steel reinforcement per the requirements of Paragraph 3.1.
 - c. Provide repair mortar:
 - 1) Provide 3/8 inches aggregate in accordance with MPII.
- C. Repair Mortar Application:
1. Comply with MPII for mixing and placement of repair mortar.
 2. After initial mixing of repair mortar, do not introduce additional water to change consistency. Discard repair mortar if consistency becomes too stiff to place.

3. Place repair mortar to not less than recommended minimum thickness indicated in the MP11 and in no event less than 3/8 inches.
 - a. Apply repair mortar in accordance with the following minimum requirements:
 - 1) Not less than 3/8 inches over existing sound, exposed coarse aggregate.
 - 2) Not less than 2 inches of cover (unless otherwise required) over exposed reinforcing steel.
4. At horizontal applications, repair mortar shall be screeded and bullfloated to the proper elevation, to ensure all surface moisture will drain freely and properly without puddle areas.
5. Provide repair mortar in even, uniform plane to restore the concrete member to its original surface finish and plane.
 - a. Tolerance for being out-of-plane shall be such that gap between a 1-foot straight edge and repair mortar surface shall not exceed 1/4 inches, and gap between a 4 feet straight edge and repair mortar surface shall not exceed 3/8 inches. This shall apply to straight edges placed in any orientation at any and all location on the repair mortar surface.
6. Prevention of Drying:
 - a. Prevent exposed plastic mortar surfaces from drying. Provide windbreaks, foggers, and evaporation retarders, as necessary, during finishing.
 - b. Foggers shall maintain humidity at height of 2 feet to 3 feet above surface of concrete.
 - c. If necessary, apply evaporation retarder between finishing operations.
- D. Repair of Exposed Embedded Items in Concrete:
 1. This provision addresses repair and rehabilitation of corroded metal items embedded in existing concrete and to other locations as expressly shown or indicated on the Drawings. Existing concrete damage by corrosion of embedded metal shall be repaired in accordance with this Section's Paragraph 3.2.B.
 2. Preparation:
 - a. Fully expose extent of metal corrosion within each embedded item by chipping to sound material. Where specifically shown or indicated on the Drawings, completely remove exposed metal item to extent shown or indicated.
 - b. Remove corrosion on embedded metal item and corrosion on exposed reinforcing steel by abrasive blasting to a white-metal finish.
- E. Extend existing control, construction, and expansion joints through concrete repairs.
- F. For repairs of existing concrete damage, finish of repaired areas shall match the finish of existing adjacent concrete surface.

3.3 CURING

- A. Curing of Repair Mortar:
 1. Perform curing of repair mortar immediately after final finishing.
 2. Perform curing by combination of covering repair Work with wet burlap and applying liquid membrane-forming curing compound.
 3. Employ methods and sequence to maintain moisture for not less than seven days.

3.4 FIELD QUALITY CONTROL

- A. Observations and Inspections:
 1. Owner will witness surface preparation, substrate moisture conditions, and installation of materials indicated in this Section. Such observations do not relieve Contractor from obligation to comply with the Contract Documents.
 2. Owner-retained special inspector shall be present while material manufacturer's technical representatives are at the Site instructing Contractor's structural concrete repair personnel, Contractor's joint sealant system personnel, and installers in the use of the associated material(s).

- B. Defective Work:
1. Defective Repair:
 - a. Any and all repairs are defective Work when one or more of the following occurs:
 - 1) Repair is not properly finished and in accordance with specified tolerances.
 - b. Promptly remove and remedy defective concrete repair Work in accordance with the Contract Documents.
 2. Damaged Work:
 - a. Before acceptance of the Work (following final inspection in accordance with the General Conditions and other Contract Documents), neatly repair damaged surfaces, corners of concrete, and finish.
 - b. When performing surface remedial repairs, finish areas to smooth, dense watertight condition.
 - c. Replace unsatisfactory concrete patching Work.
 3. Corrective Work:
 - a. If correction of defective Work (under this Section) is necessary, remove defective Work. Key area to be remedied, clean, and soak surface with water and patch with approved materials. Patch concrete to match existing adjacent concrete surfaces.
 - b. Clean surface cavities resulting from form ties, other holes, honeycomb spots, broken corners and edges, and other effects. Saturate with water and point with a mortar of patching material paste. Comply with patching material manufacturer's recommendations concerning placement, pot life, and curing.
 - c. Tolerance deviations and other surface defects may also be corrected, when approved by Engineer, by grinding high areas of swales.
 - d. Where remedial work is unsatisfactory, completely remove such Work and replace with new Work in accordance with the Contract Documents.
 4. Special inspection of remedial work is required. Special inspection will be performed after completion of surface preparation and during installation of remedial Work.

END OF SECTION

SECTION 03 15 19

ANCHORAGE TO CONCRETE

1.1 SUMMARY

- A. Section Includes:
1. Requirements for anchorages in concrete, including: cast-in-place anchor bolts, anchor rods, reinforcing anchorage adhesive, and post-installed concrete anchors required for the Project but not specified elsewhere in the Contract Documents.
 2. Delegated design requirements for concrete anchors not expressly shown or indicated on the Drawings or elsewhere in the Contract Documents, including, but not limited to, anchorages in concrete for the following structural and nonstructural components:
 - a. Mechanical and electrical Work, including process-mechanical Work, site and infrastructure Work, electrical Work, communications Work, electronic safety and security systems Work, and others.
 - b. Other components requiring anchorages to concrete.
- B. Related Requirements: Include but are not necessarily limited to:
1. Section 01 35 73 - Delegated Design Procedures.
 2. Section 01 81 10 - Wind and Seismic Criteria
 3. Section 40 05 07 - Pipe Support Systems.

1.2 REFERENCES

- A. Definitions and Terminology:
1. This provision presents definitions and terminology, which have the meanings indicated in this provision, applied to the singular or plural thereof, and without regard to use of initial capital letters.
 - a. Adhesive Anchors:
 - 1) Post-installed anchors developing their strength primarily from chemical bond between the concrete and the anchor.
 - 2) Includes anchors using acrylics, epoxy and other similar adhesives.
 - b. Anchor Bolt: Any cast-in-place anchorage that is made of a headed (i.e. bolt) material.
 - c. Anchor Rod: Any cast-in-place or post-installed anchorage made from unheaded, threaded, rod or deformed bar material.
 - d. Concrete Anchor: Generic term for either an anchor bolt or an anchor rod.
 - e. Galvanizing: Hot-dip galvanizing in accordance with ASTM A123, ASTM A153 or ASTM F2329 with minimum coating of 2.0 ounces of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by reference standard.
 - f. Hardware: As defined in ASTM A153.
 - g. MPlI: Manufacturer's printed installation instructions.
 - h. Mechanical Anchors:
 - 1) Post-installed anchors developing their strength from attachment other than thru adhesives or chemical bond to concrete.
 - 2) Includes expansion anchors, expansion sleeve, screw anchors, undercut anchors, specialty inserts and other similar types of anchorages.
 - 3) Drop-in anchors and other similar non-ICC ES approved anchors are unacceptable.
 - i. Post-Installed Anchor: Adhesive or mechanical anchor installed into previously placed and adequately cured concrete.
- B. Reference Standards:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete and Commentary.
 2. American Concrete Institute/Concrete Reinforcing Steel Institute (ACI-CRSI):

- a. Adhesive Anchor Installation Certification Program: Adhesive Anchor Installer.
- 3. American Institute of Steel Construction (AISC):
 - a. 303, Code of Standard Practice for Steel Buildings and Bridges.
 - b. 355.2, Seismic Testing of Post-Installed Concrete and Masonry Anchors in Cracked Concrete.
 - c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
- 4. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - e. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - f. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - g. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - h. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - i. F436, Standard Specification for Hardened Steel Washers.
 - j. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - k. F594, Standard Specification for Stainless Steel Nuts.
 - l. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 - m. F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
- 5. International Code Council Evaluation Service (ICC-ES):
 - a. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - b. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Comply with coordination requirements in Section 01 35 73 - Delegated Design Procedures.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Code-required Special Instructions:
 - a. Special Inspection is required in accordance with the building code for all concrete anchorages.
 - b. Notify the Special Inspector that an inspection is required prior to concrete placement (or during post-installed anchorage installation).
 - c. See the "Field Quality Control" Article in "Part 3 – Execution" of this Section for additional requirements.
- B. Qualifications:
 - 1. Delegated Design Professional:
 - a. Delegated design professional's qualifications and responsibilities shall be in accordance with Section 01 35 73 - Delegated Design Procedures.
 - 2. Installer:
 - a. Installer for post-installed anchors shall be trained by the manufacturer or certified by a training program approved by the Engineer.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Submit schedule (table or listing) of types, sizes (diameter, length, embedment length), material, finish, and proposed manufacturers of anchorages to concrete to be provided. Apportion by Project-specific application (for example, "Anchorages for cooling water pumps in basement") and indicate where anchorages are fully-designed by Engineer and those for which final design was prepared by delegated design professional.
 - b. Engineer's approval of such Shop Drawing will be only for anchorages fully designed by Engineer. For anchorages for which final design is by delegated design professional, include on such Shop Drawing delegated design professional's approval stamp.
 2. Product Data: Submit as Action Submittals product data for anchorages to concrete fully designed by Engineer. For anchorages to concrete for which final design is by delegated design professional, submit as Informational Submittals bearing approval stamp of delegated design professional.
 - a. Manufacturer's express, written acknowledgement that proposed items comply with referenced standards indicated in this Section and, as applicable, by delegated design professional.
 - b. Manufacturer published data and information for each anchor.
 - 1) Clearly indicate items that are proposed for the Work. Neatly strike out or obscure materials and products not proposed.
 - c. Manufacturer's published installation instructions and instructions for code-required special inspections and tests.
 - d. Post-Installed Anchors: In addition, submit for each post-installed anchor system current ICC-ES report, indicating the following:
 - 1) Manufacturer's certification that anchors comply with requirements indicated in the Contract Documents.
 - 2) Performance data indicating that anchor is approved by its manufacturer for use in cracked concrete.
 - 3) Seismic design categories for which anchor system is approved by ICC-ES report.
 - e. Anchorage layout drawings and details:
 - 1) Drawings showing location, configuration, spacing and edge distance.
 3. Delegated Design Professional's Instruments of Service Submittals: Submit, in accordance with this Section and Section 01 35 73 – Delegated Design Procedures, for each anchorage to concrete for which final design is by delegated design professional:
 - a. Certification of compliance, in accordance with Section 01 35 73 – Delegated Design Procedures. Indicate design tension and shear loads used for anchor design.
 - b. Delegated design professional's drawings.
 - c. Delegated design professional's specifications, if any, when prepared by delegated design professional.
 - d. Post-Installed Anchors (for which final design is by delegated design professional): Submittal shall also include the following for post-installed anchors for which final design was by delegated design professional:
 - 1) Show diameter, embedment depth and edge distance of each anchor.
 - 2) Indicate compliance with ACI 318 Chapter 17.
 - 3) Type of post-installed anchor system used.
 - a) Provide manufacturer's ICC-ES report for the following:
 - (1) Mechanical anchorage per ICC-ES AC193.
 - (2) Adhesive anchorage per ICC-ES AC308.
 4. Samples:
 - a. Submit representative Samples of anchorages to concrete, when requested by Engineer. Engineer's approval of Samples will be for type and finish only.

- B. Informational Submittals: Submit the following:
1. Shop Drawings and Product Data Approved by Delegated Design Professional:
 - a. Submit with delegated design professional's approval stamp those Shop Drawings and product data Submittals indicated in this Article but for which final design was performed by delegated design professional.
 2. Calculations by Delegated Design Professional:
 - a. Submit sealed and signed calculations for sizing and determining embedment length of anchorages to concrete not fully designed by Engineer.
 - b. Post-Installed Anchors Designed by Delegated Design Professional: In addition, also submit design calculations:
 - 1) Indicate design load to each anchor.
 - 2) When design load is not indicated on the Drawings, include calculations to develop anchor forces based on performance and design criteria indicated in this Section.
 3. Supplier's Instructions:
 - a. Submit manufacturer's published instructions for installation.
 4. Field Quality Control Submittals:
 - a. Submit written results of required field quality control activities indicated in this Section.
 5. Reports of Supplier's Visits to Site:
 - a. Submit each written report of visit to the Site by Supplier's factory trained representative and delegated design professional. For each, indicate date and time of visit, purpose of visit, observations made, decisions made, problems encountered, and other pertinent information.
 6. Qualifications Statements:
 - a. Delegated design professional.
 - b. Each installer.

PART 2 - PRODUCTS

2.1 MATERIALS – ALL ANCHORAGES

- A. Materials – General:
1. This Article applies to all anchorages to concrete, regardless of whether fully designed by Engineer or delegated design professional. Requirements for delegated designs are in the following Article.
 2. Additional requirements for anchorages fully designed by Engineer are indicated in the Article following requirements for delegated design anchorages.
 3. For structural applications, do not use powder actuated fasteners and other types of bolts or fasteners not specified in this Section unless approved by Engineer or otherwise required by the Contract Documents.
- B. Description:
1. Provide anchorages to concrete, of the types shown or indicated, to secure to concrete materials, equipment, and appurtenances installed as part of the Work.
 2. Locations where anchorages are required are generally shown or indicated on the Drawings. Where not shown or indicated on the Drawings provide anchorages or the types required for materials, equipment, and systems where such materials, equipment, and systems are shown on the Drawings.
 3. Anchorages required include those for materials, equipment, and systems shown on the structural Drawings and Drawing other than the structural Drawings.
 4. Design loads for concrete anchorages are shown or indicated on the Drawings for anchorages where design responsibility is delegated to Contractor's delegated design professional. For such anchorages, embedment depths are not shown or indicated.
- C. Cast-in-place Concrete Anchors:
1. Buildings, non-building structures, and equipment, unless otherwise specified:

- a. ASTM F1554, Grade 36 or Grade 55 with weldability supplement S1 for galvanized threaded rods.
 - b. ASTM A307, Grade A for galvanized headed bolts.
 - 2. All other cast-in-place concrete anchors:
 - a. Stainless steel with matching nut and washer.
 - b. Submerged application: ASTM F593, Type 316, minimum yield strength of 45,000 psi.
 - c. Non-submerged application: ASTM F593, Type 304 or Type 316, minimum yield strength of 45,000 psi.
- D. Post-Installed Mechanical and Adhesive Concrete Anchors:
 - 1. Submerged application: ASTM F593, Type 316, minimum yield strength of 45,000 psi with matching nut and washer.
 - 2. Non-submerged application: ASTM F593, Type 304 or Type 316, minimum yield strength of 45,000 psi with matching nut and washer.
 - 3. Post-installed anchors and related materials shall be listed by ICC-ES or Engineer-approved equivalent.
- E. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.
- F. Deformed Bar Anchors: ASTM A496 with minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.
- G. Washers:
 - 1. ASTM F436 unless indicated otherwise, finish to match bolt.
 - 2. When stainless steel anchorage is provided for cast-in-place anchorages, provide washers of the same material and alloy as in the associated anchorage.
 - 3. Plate washers: Minimum 1/2 inch thick fabricated ASTM A36 square plates as required.
 - 4. Comply with manufacturer's written instructions for all post-installed anchorages.
- H. Nuts:
 - 1. ASTM A563 for cast-in-place anchorages.
 - 2. When stainless steel anchorages are provided for cast-in-place anchorages, nuts shall comply with ASTM F594 and shall match material and alloy of the associated anchorage.
 - 3. Follow manufacturer's requirements if using post-installed anchorage.
- I. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for regalvanizing welds and abrasions.
 - 2. ASTM A780.
 - 3. Zinc content: Minimum 92 percent in dry film.
 - 4. Products and Manufacturers: "ZRC Cold Galvanizing", by ZRC; or "High Performance Zinc Spray", by Clearco; or equal.

2.2 DELEGATED DESIGN ANCHORAGES TO CONCRETE

- A. Manufacturers:
 - 1. Post-installed anchor systems for indicated manufacturers are acceptable only when a current ICC-ES evaluation report is furnished as a Submittal and the subject anchorage system is approved by delegated design professional.
 - a. Hilti.
 - b. Dewalt.
 - c. Simpson Strong-Tie.
 - d. Or equal.
- B. Description: Perform delegated design for anchorages when one or more of the following applies:
 - 1. Design load for concrete anchorage is shown or indicated on the Drawings and anchorage embedment depth is not shown or indicated.

2. When specifically required by the Contract Documents.
 3. When an anchorage is necessary but is not shown or indicated on the Drawings.
 4. Anchorages shown on the Drawings other than the structural Drawings.
- C. Performance and Design Criteria for Delegated Design Anchorages:
1. Determine design loads, including wind and seismic loads, in accordance with applicable building code and other Laws and Regulations.
 2. For anchorage of equipment and non-structural components, use actual dead load and operating loads obtained by Contractor or delegated design professional from manufacturer. Design loads shall include operating conditions when equipment or element of the Work is in operation, dynamic loads, and other loads as appropriate or required by the building code or other Laws or Regulations.
 3. Design assuming cracked concrete.

PART 3 - EXECUTION

3.1 PREPARATION

- A. For cast-in-place concrete anchorages, allow adequate time for proper installation, inspection, and observation prior to placing concrete.
- B. Prior to installation, inspect and verify areas and conditions under which concrete anchorages will be installed.
 1. Notify Engineer of conditions detrimental to proper and timely completion of the Work.
 2. Do not proceed with the Work until unsatisfactory conditions are properly remedied.

3.2 INSTALLATION

- A. Installation Requirements - General:
 1. Install items in accordance with the Contract Documents, manufacturer's written instructions, and Laws and Regulations. Where such requirements conflict, obtain interpretation or clarification from Engineer prior to commencing the associated Work.
 2. Perform the following unless shown or indicated otherwise:
 - a. Provide stainless steel anchorages for connecting aluminum and steel members to concrete and masonry. Provide dissimilar materials protection in accordance with Section 09 96 00 – High-Performance Industrial Coatings.
 - b. Provide washers for all anchorages.
 - c. Where exposed, extend threaded anchorage a maximum of 0.75 inch and a minimum of 0.5 inch above top of fully-engaged nut. If anchorage is cut off to required maximum height, dress the threads to allow nuts to be removed without damage to nuts.
 3. Tightening of nuts: Do the following after nuts are snug-tightened down:
 - a. Upset anchorage threads to prevent nuts from backing off. Provide double nut or lock nut in lieu of upset threads for items that may require future removal.
 - b. For cast-in-place anchorages (excluding post-installed anchorages), tighten nuts an additional 1/8 turn beyond snug tight to prevent nuts from backing off.
 - c. When two nuts are used per concrete anchor above the base plate, tighten top nut an additional 1/8 turn to "lock" the two nuts together.
 - d. For post-installed anchorages, comply with MP11.
 4. Secure architectural components to avoid aesthetic distortion and to avoid overstressing fasteners from expansion, contraction, or installation.
- B. Cast-in-Place Anchorages:
 1. Provide where anchor rods or anchor bolts are indicated on the Drawings, unless another anchor type is approved by Engineer.
 2. Provide concrete anchorages as shown on the Drawings or as required to secure the Work to concrete.
 3. Tie cast-in-place anchorage in position to embedded reinforcing steel using wire.

4. Tack welding of anchorage is prohibited.
 5. Chase threads as required and coat projected portion of carbon steel anchors and nut threads with a heavy coat of clean grease after concrete has cured.
 6. Anchorage location Tolerance: in accordance with AISC 303.
 7. Provide steel or durable wood templates for all column and equipment anchorages. Place templates above top of concrete; do not impede proper concrete placement and consolidation.
- C. Mechanical Anchorages:
1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
 2. Do not use where subjected to vibration.
 3. May be used in overhead applications.
 4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- D. Post-installed Anchorages:
1. For post-installed anchors, comply with MPII regarding hole diameter and depth required to fully develop the tensile strength of anchor or reinforcing bar.
 2. Use hammer drills to create holes.
 3. Properly clean out holes in accordance with the associated ICC-ES report using non-metallic, fiber bristle brush and compressed air, or as otherwise necessary to remove all loose material from each hole prior to installing anchor in the presence of Special Inspector.
 4. Adhesive Anchorages:
 - a. Provide only where specifically indicated on the Drawings or when approved for use by Engineer.
 - b. May be provided where subjected to vibration or at buried or submerged locations.
 - c. Do not install for overhead applications or sustained tension loading conditions such as utility hangers.
 - d. Install adhesive anchors in concrete aged not less than 21 days.
- E. Finishes:
1. Coat aluminum surfaces in contact with dissimilar materials in accordance with Section 09 96 00 – High-Performance Industrial Coatings.
 2. Repair of damaged galvanized surfaces:
 - a. Prepare damaged surfaces by abrasive blasting or power sanding.
 - b. Repair damaged galvanized surfaces in accordance with ASTM A780.
 - c. Apply galvanizing repair paint to not less than 6 mils dry film thickness in accordance with galvanizing repair material manufacturer's instructions and ASTM A780.
- F. Ensure that embedded items are protected from damage and are not filled in with concrete or related materials.

3.3 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
1. Tests and inspections of anchorages shall comply with ACI 355.2 and/or ACI 355.4 as applicable.
 2. Owner reserves the right to inspect and test completed anchorages at a minimum of 10 to 25 percent of provided anchorages.
- B. Supplier's services:
1. Post-installed anchor manufacturer's representative shall demonstrate and observe the proper installation procedures for the post-installed anchors.
- C. Defective Work:

1. Anchorages that do not successfully pass required field tests and inspections or that are otherwise deemed defective by Engineer shall be remedied, in accordance with the Contract Documents, at no cost to Owner.

3.4 CLEANING

- A. After concrete has been placed, remove protection and clean all anchorage of all concrete, dirt, and other foreign matter.

END OF SECTION

SECTION 03 64 23
CRACK REPAIR AND INJECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Repair of cracks in existing concrete wider than specified in Article 3.1 of this Section.
 2. Repair of cracks in concrete Work provided by Contractor, where approved or directed by Engineer, to remedy defective concrete Work.
 3. Crack repair materials.
 4. Crack repair methods.
 5. Equipment used in performing crack repairs.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals to furnish and install epoxy grout injected into cracks in concrete, in accordance with the Contract Documents.
 2. Price and Payment Procedures.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Unit Prices:
1. Bid/pay items of Unit Price Work addressed in this Section are indicated in the Bid Form, the Agreement, and in Section 01 22 00 - Measurement and Payment.
 2. Description of each type of crack repair Unit Price Work is indicated in Article 3.1 of this Section.
 3. Criteria for measurement for payment of such Unit Price Work are addressed in the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 22 00 - Measurement and Payment, as augmented by this Section.
- B. Measurement:
1. Quantity of each item of Unit Price Work covered by this Section shall be measured for payment prior to commencement of the associated Work in each work area. Limits of cracks in concrete existing prior to the Contract that are to be repaired by Contractor will be marked at the Site by Engineer. Cracks, beyond the marked limits indicated at the Site, in concrete existing prior to the Contract, will not be eligible for payment.
 2. Work not marked and measured in advance for payment will not be eligible for payment.
 3. Engineer will observe the associated Work performed. Crack repair Work shall be in accordance with the Contract Documents for such Work to be eligible for payment, even when such Work was marked and measured in advance for payment.
 4. Repair of cracks in new concrete Work provided by Contractor is not eligible for payment under the Unit Price Work item(s) addressed by this Section. Such crack repairs are included in the Work of the associated bid/pay item under which the subject new concrete Work was provided.

1.3 REFERENCES

- A. Terminology:
1. This provision indicates terminology used in this Section and in other Contract Documents that coordinate with this Section. Such terminology may or may not be indicated using initial capital letters and, when used in relation to the Work of this Section, have the meanings indicated below.

2. "Active crack" means crack in concrete with plane surfaces in a state of movement relative to each other; dynamic condition.
 3. "Crack depth" means distance the crack extends from injection surface into the concrete to location where the subject crack is less than 0.002 inches wide.
 4. "Effective pressure" means fluid grout pressure at point of grout entry at the injection port/nozzle. Effective pressure is gauge pressure minus hydraulic head losses in the injection system.
 5. "Flushing" means removing debris and foreign matter from concrete crack to be repaired by introducing pressurized air or pressurized liquid.
 6. "Gauge pressure" means reading of pressure of fluid grout, as indicated on an appropriate gauge for the service, with current, valid calibration, on discharge of the grout pump during injection of epoxy grout.
 7. "Gravity feed" means filling and sealing of horizontally positioned cracks in concrete, using low-viscosity resins, by pouring and spreading onto surface or placing into purposely-formed reservoirs.
 8. "MPII" means manufacturer's printed installation instructions.
 9. "Passive crack" means crack in concrete with plane surfaces not moving relative to each other.
 10. "Pot life" means time during which polyurethane or epoxy resin is capable of being pumped.
 11. "Refusal criteria" means zero flow of grout at proposed effective pressure for duration of five minutes.
 12. "Resin" or "resin adhesive" means crack-filling material injected or introduced into crack in concrete for re-bonding the crack's separated edges for transfer of stress across the crack and to prevent subsequent flow of water or other liquids through the crack.
 13. "Sealant" means crack-filling material, with adhesive and cohesive properties, that forms seal preventing ingress and egress of liquids and gases into and from concrete.
 14. "Structural crack repair" means repair of cracks in concrete required to restore structural capacity of the cracked concrete member. Structural crack repair restores ability for tensile and compressive forces transmitted across the crack through the resin adhesive placed in the crack. Structural cracks typically display dimensional offset in the out-of-plane direction.
 15. The meaning of selected, other words and terminology used in this Section are indicated in ACI CT and ACI 503.7.
- B. Reference Standards:
1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 503.7, Specification for Crack Repair by Epoxy Injection.
 - c. CT, Concrete Terminology.
 2. ASTM International (ASTM):
 - a. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - b. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - e. D790, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.4 QUALITY ASSURANCE

- A. Qualifications (General):
1. Entity Performing Crack Repairs:

- a. Entity performing repair of cracks in concrete, whether Contractor or Subcontractor, and including installers and applicators, shall possess not less than five years current experience repairing cracks in concrete in facilities of similar environmental exposures installing or applying materials similar to those required in this Section.
 - b. Entity performing crack repairs shall submit to Engineer documentation of qualifications and experience, including:
 - 1) Documentation of successfully completing not less than three projects of similar size and complexity to the crack repair Work of this Project within the past five years.
 - c. Certification by Materials Manufacturers:
 - 1) Installer or applicator of crack repair materials shall be certified or approved, in writing, by crack repair materials manufacturers used in the Work, for installing the crack repair materials required.
 - d. As an alternative, installer or applicator may be certified or approved at the Site by the materials manufacturer during initial installations in accordance with Paragraph 3.6.B of this Section.
2. Manufacturer's Representative:
- a. Trained at materials manufacturers' production facilities.
 - b. Experienced with and capable of properly and clearly instructing entity performing crack repairs.
 - c. Knowledgeable of and experienced with current theories on the nature and causes of cracking in concrete.
 - d. Methods for repairing damaged concrete.
 - e. Technical aspects of correct materials selection and use.
 - f. Operation, maintenance, and troubleshooting of application equipment.
- B. Pre-Installation Conference for Crack Repair Work:
1. Schedule, convene, and actively participate in pre-installation conference at the Site not less than seven days prior to commencing crack repair Work at the Site.
 2. Conference participants shall be knowledgeable on the types and general extent of the crack repair Work and requirements of the Contract Documents relative to crack repair Work, and times for crack repair Work as allocated in the Progress Schedule accepted by Engineer. Conference participants shall include individuals empowered to speak for and bind their respective organization regarding crack repair Work.
 3. Required Participants:
 - a. Contractor's project manager and Site superintendent.
 - b. Project manager and foreman for each entity performing crack repair Work, including installers and applicators of crack repair materials.
 - c. Manufacturer's representative of each Supplier of crack repair materials to be used in the Work.
 - d. Engineer.
 4. Conference will be chaired by Engineer, who will also advise required participants of conference date, time, and location, and prepare and distribute to participants (and others as appropriate) a record of topics discussed, and decisions made during the conference.
 5. Topics to be discussed include:
 - a. Procedures for marking and measuring crack repair Unit Price Work.
 - b. Required environmental conditions and forecasted weather conditions at scheduled times of crack repair Work.
 - c. Storage of crack repair materials.
 - d. Material manufacturers' representatives' required services.
 - e. Submittals required prior to commencing the crack repair Work.
 - f. Surface preparation under this Section and other Specifications sections, and substrate condition and pretreatment
 - g. Installation and application of repair materials.
 - h. Required curing period.

- i. Special details.
- j. Field quality control requirements.
- k. Protection of adjacent surfaces and installed Work, and clean.

1.5 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Prepare crack repair work plan and submit to Engineer not less than 21 days prior to commencing Work under this Section.
 - b. Crack repair work plan shall indicate the following:
 - 1) Basis of material selection.
 - 2) Specific materials proposed for use at each type of crack and work area.
 - 3) Proposed effective pressure for injection of repair material(s) into cracks.
 - 4) Surface finishing.
 - 5) Location and size of injection ports.
 - 6) Surface preparation of concrete prior to surface sealing.
 - 7) Method of storing and handling resins, cleaning solvents, and waste materials.
 - c. Engineer's approval of crack repair work plan and any proposed crack repair methods, and Engineer's acceptance of any required certifications, does not mitigate or relieve Contractor of Contractor's responsibility to provide crack repair Work in accordance with the Contract Documents and, in no way, imparts on Engineer responsibility of any sort for construction means, methods, techniques, procedures, or sequences, or safety and protection measures incident thereto.
 - 2. Product Data:
 - a. Material manufacturers' published technical data including:
 - 1) Published product data, indicating properties, appropriate uses and applications, and limitations; and manufacturer's specifications.
 - 2) Manufacturer's written acknowledgement that materials proposed comply with requirements of standards referenced in the Contract Documents.
 - b. Material manufacturers and types:
 - 1) Epoxy resin adhesive.
 - 2) Polyurethane sealant.
 - 3) Surface seal.
 - 4) Epoxy penetrating sealant.
 - 5) Silane sealer.
- B. Informational Submittals: Submit the following:
 - 1. Certifications:
 - a. Certification of Materials for Intended Service:
 - 1) Certification of material manufacturer, signed by person factory-trained by material manufacturer in the application of the materials proposed for use, indicating that materials and crack repair work plan have been reviewed and are suitable for the intended use on this Project.
 - 2) Do not begin injection of cracks in concrete until crack repair methods proposed for the Work are certified by material manufacturer's technical representative and accepted by Engineer.
 - b. Manufacturer's Certification of Installer or Applicator:
 - 1) Written certification or approval of material manufacturer of each proposed installer or applicator of crack repair materials, acknowledging that installer or applicator is knowledgeable regarding installing and applying each product proposed for use.
 - 2) In lieu of written certification or approval required by the paragraph immediately above, submit certification that manufacturer's technical representative performed training for the installers or applicators at the Site in accordance with this Section.

- c. Certification of calibration, and calibration records for the past year, for each pressure gauge to be used in the crack repair Work.
 - 2. Technical data for metering, mixing, and injection equipment.
 - 3. Manufacturer's Instructions:
 - a. Repair materials manufacturers' published installation instructions.
 - b. Installation instructions for repairing core holes taken at epoxy resin injection locations.
 - 4. Qualifications Statements:
 - a. Entity performing concrete crack repairs, including installers and applicators.
 - b. Manufacturers' representatives performing services at the Site, when such qualifications are requested by Engineer.
- C. Closeout Submittals: Submit the following:
 - 1. Record documents that accurately depict actual locations of repaired cracks and type of crack injection materials used at each location. This may be shown and indicated on record drawings required in Section 01 78 39 - Project Record Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with material manufacturer's written instructions and recommendations regarding handling, delivery, and storage.
- B. Storage:
 - 1. Store materials in tightly-sealed, original containers, off the ground and in dry location with humidity controls.
 - 2. Do not store in direct sunlight.
 - 3. Protect materials from temperature extremes and avoid freezing temperatures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, manufacturers indicated below are acceptable for use in the Work of this Section.
 - 1. Epoxy Resin Adhesive:
 - a. Master Builders Solutions.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - d. Or equal.
 - 2. Surface Seal:
 - a. Master Builders Solutions.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - d. Or equal.
 - 3. Polyurethane Sealant:
 - a. Master Builders Solutions.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - d. Green Mountain International.
 - e. Or equal.
 - 4. Epoxy Penetrating Sealant:
 - a. Master Builders Solutions.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - d. Or equal.
 - 5. Silane Sealer:
 - a. Sika Corporation.
 - b. Or equal.

- B. All materials of each type used for crack injection shall be furnished by a single manufacturer, to ensure compatibility of materials.

2.2 MATERIALS

- A. Epoxy Resin Adhesive:
 - 1. Two-part epoxy adhesive containing 100% solids, complying with the following:
 - a. Compliant with ASTM C881, Type IV, Grade 1. Viscosity that allows material to achieve and maintain penetration requirements of ACI 503.7.
 - b. Bond Strength: 2,000 psi in accordance with ASTM C882.
 - c. Neat Tensile Strength: 7,000 psi in accordance with ASTM D638.
 - d. Neat Elongation: 1.5%, minimum, at seven days at 70 degrees F, in accordance with ASTM D638.
 - e. Flexural Strength: 8,000 psi in accordance with ASTM D790.
 - f. Compressive Strength: 10,000 psi in accordance with ASTM D695.
 - 2. For injection of structural cracks (active cracks and passive cracks).
 - 3. Acceptable Products:
 - a. MasterInject 1380, by Master Builders Solutions.
 - b. Sikadur 35, Hi-Mod LV, by Sika Corporation.
 - c. Dural 452 LV, by Euclid Chemical Company.
 - d. Or equal.
- B. Surface Seal:
 - 1. Material shall seal crack faces and have sufficient strength and adhesion to contain the injection adhesive during injection and while injection adhesive cures.
 - 2. Capable of being removed after injection, when not leave residue or damage concrete surface concrete.
 - 3. Acceptable Products:
 - a. MasterEmaco ADH 1420, by Master Builders Solutions.
 - b. Sikadur 31, Hi-Mod Gel, by Sika Corporation.
 - c. Dural Fast Set Gel, by Euclid Chemical Company.
 - d. Or equal.
- C. Polyurethane Sealant:
 - 1. Low-viscosity, expanding, hydrophilic polyurethane chemical grout forming a flexible gasket to seal non-structural cracks in concrete.
 - 2. Acceptable Products:
 - a. MasterInject 1210 IUG, by Master Builders Solutions.
 - b. SikaFix HH Hydrophilic, by Sika Corporation.
 - c. Dural Aqua-Fil, by Euclid Chemical Company.
 - d. Mountain Grout Gel Foam, by Green Mountain International.
 - e. Or equal.
- D. Epoxy Penetrating Sealant:
 - 1. Super-low-viscosity, two-component epoxy penetrating sealer containing 100% solids.
 - 2. Capable of being used alone to seal passive horizontal cracks less than 0.030 inches wide.
 - 3. Acceptable Products:
 - a. MasterInject 1000, by Master Builders Solutions.
 - b. Sikadur 55 SLV, by Sika Corporation.
 - c. Dural 335, by Euclid Chemical Company.
 - d. Or equal.
- E. Silane Sealer:
 - 1. Use only for cracks less than 0.010 inches wide, brushed onto surface.
 - 2. Acceptable Products:
 - a. Sikagard 706, by Sika Corporation.
 - b. Or equal.

PART 3 - EXECUTION

3.1 CRACK REPAIR – GENERAL

- A. Cracks in existing concrete designated as active crack or passive crack, and as either structural crack or non-structural crack, and exhibiting leakage as shown or indicated by the Engineer, shall be numbered, and physically marked and measured in accordance with Article 1.2 of this Section for crack injection.
- B. Cracks in new concrete Work as directed by Engineer shall be repaired in accordance with this Section.
- C. Crack Monitoring:
 - 1. Engineer may require monitoring of cracks to be repaired, using crack width monitor (provided by Contractor) for period (not less than 96 hours) established by Engineer, to verify whether crack is active or passive.
 - 2. When directed by Engineer, continue monitoring crack width for time required by Engineer to determine whether crack is at its widest, as measured at concrete surface.
- D. D. Crack repair procedures for cracks shall be verified by material manufacturer's technical representative and shall be in conformance with one of the following methods. Contactor shall notify Owner's Representative if any crack widths greater than 0.125 inch are uncovered. Method 1: Repair of passive cracks and cracks requiring structural repair in walls shall be as follows:
 - a. Crack widths 0.010 to 0.125 inches shall be pressure injected with epoxy resin adhesive.
- 2. Method 2: Repair of passive cracks and cracks requiring structural repair in slabs shall be as follows:
 - a. Cracks widths 0.010 to 0.125 inches may be pressure injected with epoxy resin adhesive or gravity fed with epoxy penetrating sealant in accordance with MP11.
- 3. Method 3: Repair of active, non-structural cracks, cracks that exhibit leakage, or as directed by Engineer shall be as follows:
 - a. Crack widths 0.010 to 0.125 inches shall be pressure injected with polyurethane sealant.
- 4. Method 4: Repair of active cracks requiring structural repair shall be as follows:
 - a. Crack widths 0.010 to 0.125 inches shall be pressure injected with epoxy resin adhesive.
 - b. Inject crack where crack is widest, as measured at concrete surface during one, 24 hour period.
- 5. Method 5: Very narrow crack (less than 0.010 inches wide) may be sealed with silane sealer when directed by Engineer and approved by material manufacturer for the intended application.

3.2 PREPARATION

- A. Remove loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants from surfaces of cracks.
- B. Clean cracks in accordance with the crack repair product MP11.
- C. Clean surfaces adjacent to cracks, for not less than 1 inch on each side of each crack, to remove loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants that may be detrimental to bond of surface seal.
- D. Do not use cleaners that will or have potential to adversely affect the repair.

3.3 EQUIPMENT USED FOR CRACK REPAIRS

- A. Gauges:
 - 1. Use properly-calibrated gauges, with current calibration, with pump and injection hose used for introducing material into cracks. Provide additional gauges at the Site to replace gauges that malfunction.

- B. Pump:
 1. Pump equipment used for pressure injection of material into cracks shall be suitable for the intended use and compatible with injection resin used.
 2. Portable, positive displacement-type pump with interlock providing inline mixing and metering for two-component injection resins.
 3. Where volume of crack repair is less than one quart for 1000 square feet of gross repair area, or where excessive grout pressure developed by pump might further damage structure, pre-mixed material and hand cartridge pumps may be used if acceptable to Engineer.
 4. Pump may be electric-powered or air-powered with interlocks providing, at the nozzle, positive ratio control of proportions for the two components.
 5. Use a primary injection pump for each material of different mix ratio. Also have available at the Site standby backup pump of similar ratio.
 6. Capable of immediately compensating for changes in resins.
 7. Do not use batch mix pumps.
 8. Provide pressure hoses and injection nozzle for proper mixing of two adhesive components of epoxy resin adhesive.
- C. Discharge Pressure Control:
 1. Use automatic pressure controls capable of discharging mixed resin adhesive at pressures up to 190 to 210 psi, that maintain required pressure within range indicated in this paragraph.
- D. Automatic Shutoff Control:
 1. Provide and use sensors on both components for epoxy resin adhesive reservoirs for stopping pump automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance:
 1. Maintain resin adhesive manufacturer's prescribed mix ratio within a tolerance of plus or minus 5% by volume at discharge pressure up to 160 psi.
- F. Ratio/Pressure Check Device:
 1. Use two independent, valved nozzles capable of controlling flow rate and pressure by opening or closing valve as necessary to restrict material flow.
 2. Pressure gauge capable of sensing pressure behind each valve.

3.4 APPLICATION

- A. Environmental Conditions:
 1. Comply with material manufacturers' written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance of concrete crack repair products.
 2. Substrate surface and ambient air temperature shall be between 40 and 90 degrees F for not less than 24 hours after application.
 3. Pre-condition components to temperature of 70 degrees F for 24 hours immediately prior to installation, unless otherwise required in MPIL.
 4. Allow surfaces to attain temperature and conditions required before application.
- B. Pressure Injection:
 1. Use repair methods and equipment in accordance with Articles 3.1 and 3.3 of this Section. Use of caulk guns to fill cracks is unacceptable.
 2. Drilling and Installing Injection Ports:
 - a. Drill injection holes on each side of crack at a 45-degree angle to concrete surface.
 - b. Provide holes at locations so that holes intersect crack at the approximate midpoint of crack depth. Holes shall extend through the crack section.
 - c. Size of holes shall accommodate injection ports.
 - d. Spacing of Injection Ports:

- 1) Spacing between injection port holes shall not exceed the lesser of: depth of crack, 8 inches, or thickness of concrete member. Injection port holes shall be alternated from one side of crack to the other side of the crack.
 - 2) Space injection ports closer together to allow adjustment of injection pressure for minimum loss of resin to soil at locations where:
 - a) Cracks extend entirely through wall.
 - b) Backfill of walls on one side.
 - c) Difficult to excavate behind wall to seal both crack surfaces.
 - e. Prior to installing injection ports, clean each hole each hole of deleterious material by air-water blast to completely remove drill cuttings from hole.
 - f. Install and seal around each injection port with surface seal material in accordance with material MPII.
 - 1) Inserted end of injection port shall not extend beyond point at which drilled hole intersects the crack.
 3. Cleaning and Flushing:
 - a. After injection ports are inserted and sealed, flush crack with air-water mixture, or alternating water and air flush, to remove deleterious materials prior to injection of resin.
 - b. Inject flushing media (air and water) through injection ports. Continue flushing until flushing media discharges from adjacent injection port and the crack is thoroughly cleaned.
 - c. Perform final flush with air only to remove remaining water.
 4. Surface Sealing:
 - a. Provide surface seal in accordance with MPII to faces of all accessible cracks prior to pressure injecting.
 - b. Seal surfaces of crack to prevent escape of injection resin.
 5. Injection:
 - a. Comply with material MPII and manufacturer's technical representative for mixing and injecting procedures.
 - b. Commence injecting resin starting with injection port at crack's lowest elevation.
 - c. Proceed upward along the crack, injecting resin through each successive injection port, without interruption, to the crack's highest elevation.
 - d. Do not relocate injection nozzle to adjacent injection port until resin appears at the next-higher adjacent injection port or refusal criteria is developed.
 - e. Seal each injection port immediately after completing the injection at that injection port.
- C. Gravity Feed:
1. Provide epoxy penetrating sealant in accordance with material MPII.

3.5 CLEANING

- A. Removal of Crack Seals at Pressure-Injected Cracks:
1. After completion of pressure injecting cracks in a given work area, remove surface seal material and re-finish concrete in area of pressure injection to match finish of existing, adjacent concrete.
 2. Comply with Section 03 00 05 - Concrete regarding finishing requirements.
 3. Do not perform surface finishing until curing period, as specified by material MPII, is complete.
- B. Cleaning:
1. Clean and properly dispose of excess materials.
 2. Avoid creation of nuisances.
 3. Comply with Section 01 74 00 - Cleaning.

3.6 FIELD QUALITY CONTROL

- A. Field Tests:
1. Monitor each pressure injection location. Observe and record the following:
 - a. Volume of resin used within each 10 feet of crack length.

- b. Pump gauge pressure at intervals of not more than 10 minutes while material is being pumped.
 - c. Indication of crack location and number, injection port spacing, and confirmation of resin appearing or refusal at each injection port.
2. Epoxy Resin Adhesive Two-Component Ratio Tests:
- a. Perform ratio test for each injection unit at beginning and end of each injection work day, and when injection work is stopped for more than one hour.
 - b. Document and maintain complete, accurate records of ratios and pressure checks.
 - c. Disconnect mixing head and pump two adhesive components simultaneously through ratio check device.
 - d. Adjust discharge pressure to 160 psi for both adhesive components.
 - e. Simultaneously discharge both adhesive components into separate calibrated containers.
 - f. Compare amounts simultaneously discharged into calibrated containers during same period, to determine mix ratio.
 - g. Complete test at 160 psi discharge pressure and repeat procedure for 0 psi discharge pressure.
3. Injection Pressure Test:
- a. Perform injection pressure test for each injection equipment unit:
 - 1) At start and end of each injection work day.
 - b. When injection work is stopped for more than 45 minutes Disconnect mixing head of injection equipment and connect two adhesive component delivery lines to pressure check device.
 - c. Pressure Check Device:
 - 1) Two independent, valved nozzles capable of controlling flow rate and pressure.
 - 2) Pressure gauge capable of sensing and displaying pressure behind each valve.
 - d. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 psi.
Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 psi within three minutes.
 - e. Check tolerance to verify equipment capable of meeting specified ratio tolerance.
- B. Suppliers' Services:
- 1. Manufacturers of crack repair materials shall:
 - a. Furnish required materials and services of manufacturer's representative at the Site.
 - b. Review preparation and installation by Contractor and entity performing crack repair Work.
 - c. Certify the installation methods to be used for each repair material used in the crack repair Work of this Section.
 - d. Certify the installers and applicators of crack repair materials, if documentation of such prior certification was not previously furnished as a Submittal prior to starting the Work.
 - 2. Manufacturers' representatives of crack repair materials shall be at the Site prior to and during first installation of the materials furnished under this Section to review preparation, field quality control, and proposed installation methods.
- C. Item – Concrete Crack Repair and Injection:
- 1. Measurement will be the length, in feet, of existing, concrete crack repaired, measured at the concrete surface.
 - 2. Sub-Items: This Work of this item is divided into the following, separate sub-items, with separate quantity for each sub-item as indicated in the Bid Form and Agreement:

- a. Method 1: Repair of passive cracks and cracks requiring structural repair in walls
 - b. Method 2: Repair of passive cracks and cracks requiring structural repair in slabs.
 - c. Method 3: Repair of active, non-structural cracks, cracks that exhibit leakage, or as directed by Engineer.
 - d. Method 4: Repair of active cracks requiring structural repair.
 - e. Method 5: Very narrow cracks (0.010 inches wide and less).
 - f. Crack widths greater than 1/8 inches.
3. Item Includes (all in accordance with the Contract Documents):
 - a. As indicated in Section 03 64 23 - Crack Repair and Injection Concrete.
 4. Not included in this bid/pay item:
 - a. As indicated in Section 03 64 23 - Crack Repair and Injection.
 - b. Repair of cracks in new concrete Work provided by Contractor is not eligible for payment under the Unit Price Work of this item. Such repairs shall be performed without additional cost to Owner.
 5. Payment: Unit price per foot for the crack repair Work of the type indicated, under this item will be full compensation for Work for the associated type of crack repair Work, performed under the associated sub-item, complete in accordance with the Contract Documents, and not specifically included under other bid/pay items or contracts.

END OF SECTION



DIVISION 05

METALS



DSECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under work of other Specification Sections.
 2. Design of all temporary bracing not indicated on Drawings.
 3. Design of systems and components, including but not limited to:
 - a. Stairs.
 - b. Modular framing system.
- B. Related Specification Sections include but are not necessarily limited to:
1. Section 03 00 05 - Concrete.
 2. Section 03 15 19 - Anchorage to Concrete.
 3. Section 05 52 46 - Mechanically Fastened Aluminum Railings.
 4. Section 06 82 00 - Fiberglass Reinforced Plastic Fabrication.
 5. Section 09 96 00 - High Performance Industrial Coatings.

1.2 REFERENCES

- A. Definitions
1. Fasteners: As defined in ASTM F1789.
 2. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 oz of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
 3. Hardware: As defined in ASTM A153/A153M.
 4. Installer or Applicator:
 - a. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - b. Installer and applicator are synonymous.
 5. PQR: Procedure Qualification Record
 6. MIC: Microbiologically induced corrosion.
- B. Referenced Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 2. American Institute of Steel Construction (AISC):
 - a. 325, Manual of Steel Construction.
 - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 3. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 4. ASTM International (ASTM):
 - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - b. A36, Standard Specification for Carbon Structural Steel.

- c. A47, Standard Specification for Ferritic Malleable Iron Castings.
- d. A48, Standard Specification for Gray Iron Castings.
- e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
- g. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- i. A197, Standard Specification for Cupola Malleable Iron.
- j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- k. A276, Standard Specification for Stainless Steel Bars and Shapes.
- l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- n. A380/A380M, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- q. A536, Standard Specification for Ductile Iron Castings.
- r. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
- s. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- t. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- v. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
- w. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A992, Standard Specification for Steel for Structural Shapes.
- z. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- aa. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
- hh. F436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.

- ii. F467, Standard Specification for Nonferrous Nuts for General Use.
 - jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - ll. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
 - mm. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
 - nn. F1789, Standard Terminology for F16 Mechanical Fasteners.
 - oo. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
5. American Welding Society (AWS):
 - a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. D1.1, Structural Welding Code - Steel.
 - c. D1.2, Structural Welding Code - Aluminum.
 - d. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 6. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 510, Metal Stairs Manual.
 - b. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).
 - c. MBG 531, Metal Bar Grating Manual.
 7. NACE International (NACE).
 8. Nickel Development Institute (NiDI):
 - a. Publication 11 007, Guidelines for the Welded Fabrication of Nickel-Containing Stainless Steels for Corrosion Resistant Services.
 9. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings:
 2. Fabrication and/or layout drawings and details:
 - a. Submit drawings for all fabrications and assemblies.
 - 1) Include erection drawings, plans, sections, details and connection details.
 - b. Identify materials of construction, shop coatings and third party accessories.
 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Provide manufacturer's standard allowable load tables for the following:
 - 1) Grating.
 - 2) Modular framing systems.
 4. Contractor designed systems and components:
 - a. Certification that manufactured units meet all design loads specified.
 - b. Shop Drawings and engineering design calculations:
 - 1) Indicate design live loads.
 - 2) Sealed by a licensed professional engineer, registered in the State of California.

- 3) Engineer will review for general compliance with Contract Documents.
- c. Contractor designed systems and components include the following:
 - 1) Metal Stairs and associated landings.

B. Informational Submittals:

1. Certification of welders and welding processes.
 - a. Indicate compliance with AWS.
2. NACE certification of surface preparation.
3. NACE certification of paint application.
4. Qualifications:
 - a. NACE inspector qualifications.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Qualify welding procedures and welding operators in accordance with AWS.
 - a. All welders shall be qualified in all positions that will be utilized during welding. Welders shall utilize qualified PQR for testing.
 - b. For all stainless steel immersed in wastewater applications: Visual Appearance Welds- Due to concerns with MIC related corrosion, welds shall be visually inspected to ensure surfaces are free of undercut, pin holes, overlap or other weld defects that would create areas for MIC or other corrosion to occur.
2. Fabricator shall have minimum of 10 years of experience in fabrication of metal items specified.
3. Engineer for contractor-designed systems and components: Professional structural engineer licensed in the State of California.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Abrasive stair nosings (embedded in concrete stairs):
 - a. American Safety Tread.
 - b. Balco.
 2. Mechanical anchor bolts:
 - a. See Section 03 15 19.
 3. Epoxy adhesive anchor bolts:
 - a. See Section 03 15 19.
 4. Concrete screw anchors:
 - a. See Section 03 15 19.
 5. Castings, trench covers and accessories:
 - a. Neenah Foundry Co.
 - b. Deeter Foundry Co.
 - c. Barry Craft Construction Casting Co.
 - d. McKinley Iron Works.

6. Galvanizing repair paint:
 - a. Clearco Products Co., Inc.
 - b. ZRC Products.
7. Modular framing system:
 - a. Unistrut Building Systems.
 - b. B-Line Systems.
 - c. Kindorf.

2.2 MATERIALS

A. Steel:

1. Structural:
 - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
 - b. All other plates and rolled sections: ASTM A36.
2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
3. Structural tubing:
 - a. ASTM A500, Grade B (46 ksi minimum yield).
4. Bolts, high strength:
 - a. ASTM F3125, Grade A325.
5. Nuts, high strength:
 - a. ASTM A563.
6. Washers (hardened):
 - a. ASTM F436.
 - b. Provide two (2) washers with all bolts.
7. Bolts and nuts (unfinished):
 - a. ASTM A307, Grade A.
8. Welding electrodes: AWS D1.1, E70 Series.
9. Steel forgings: ASTM A668.

B. Stainless Steel:

1. Stainless steel in welded applications: Low carbon 'L' type.
2. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi.
 - a. Bars, shapes: ASTM A276, Type 304.
 - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
 - c. Strip, plate and flat bars: ASTM A666, Type 304 or 316.
 - d. Bolts and nuts: ASTM F593, Type 304 or 316.
3. Minimum yield strength of 25,000 psi and minimum tensile strength of 70,000 psi.
 - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
4. Welding electrodes: In accordance with AWS for metal alloy being welded.

C. Aluminum:

1. Alloy 6061-T6, 32,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zees.
 - b. Weir plates, baffles and deflector plates, ASTM B209.
2. Alloy 6063-T5 or T6, 15,000 psi tensile yield strength minimum.
 - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
3. ASTM B26 for castings.
4. ASTM F468, alloy 2024 T4 for bolts.

5. ASTM F467, alloy 2024 T4 for nuts.
 6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.
- D. Washers: Same material and alloy as found in accompanying bolts and nuts.
- E. Embedded Anchor Bolts:
1. See Specification Section 03 15 19.
- F. Mechanical Anchor Bolts and Adhesive Anchor Bolts:
1. See Specification Section 03 15 19.
- G. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.
- H. Deformed Bar Anchors: ASTM A1064 with a minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.
- I. Iron and Steel Hardware: Galvanized in accordance with ASTM A153/A153M when required to be galvanized.
- J. Galvanizing Repair Paint:
1. High zinc dust content paint for regalvanizing welds and abrasions.
 2. ASTM A780.
 3. Zinc content: Minimum 92% in dry film.
 4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- K. Dissimilar Materials Protection: See Specification Section 09 96 00.

2.3 MANUFACTURED UNITS

- A. Abrasive Stair Nosings:
1. Interior stairs:
 - a. Two component consisting of an embedded subchannel and an abrasive tread plate.
 - b. Subchannel: 6063-T5 extruded aluminum.
 - 1) Complete with concrete anchors.
 - c. Tread plate:
 - 1) 6063-T5 extruded aluminum.
 - 2) Solid epoxy abrasive filler.
 - a) Color: To be selected by Engineer.
 - d. Balco "DXH-330".
 - e. Finish: Mill.
 2. Length:
 - a. Concrete stairs and landings:
 - 1) 4 inches less than overall stair width.
 - 2) Where tread mounted railing post occurs, hold nosing back 4 inches clear from railing centerline.
 - b. Concrete filled metal pan stairs: Full length of tread.
 - c. Concrete landings at metal stairs: 4 inches less than clear width between stringers.
- B. Metal Stairs:
1. Treads: Grating as specified.
 - a. Provide integral corrugated non-slip nosing.
 2. Risers:
 - a. Grating treads:
 - 1) Solid plate welded to trailing edge of tread or landing.

- 2) Minimum 3/16 inches thick by 4 inches high.
 3. Landings:
 - a. Grating as specified.
 - b. Provide integral corrugated non-slip nosing at edge acting as stair tread/nosing.
 4. Design live load for landing platform and supporting structure:
 - a. 100 PSF, uniform load.
 - b. 300 LBS concentrated load on 4 inches square area.
 - c. All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
 - d. Maximum deflection: 1/300 of span under a superimposed live load of 100 psf.
 5. Design, fabricate, and install in compliance with NAAMM and applicable codes.
 - a. NAAMM AMP 510:
 - 1) Exterior at site structures and equipment: Industrial Class.
 - 2) Interior or exterior at buildings: Service Class.
 6. Handrails and guardrails: Refer to Specification Section 05 52 46.
 7. Material:
 - a. Aluminum.
- C. Heavy-Duty Castings, Trench Covers, and Accessories:
1. Prefabricated, ductile iron ASTM A536 or cast aluminum ASTM B26.
 2. Design load: AASHTO HS-20-wheel loading for indicated span.
 3. Machine horizontal mating surfaces.
- D. Modular Framing System:
1. Materials:
 - a. Steel: ASTM A1011, carbon steel, Grade 33.
 - 1) Hot-dipped galvanized, ASTM A123 or ASTM A153.
 - b. Aluminum: ASTM B221 or ASTM B209.
 - c. Stainless steel: ASTM A666.
 - d. Fiberglass: See Specification Section 06 82 00.
 2. Channels and inserts:
 - a. Steel or stainless steel: Minimum 12 GA.
 - b. Aluminum: Minimum 0.080 inches.
 - c. Channels to have one side with a continuous slot with in-turned lips.
 - 1) Width: 1-5/8 inches.
 - 2) Depth and configuration as necessary for loading conditions.
 3. Fittings: Same material as system major components.
 4. Fasteners:
 - a. Nuts: Toothed grooves in top of nuts to engage the in-turned lips of channel.
 - b. Bolts: Hex-head cap screws.
 - c. Same material as system major components.
 5. End caps:
 - a. At each exposed end of each piece mounted on walls, or guardrails, or suspended from framing 7 feet or less above the floor or platform.
 - a) Plastic for all exposed ends 7 feet or more above floor or platform.
 - b) Plastic or metallic for all other exposed ends.
 6. Schedule:
 - a. Interior wet areas: Stainless steel.

- b. Interior corrosive areas: Stainless steel.
 - c. Exterior areas: Aluminum.
 - d. All other areas not listed above: Hot-dipped galvanized steel.
7. Provide dissimilar materials protection in accordance with Specification Section 09 96 00.
 8. Repair all cut ends or otherwise damaged areas of galvanized steel in accordance with ASTM A780.

2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
 1. Grind smooth all rough welds and sharp edges.
 - a. Round all corners to approximately 1/32 - 1/16 inches nominal radius.
- C. Provide drilled or punched holes with smooth edges.
 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Shop Connections:
 1. Stainless steel connections subject to corrosive environments or immersion service will be subject to the following enhanced visual and welding requirements:
 - a. Fabricator
 - 1) Fabricator shall have QC program and procedures in place to avoid cross contamination with carbon steel products and material.
 - b. Weld Procedures
 - 1) Weld procedures shall be qualified for all positions that will be welded, qualified by testing in accordance with applicable welding code AWS D1.6 requirements.
 - 2) Procedure Qualification Record (PQR) shall document all essential variables to perform consistent quality welds. PQR shall include maximum heat input per pass and shall be tested for CVN properties, macro hardness, G48 mass loss ferric chloride pitting corrosion test, and macro/micro hardness testing.
 2. Welds shall be continuous fillet type unless indicated otherwise.
 3. Full penetration butt weld at bends in stair stringers and ladder side rails.
 4. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
 5. Weld aluminum in accordance with AWS D1.2.
 6. All headed studs to be welded using automatically timed stud welding equipment.
 7. Grind smooth welds that will be exposed.
- A. Make provisions to prevent carbon steel/free iron contamination of stainless steel surfaces (i.e., contact between carbon steel or iron and stainless steel component). Do not use cutting/grinding/drilling tools, wire brushes, or wire wheels on stainless steel that have been previously used on carbon steel or iron. Do not support or hang stainless steel weldments or fixtures with carbon steel cables or dunnage.
- B. Passivate stainless steel items and stainless steel welds after they have been ground smooth. In accordance with ASTM A380/A380M.
- C. Passivation Requirements:
 1. For components/assemblies to be used only in dry air service environments:
 - a. No post-fabrication passivation treatments are required for external corrosion control.
- D. Conceal fastenings where practicable.
- E. Fabricate work in shop in as large assemblies as is practicable.
- F. Tolerances:

1. Rolling:
 - a. ASTM A6.
 - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 inches.
 - 2) Framed members:
 - a) 30 feet or less: 1/16 inches.
 - b) Over 30 feet: 1/8 inches.
 - b. Member straightness:
 - 1) Compression members: 1/1000 of axial length between points laterally supported.
 - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
 - c. Specified member camber (except compression members):
 - 1) 50 feet or less: -0/+1/2 inches.
 - 2) Over 50 feet: -0/+1/2 inches (+1/8 inches per 10 feet over 50 feet).
 - 3) Members received from mill with 75% of specified camber require no further cambering.
 - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
 - 5) Camber shall be measured in fabrication shop in unstressed condition.
 - d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
 - e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- G. Fabricate grating, checkered plate, stairs, ladders and accessories using aluminum unless shown otherwise on Drawings.
 1. Finish:
 - a. Mill, unless noted otherwise.
 - b. Coat surfaces in contact with dissimilar materials.
 - 1) See Specification Section 09 96 00.
- H. Fabricate grating in accordance with NAAMM MBG 531.
 1. Maximum tolerance for difference in depth between grating depth and seat or support angle depth: 1/8 inches.
 2. Distance between edge of grating and face of embedded seat angle or face of wall or other structural member: 1/4 inches.
 - a. Tolerance: NAAMM MBG 531.
 3. Ends and perimeter edges: Banded, with alternate bearing bars welded to band.
 - a. Provide full depth banding unless noted otherwise.
 - b. Banding at trenches and sumps to be 1/4 inches less than grating depth to allow for drainage.
 4. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 inches high toe plate.
 5. Provide joints at openings between individual grating sections.

6. Fabricate grating so that bearing bars and cross bars in adjacent sections are aligned.
- I. See Specification Section 09 96 00 for preparation and painting of ferrous metals and other surfaces.
- J. Coat surfaces in contact with dissimilar material.
 1. Tnemec Series L69.
 2. 5 mils DFT.

2.5 SOURCE QUALITY CONTROL

A. Surface Preparation:

1. Refer to Specification Section 09 96 00 for surface preparation requirements.
1. All miscellaneous metal fabrication item surfaces shall be observed and approved, prior to application of shop-applied coatings, by a NACE Certified Coatings Specialist (CIP-3) with at least 4 years of experience in similar inspections.
 - a. Inspection shall be performed to determine depth of blast profile and cleanliness of surface.
 - b. Fabricator shall reblast and or re-clean surfaces as required until acceptable.

B. Shop Applied Coating Application:

1. Refer to Specification Section 09 96 00 for coating requirements.
2. After surface has been accepted in writing by NACE certified coatings inspector, fabricator may proceed with application of coatings.
3. Application of coatings shall be observed and certified by NACE certified coatings inspector.

C. Shop Inspection and Testing:

1. Employ and pay for the services of a qualified independent testing agency to inspect and test all structural steel work for compliance with Contract Documents.
2. Contractor responsible for testing to qualify shop and field welders and as needed for Contractor's own quality control to ensure compliance with Contract Documents.
3. Independent testing agency shall have a minimum of five years performing similar work and shall be subject to Owner's approval.

D. Responsibilities of Testing Agency:

1. Inspect shop and field welding in accordance with AWS Code including the following non-destructive testing:
 - a. Visually inspect all welds.
 - b. In addition to visual inspection, test 50% of full penetration welds and 20% of fillet welds with liquid dye penetrant or mag particle.
 - c. Test 20% of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.
 - d. For all surfaces intended to be immersed or intended to be water tight:
 - 1) 100% of all fillet welds shall be PT tested to ensure water-tight surfaces are free of surface defects that would create areas for MIC.
 - 2) 100% of all completed SS welds and material shall be passivated in accordance with ASTM A370.
2. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9.
 - a. Verify direct tension indicator gaps, if applicable.
3. Inspect structural steel which has been erected.
4. Inspect stud welding in accordance with AWS Code.
5. Prepare and submit inspection and test reports to Engineer.
 - a. Assist Engineer to determine corrective measures necessary for defective work.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide items to be built into other construction in time to allow their installation.
 - 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
 - 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

3.2 INSTALLATION

- A. Set metal work level, true to line, plumb.
 - 1. Shim and grout as necessary.
- B. Contractor is solely responsible for safety.
 - 1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
 - 2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, and diagonal bracing or rigid connections are installed.
 - 3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
 - 4. Until all elements of the permanent structure and lateral bracing system are complete, temporary bracing for the partially complete structure will be required.
- C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including construction activities and operation of equipment is the responsibility of the Contractor.
 - 1. Plumb, align, and set structural steel members to specified tolerances.
 - 2. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
 - 3. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
 - 4. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
 - a. If not obvious from experience or from the Drawings, confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
 - 5. Remove and dispose of all temporary work and facilities off-site.
- D. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
 - 1. Report defects in work-in-place which may influence satisfactory completion of the work.
 - 2. Absence of such notification will be construed as acceptance of work-in-place.
- E. Field Measurement:
 - 1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
 - 2. Contractor responsible for the accurate fit of the work.

- F. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
 - 1. Use surveyor's level.
 - 2. Notify Engineer of any errors or deviations found by such checking.
- G. Framing member location tolerances after erection shall not exceed the frame tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
- H. Erect plumb and level; introduce temporary bracing required to support erection loads.
- I. Use light drifting necessary to draw holes together.
 - 1. Drifting to match unfair holes is not allowed.
- J. Welding:
 - 1. Comply with AWS D1.1, AWS D1.2, and AWS D1.6 (as applicable for the material welded) and requirements of this Section's "Fabrications" Article in "Part 2 - Products".
 - 2. When joining two sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
 - 3. 100% of all completed stainless steel welds and material shall be passivated in accordance with ASTM A370/A370M.
- K. Shore existing members when unbolting of common connections is required.
 - 1. Use new bolts for rebolting connections.
- L. Clean stored material of all foreign matter accumulated prior to the completion of erection.
- M. Bolt Field Connections: Where practicable, conceal fastenings.
- N. Field Welding:
 - 1. Follow AWS procedures.
 - 2. Grind welds smooth where field welding is required.
 - 3. 100% of all completed stainless steel welds and material shall be passivated in accordance with ASTM A370/A370M.
- O. Field cutting grating or checkered plate to correct fabrication errors is not acceptable.
 - 1. Replace entire section.
- P. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- Q. Unless noted or specified otherwise:
 - 1. Connect steel members to steel members with 3/4 inches diameter ASTM F3125, Grade A325 high strength bolts.
 - 2. Connect aluminum to aluminum with 3/4 inches diameter stainless bolts.
 - 3. Connect aluminum to structural steel using 3/4 inches diameter stainless steel bolts.
 - a. Provide dissimilar metals protection.
 - 4. Connect aluminum and steel members to concrete and masonry using stainless steel mechanical anchor bolts or adhesive anchor bolts unless shown otherwise.
 - a. Provide dissimilar materials protection.
 - 5. Provide washers for all bolted connections.
 - 6. Where exposed, bolts shall extend a maximum of 3/4 inches and a minimum of 1/2 inches above the top of installed nut.
 - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- R. Install and tighten ASTM F3125, Grade A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD).

1. Provide hardened washers for all Grade A325 bolts.
 - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- S. After bolts are tightened, upset threads of ASTM A307 bolts or anchor bolts to prevent nuts from backing off.
- T. Secure metal to wood with lag screws of adequate size with appropriate washers.
- U. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
 1. Provide full penetration welded splices where continuity is required.
- V. Provide each fabricated item complete with attachment devices as indicated or required to install.
- W. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- X. Set beam and column base plates accurately on nonshrink grout as indicated on Drawings.
 1. See Division 03 Specification Sections for non-shrink grout and anchorage.
 2. Set and anchor each base plate to proper line and elevation.
 - a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams.
 - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
 - 2) Tighten nuts on anchor bolts.
 - b. Fill space between bearing surface and bottom of base plate with nonshrink grout.
 - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
 - c. Do not remove wedges or shims.
 - 1) Where they protrude, cut off flush with edge of base plate.
 - d. Fill sleeves around anchor bolts solid with non-shrink grout.
- Y. Tie anchor bolts in position to embedded reinforcing steel using wire.
 1. Tack welding prohibited.
 - a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
 2. Anchor bolt location tolerance:
 - a. Per Section 03 15 19.
- Z. Provide abrasive stair nosings in each tread and landing of all concrete stairs and at each concrete stair landing having metal stair structure attaching to the concrete landing.
 1. Center stair nosings in stair width.
- AA. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor.
 1. Keep screw holes clean and ready to receive screws.
- BB. Attach grating to end and intermediate supports with grating saddle clips and bolts.
 1. Maximum spacing: 2 feet on-center with minimum of two per side.
 2. Attach individual units of aluminum grating together with clips at 2 feet on-center maximum with a minimum of two clips per side.
- CC. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 96 00.
- DD. Repair damaged galvanized surfaces in accordance with ASTM A780.
 1. Prepare damaged surfaces by abrasive blasting or power sanding.

2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

- A. Tolerances (unless otherwise noted on the Drawings):
 1. Frame placement, after assembly and before welding or tightening.
 - a. Deviation from plumb, level and alignment: 1 inch 500, maximum.
 - b. Displacement of centerlines of columns: 1/2 inches maximum, each side of centerline location shown on Drawings.

3.4 CLEANING

- A. After fabrication, erection, installation, or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09 96 00.

END OF SECTION

SECTION 05 52 46
MECHANICALLY FASTENED ALUMINUM RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum handrail, stair rail and guardrail.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 - Procurement and Contracting Requirements.
 - 2. Division 01 - General Requirements.
 - 3. Section 05 50 00 - Metal Fabrications.
 - 4. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 - b. DAF 45, Designation System for Aluminum Finishes.
 - 2. ASTM International (ASTM):
 - a. B108, Standard Specification for Aluminum-Alloy Permanent Mold Castings.
 - b. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - c. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - d. B247, Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.
 - e. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
 - f. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 - 3. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 521, Pipe Railing Systems Manual.
 - 4. U.S. Department of Justice, Architectural and Transportation Barriers Compliance Board (Access Board):
 - a. Americans with Disabilities Act (ADA):
 - 1) Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 DEFINITIONS

- A. Guardrail: A system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.
- B. Handrail: A horizontal or sloping rail intended for grasping by the hand for guidance or support.
- C. Railing: A generic term referring to guardrail, handrail and/or stair rails.
- D. Stair Rail: A guardrail, installed at the open side of stairways with either a handrail mounted to the inside face of the guardrail, or where allowed by applicable codes, with the top rail mounted at handrail height and serving the function of a handrail.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Fabrication and/or layout drawings:
 - a. Drawings showing profile, location, and fabrication details.
 - b. Type and details of anchorage.
 - c. Location and type of expansion joints.
 - d. Materials of construction, shop coatings and all third-party accessories.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation details.
 - 3. Certification that railings have been designed and fabricated to meet the loading requirements specified.
 - 4. Calculations for all proposed deviations from the Specification.
 - a. Calculations shall be performed, sealed, signed and dated by a registered professional structural engineer licensed in the State of California.
 - b. Calculations shall be specific to this Project and shall include all assumptions, references and design interpretations used to achieve the results obtained by the Engineer.
 - c. Reduction in load criteria is not acceptable as reason for deviation from sizes indicated in the Specification.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver and handle railings to preclude damage.
- B. Store railings on skids, keep free of dirt and other foreign matter which will damage railings or finish and protect against corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Mechanically fastened component railing systems.
 - a. Golden Railing – Friction Railing System.
 - b. Moultrie Manufacturing Company – Wesrail II.
 - c. Peak-to-Peak Engineered Railings – Tang Railing System.
 - d. Tuttle Railing Systems – TABCO 8000.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Alloy 6061-T6.
 - 1. ASTM B209 for sheets and plates.
 - 2. ASTM B221 and ASTM B308 for shapes - beams, channels, angles, tees, and zees.
 - 3. ASTM B247 for forgings.
- B. Alloy 6063-T5 or T6.
 - 1. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
- C. Fittings:
 - 1. Cast aluminum: ASTM B108.
 - 2. Machined aluminum: 6063-T5 or T6 alloy.
- D. Shims: Aluminum of same alloy as component being shimmed.

E. Fasteners: Stainless steel.

F. Expansion and Adhesive Anchors: See Specification Section 03 15 19.

2.3 FABRICATION

A. General:

1. Verify field conditions and dimensions prior to fabrication.
2. For fabrication of items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
3. Form exposed work with smooth, short radius bends, accurate angles and straight edges.
 - a. Ease exposed edges to a radius of approximately 1/32 inches.
 - b. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - c. Drill or punch holes with smooth edges.
4. Form exposed connections with flush, smooth, hairline joints, using stainless steel or aluminum splice locks to splice sections together.
 - a. Ease the edges of splices and expansion joints and remove all burrs left from cutting.
5. Provide for anchorage of type indicated on Drawings or as required by field conditions.
 - a. Drill or punch holes with smooth edges.
6. Design railings and anchorage system in accordance with NAAMM AMP 521 to resist loading as required by the building code.
 - a. Maximum allowable stresses per AA ADM 1.
7. Design railings in accordance with accessibility requirements per the building code and ADAAG.

B. Custom fabricate railings to dimensions and profiles indicated.

1. Guardrails:
 - a. Posts: Minimum 1 1/2 inches nominal diameter Schedule 80 pipe.
 - 1) Space vertical posts as required by loading requirements but not more than 4 feet on center.
 - b. Rails: Minimum 1 1/2 inches nominal diameter Schedule 40 pipe.
 - 1) Where details are not indicated, space intermediate rails to requirements of the building code or OSHA Standards, whichever requires the more restrictive design.
2. Handrail: Minimum 1 1/4 inches nominal diameter Schedule 40 pipe.
 - a. Outside diameter: 1 1/2 inches minimum, 2 inches maximum.
 - b. Space handrail brackets as required by loading requirements but not more than 4 feet on center.
3. Mounting:
 - a. Provide manufacturer's standard cast or machined flanges or brackets as necessary for conditions shown on Drawings.
 - 1) Railing posts shall be secured using socket-head stainless steel set screws.
 - a) Bolts, TEK screws, rivets, or adhesive are not acceptable.
 - b. Flanges and brackets shall allow for removal of railing sections where removable railings are indicated on the Drawing.
 - 1) Completed assembly shall be designed to withstand the loading capacity specified.
4. Toeboards:
 - a. 1/4 inches thick by 4 inches high extruded toeboard with stiffener ribs.
 - 1) Moultrie "WIIKP20" contour kickplate.

C. Railing Fabrication:

1. All railings are to be mechanically fastened component system.

2. Railing system shall be an engineered system designed specifically for use as guardrail system.
 - a. Fittings shall be internally connected, flush-fitting aluminum or stainless steel.
 - b. Fasteners shall be 302 series stainless steel Allen head set screws.
 - 1) Rivets, adhesive or headed screws are not acceptable.
 3. Fit exposed ends of guardrails and handrails with solid terminations.
 - a. Return ends of handrail to wall, but do not attach to wall.
 - b. Where guardrail terminates at a wall, provide a vertical post or end-loop 4 inches off the wall to center of vertical member.
 4. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly of units at project site.
 5. Provide weeps to drain water from hollow sections of railing at exterior and high humidity conditions.
 - a. Drill 1/4 inches weep hole in railings closed at bottom:
 - 1) 1 inches above walkway surface at bottom of posts set in concrete.
 - 2) 1 inches above base flange or reinforcing spud where applicable.
 - 3) At low point of intermediate rails.
 - b. Do not drill weep holes:
 - 1) In bottom of base flange.
 6. Expansion joints:
 - a. Joints to be designed to allow expansion and contraction of railing and still meet design loads required.
 - 1) Top rail splices and expansion joints shall be located within 8 inches of post or other support.
 - 2) Where railings span building expansion joints; provide a railing expansion joint in the span crossing the building expansion joint.
 - b. Provide expansion joints in any continuous run exceeding 20 feet in length.
 - 1) Space expansion joints at not more than 40 feet on center.
 - c. Provide minimum 0.10 inches of expansion joint for each 20 feet length of top rail for each 25 DEGF differential between installation temperature and maximum design temperature.
 - 1) Maximum expansion joint width at time of installation shall not exceed 3/8 inches.
 - a) Provide additional expansion joints as required to limit expansion joint width.
 - d. Provide slip-joint with internal sleeve.
 - 1) Extend slip joint min 2 inches beyond joint at maximum design width.
 - 2) Fasten internal sleeve securely to one side.
 - a) Provide Allen-head set screw located in bottom of rail.
 - b) Rivets or exposed screw heads are not acceptable.
- D. Finish:
1. Architectural Class 1 coating per AA DAF 45:
 - a. AA-M12C22A41 clear anodized.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to installation, inspect and verify condition of substrate.
- B. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.

3.2 INSTALLATION

- A. Install handrails and guardrails to meet loading requirements of the building code and OSHA.
- B. Install products in accordance with manufacturer's instructions.
- C. Set work accurately in location, alignment and elevation; plumb, level and true.
 - 1. Measure from established lines and items which are to be built into concrete, masonry or similar construction.
- D. Align railings prior to securing in place to assure proper matching at butting and expansion joints and correct alignment throughout their length.
 - 1. Provide shims as required.
- E. Install proper sized expansion joints based on temperature at time of installation and differential coefficient of expansion of materials in all railings as recommended by manufacturer.
 - 1. Lubricate expansion joint splice bar for smooth movement of railing sections.
- F. Provide removable railing sections where indicated on Drawings.
- G. Provide toeboards on walkway side of all elevated walkways, platforms and stair landings, and where indicated on the Drawings or required by OSHA Standards.
- H. Attach handrails to walls or guardrail with brackets designed for condition:
 - 1. Provide brackets which provide a minimum 2-1/4 inches clearance between handrail and nearest obstruction.
 - a. Handrails shall not project more than 4-1/2 inches into required stairway width.
 - 2. Anchor handrail brackets to concrete or masonry walls with stainless steel adhesive anchors with stainless steel hex head bolts.
- I. Anchor railings to concrete with stainless steel adhesive anchors with stainless steel bolts, nuts and washers unless noted otherwise in the Contract Documents.
 - 1. Where exposed, bolts shall extend minimum 1/2 inches and maximum 3/4 inches above the top nut.
 - a. If bolts are cut off to required height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nut.
 - b. Bevel the top of the bolt after cutting to provide a smooth surface.
- J. Anchor railings to metal structure with stainless steel bolts, nuts and washers.
- K. Install toeboards to fit tight to the walking surface.
 - 1. Attach to railing vertical post with manufacturer's standard mounting clamp:
 - a. Adjustable.
 - b. Designed to engage in extruded slot on back of toeboard.
 - 2. Provide splice bars, corner splices and brackets:
 - a. Manufacturer's standard items as required for a complete installation.
 - 3. Provide spacer bar and U-bracket where necessary for toeboard to clear mounting flange.
 - 4. Bottom of toeboard shall not exceed 1/4 inches above walking surface.
- L. Coat aluminum in contact with dissimilar metal or concrete in accordance with Specification Section 09 96 00.
- M. Provide railings as required for stair construction identified in Specification Section 05 50 00.

END OF SECTION



DIVISION 06

WOOD, PLASTICS, AND COMPOSITES



SECTION 06 82 00
FIBERGLASS REINFORCED PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiberglass reinforced plastic (FRP) fabrications including but not limited to:
 - a. Grating.
 - b. Supporting structure design.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 05 50 00 - Metal Fabrications.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A14.3, Safety Requirements for Fixed Ladders and Workplace Surfaces Package.
 - 2. ASTM International (ASTM):
 - a. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 DEFINITIONS

- A. Skid-resistant:
 - 1. Manufacturer's standard applied abrasive grit coating.
 - 2. Abrasive coated tape is not acceptable.
- B. FRP: Fiberglass Reinforced Plastic.

1.4 SYSTEM DESCRIPTION

- A. All fiberglass reinforced plastic support systems shall be designed by a registered professional structural engineer licensed in the State of California.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations on reinforcing field cut openings.
 - 2. Fabrication and/or layout drawings.
 - a. Plan showing profile, location, section and details of each item including anchorage or support system(s).
 - b. Locations and type of expansion joints.
 - c. Materials of construction including shop applied coatings.
 - d. Listing of all accessory items being provided indicating material, finish, etc.
 - 3. Certifications:
 - a. Certification of Structural Engineer's qualifications.
 - b. Certification that all components and systems have been designed and fabricated to meet the loading requirements specified.

4. Manufacturer's full line of colors available for each component - yellow.
- B. Informational Submittals:
1. Complete design calculations of all supporting structure and fastening conditions.
 - a. Design calculations to be for information only and stamped and signed by a registered engineer in the State of California.
 - b. Engineer will not review or take any action on submittal.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle each item to preclude damage.
- B. Store all items on skids above ground.
1. Keep free of dirt and other foreign matter which will damage items or finish and protect from corrosion and UV exposure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Grating and solid plate:
 - a. American Grating.
 - b. Enduro Composites.
 - c. Fibergate Composite Structures, Inc.
 - d. Harsco Industrial IKG.
 - e. International Grating Inc.
 - f. Mona Composites.
 - g. Seasafe, Inc.
 - h. Strongwell Corporation.

2.2 MATERIALS

- A. Fiberglass Reinforced Plastic (FRP):
1. Vinyl ester with fiberglass reinforcing.
 - a. Type 1.
 - b. Resin Base: Isophthalic polyester
 - c. Description: Industrial grade corrosion resistance and fire retardant
 - d. Corrosion Resistance: Very good
 - e. Product: Pultruded
 - f. Maximum Temperature: 150 degrees F
 2. Fire retardant.
 - a. Flame spread: ASTM E84, 25 or less.
 3. Color: Yellow
- B. Fasteners, Clips, Saddles, and Miscellaneous Components:
1. Fiberglass where possible.
 2. Stainless steel may be used if fiberglass component is not available.
- C. Adhesive: Recommended by manufacturer.
- D. Skid-resistant Surfacing: Manufacturer-applied abrasive grit coating.

2.3 FABRICATION

- A. General:

1. Verify field conditions and dimensions prior to fabrication.
 2. Preassemble items in shop to greatest extent possible.
 3. All components shall be treated with UV inhibitor.
 4. Drill or punch holes with smooth edges.
- B. Grating and Solid Plate Material:
1. Design live load:
 - a. 100 psf uniform live load.
 - b. 300 pounds concentrated load.
 - c. Maximum deflection of 1/300 of span under a superimposed live load.
 - d. Design for the most severe loading condition noted above.
 2. Minimum grating depth: 1-1/2 inches.
 3. Bar span: Maximum of 1-1/2 inches center to center.
 4. Walking surface: Manufacturer's standard applied abrasive grit coating.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Set work accurately in location, alignment, and elevation, plumb, level, and true.
 1. Measure from established lines and levels.
 2. Provide temporary bracing or anchors in formwork for items built into concrete, masonry, or similar construction.
 3. Tolerances:
 - a. Maximum variation from plumb in vertical line: 1/8 inches in 3 feet.
 - b. Maximum variation from level of horizontal line: 1/4 inches in 20 feet.
 - c. Maximum variation from plan location: 1/4 inches in 20 feet.
 - d. For concrete and solid masonry anchorage, use stainless steel expansion or adhesive anchors with stainless steel bolts with hex nuts.
 - e. Anchor size and embedment to be designed by component fabricator.
 - 1) Provide minimum of 1/2 inches anchor bolts.
- C. Coat all exposed surfaces of stainless steel fasteners with minimum 15 mil gel coating to match component being anchored.
- D. Fasten railings to beams and stair stringers with stainless steel bolts, nuts and washers.
 1. Provide two washers for each bolt.
- E. Attach grating to each end and intermediate support clip or saddle with bolts, nuts and washers.
 1. Maximum spacing: 2 feet on-center with minimum of two per side.
 2. Attach clips or saddles to bearing bars only.
 3. Reinforce all field cut openings in accordance with manufacturer's recommendations.
- F. Attach stair treads at ends to stair stringer with hold-down clips, bolts, nuts, and washers.
 1. Minimum two clips per end.
- G. File cut ends of all fiberglass to a 1/32 inches radius.
- H. Seal cut ends of all items with catalyzed resin as recommended by manufacturer.
 1. Provide same resin used in fabrication of item as a minimum.
- I. Provide all modular framing components as required to suit condition.
 1. Install in accordance with manufacturer's recommendations.

END OF SECTION



DIVISION 09

FINISHES



SECTION 09 96 00
HIGH PERFORMANCE INDUSTRIAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Work under this section consists of the removal of the existing coating including insulation materials and aluminum sleeves, surface preparation and field coating application necessary to complete work on piping, pipe supports, and digester lids owned by Sanitary District No. 5 of Marin County.
 2. Application of high performance industrial coatings (HPIC).
 3. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
 4. Minimum surface preparation requirements.
- B. Related Specification Sections include but are not necessarily limited to:
1. Section 01 61 03 - Equipment - Basic Requirements.
 2. Division 40 - Process Interconnections.
 3. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
 4. Section 40 42 00 – Pipe, Duct, and Equipment Insulation.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Association for Materials Protection and Performance (AMPP; formerly NACE International [NACE] and The Society for Protective Coatings [SSPC]):
 - a. QP 1, Field Industrial Contractor Qualification.
 - a. NACE SP0178, Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service.
 - b. NACE SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 - c. NACE SP0287, Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape.
 - d. SSPC PA 1, Shop, Field, and Maintenance Coating of Metals.
 - e. SSPC PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 - f. SSPC SP 1, Solvent Cleaning.
 - g. SSPC SP 2, Hand Tool Cleaning.
 - h. SSPC SP 3, Power Tool Cleaning.
 - i. SSPC SP 5/ NACE No. 1, White Metal Blast Cleaning.
 - j. SSPC SP 6/ NACE No. 3, Commercial Blast Cleaning.
 - k. SSPC SP 7/ NACE No. 4, Brush-off Blast Cleaning.
 - l. SSPC SP 10/ NACE No. 2, Near-White Blast Cleaning.
 - m. SSPC SP 16, Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
 - n. SSPC VIS 1, Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
 2. ASTM International (ASTM):
 - a. B499, Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals.
 - b. D3359, Standard Test Methods for Rating Adhesion by Tape Test.
 - c. D4285, Standard Test Method for Indicating Oil or Water in Compressed Air.
 - d. D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages.

- e. D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - f. D6132, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gage.
 - g. D6677, Standard Test Method for Evaluating Adhesion by Knife.
 - h. D7091, Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
 - i. E337, Standard Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures).
3. Environmental Protection Agency (EPA).
 - a.
 4. National Association of Pipe Fabricators (NAPF):
 - a. 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings:
 - 1) 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.
 - 2) 500-03-05, Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
 5. NSF International (NSF).
 - a. 61, Drinking Water System Components - Health Effects.
- B. Qualifications:
1. Manufacturer's Representative: The Contractor shall provide for the services of the coating manufacturer's representative(s) who shall:
 - a. Attend site meetings at the request of the Owner or the Contractor to give advice on the properties, performance, storage and handling requirements, and installation of manufacturer's materials or equipment; and resolve queries pertaining to the manufacturer's product. The manufacturer's representative(s) shall provide written reports to the Owner as required.
 - b. Inspect the installation as required by these Specifications or requested by the Owner to verify or certify that the materials, equipment, or installation are in accordance with the manufacturer's printed instructions and these Specifications.
 - c. Coating manufacturer's technical representative shall be an AMPP (formerly NACE) Certified Coatings Inspector, Level 3 minimum.
 2. The Contractor performing surface preparation and coatings application shall be certified to AMPP QP 1 prior to the contract award and shall remain certified during the performance of the work.
 3. The Contractor shall employ a Quality Control Coordinator (QCC).
 - a. The QCC shall be on site full time during surface preparation and coating application and be responsible for continuing quality assurance and control of the work in accordance with all procedures and inspection requirements contained in the Specifications and governing documents.
 - b. The QCC shall be, at a minimum, an AMPP (former NACE) Certified Level 2 coatings inspector with a minimum of five years of recent, continuous experience applying the industrial maintenance coatings products used on this project.
 4. The Contractor shall maintain on-site an independent Quality Control Inspector (QCI).
 - a. The QCI shall be, at a minimum, an AMPP (former NACE) Certified Level 2 coatings inspector and shall not be a foreman or a member of the Contractor's production staff.
 - b. The QCI shall verify that all the work performed by the Contractor is being performed in accordance with the Specifications and document all non-conforming work.

- c. The QCI's sole purpose shall be quality control testing, inspection, and reporting. The QCI shall be solely dedicated to quality control activities and shall not perform any production work.
 - d. The QCI shall be trained in all tests, inspections, and instrument use required for the inspection of surface preparation and coating application. Documentation of training shall be provided.
 - e. The QCI shall take the lead in all inspections, but applicators shall perform wet film thickness measurements during application of the coatings, with QCI conducting random spot checks.
 - f. The QCI shall be onsite full time during any operations that affect the quality of the system (e.g., surface preparation, coating application, and final inspection at project completion).
 - g. The Contractor shall not replace the QCI assigned to the project without advance notice to the Owner.
5. The Contractor's workers shall work under the direction of qualified and experienced supervisors. Supervisors shall:
- a. Have a minimum of seven years of recent, continuous experience supervising industrial maintenance coating application operations similar to the operations required to complete this project.
 - b. Be certified by the coating manufacturer for all coating products used on this project.
6. The Contractor shall employ trained, experienced applicators. Coating applicators shall:
- a. Have a minimum of five years of recent, continuous experience applying the industrial maintenance coatings products used on this project.
 - b. Be trained and certified by the coating manufacturer for all coating products used on this project.
 - c. Continuity of personnel shall be maintained. QCC shall report and coordinate the transfers of key personnel with the Owner.
- C. Contractor field sampling and testing:
- 1. Collect pint samples of coating components at the request of Engineer.
 - 2. Samples shall be collected at random from the products delivered to the jobsite.
 - 3. Test pint samples to verify that the products conform to this specification.
 - 4. Remove all products from the jobsite found not in conformance and replace with products that conform to this specification.
- D. Container marking and shipping certifications: Color pigments shall be ground in at the factory and be of the highest quality. Each container shall be clearly marked with the manufacturer's batch number, and color. Certification that the furnished coating materials comply with these requirements shall accompany each shipment.
- E. Miscellaneous:
- 1. Furnish coating through one manufacturer unless noted otherwise.
 - 2. Deviation from specified MIL thickness or product type is not allowed without written authorization of Engineer.
 - 3. Material shall not be thinned unless approved, in writing, by the coating manufacturer's technical representative.

1.3 DEFINITIONS

- A. Applicator: Applicator is the person actually installing or applying the product in the field, at the Project site, or at an approved shop facility.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Section where the product is specified or in Section 01 61 03.
- C. Appurtenant Surface: Accessory or auxiliary surface attached to or adjacent to a surface indicated to be coated.

- D. Corrosive Environment: Immersion in or subject to:
 - 1. Condensation, spillage or splash of a corrosive material such as water, wastewater or chemical solution.
 - 2. For purposes of this Specification Section, the entire project site is considered a Corrosive Environment unless defined as Highly Corrosive Environment below.
- E. DFT: Dry Film Thickness. The thickness of a coating after all the solvent has evaporated and the coating has cured.
- F. Finished Area: A room or area that is listed in or has finish called for on Room Finish Schedule or is indicated on Drawings to be coated.
- G. Holiday:
 - 1. A void, crack, thin spot, foreign inclusion, or contamination in the coating that significantly lowers the dielectric strength of the coating.
 - 2. May also be identified as a discontinuity or pinhole.
- H. HPIC: High performance industrial coatings. Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as HPIC.
- I. Immersion Service:
 - 1. Any surface immersed in water or some other liquid.
 - 2. Surface of any pipe, valve, or any other component of the piping system subject to frequent wetting.
 - 3. Surfaces within two feet above high-water level in water bearing structures.
- J. Outdoor Atmosphere or Surface: Outdoor atmosphere or surface exposed to weather and/or direct sunlight.
- K. Piping System: Pipe, valves, fittings and accessories.
- L. Surface Hidden from View:
 - 1. Within pipe chases.
 - 2. Between top side of ceilings and underside of floor or roof structures above.
- M. Vapor Space: Interior space within tankage, closed structures, or similar elements that is above the low liquid line and subject to the accumulation of fumes, vapor or condensation.

1.4 SUBMITTALS

- A. Certifications:
 - 1. Provide experience qualifications for Applicator, Supervisors, QCC, and QCI.
 - a. No submittal information will be reviewed until Engineer has received these qualifications.
 - 2. Provide AMPP (former NACE) inspector certification for QCC and QCI.
 - 3. Provide manufacturer's certification that products to be used comply with specified requirements and are suitable for intended application.
 - 4. Submittals, not including the above certifications, will be returned without review.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's surface preparation instructions.
 - c. Manufacturer's application instructions.
 - d. If products being used are manufactured by Company other than listed in the MATERIALS Article of this Specification Section, provide complete individual data sheet comparison of proposed products with specified products including:
 - 1) Surface requirements and blasting equipment.
 - 2) Temperature and humidity control procedures and equipment.

- 3) Application procedure and equipment.
 - 4) Coverage rates.
 - 5) Certification that product is designed for intended use and is equal or superior to specified product.
 - e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.
 - f. Coating manufacturer's recommendation on abrasive blasting.
 - g. Coating manufacturer's technical representative's written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
 - h. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.
 - i. Contractor's written Safety plan, the Injury and Illness Prevention Plan (IIPP), Spill Prevention, Control, and Countermeasure (SPCC) and Hazardous Materials Emergency Response (Hazmat) Plan.
2. Manufacturer's statement regarding applicator instruction on product use.
- C. Informational Submittals:
1. Surface preparation approval by QCI.
 2. Coating application certification by QCI.
 3. Approval of application equipment by QCI.
 4. Applicator's daily records by QCC per Article 3.7 - FIELD QUALITY CONTROL.
 5. Submit daily records at end of each week in which coating work is performed unless requested otherwise by the Engineer.
 6. Daily inspection reports by QCI per Article 3.6 - INSPECTION AND TESTS.
 7. Submit daily records at end of each week in which coating work is performed unless requested otherwise by the Engineer.
 8. Contractor's written plan for secondary containment of fuel operated equipment, and fuel storage, spillage and prevention plan.
 9. Contractor's written plan for emergency response and rescue
 10. Certification that coating systems requiring holiday detection testing are free of pinholes or other material defects.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original containers, labeled as follows:
 1. Name or type number of material.
 2. Manufacturer's name and item stock number.
 3. Contents, by volume, of major constituents.
 4. Warning labels.
 5. VOC content.
- B. Store materials in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F.
- C. Materials shall be stored and mixed only in areas designated for that purpose and approved by QCI and the Engineer.
- D. All materials shall be stored in accordance with manufacturer's instructions, in a well-ventilated area, with precautionary measures taken to prevent fire hazards.
- E. Storage and mixing areas shall be kept clean and free of rags, waste, and scrapings. Containers shall be kept tightly closed after each mixing or use.
- F. NO SMOKING signs shall be hung over the door and inside each coating storage or mixing room.
- G. Requirements of regulatory agencies: The products, equipment, and work specified in this section are subject to the rules and regulations of the California Environmental Protection Agency (CalEPA).

- H. Surface preparation and application of coatings shall be performed by the Contractor in compliance with all applicable federal, state, and local occupational safety and health regulations.
- I. Obtain and comply with all safety precautions recommended by the coating manufacturer in printed instructions or special bulletins and as required by applicable regulations.
- J. Provide forced ventilation in areas where inadequate ventilation exists.

1.6 PROJECT CONDITIONS

- A. Pre-application Conference:
 - 1. Prior to commencement of surface preparation or coating application, the Contractor shall convene a pre-application conference with all affected parties, including but not limited to: the applicator, coating manufacturer's technical representative, Owner, and Engineer.
 - 2. The meeting shall discuss all aspects of the Project including but not limited to:
 - a. Schedule.
 - b. Material storage and handling.
 - c. Examination of surfaces to be coated.
 - d. Protection of surfaces not to be coated.
 - e. Surface preparation.
 - f. Coating application:
 - 1) Environmental conditions for application of coatings.
 - 2) Temporary environmental controls.
 - g. Field quality control requirements:
 - 1) Manufacturer's technical representative responsibilities.
 - 2) Contractor performed testing.
 - a) Instrumentation requirements.
 - b) Frequency of testing.
 - c) Record keeping.
 - 3) QCI performed testing.
- B. Verify that atmosphere in area where coating is to take place is within coating manufacturer's acceptable temperature, humidity and sun exposure limits.
 - 1. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.
 - a. Provide temporary dehumidification equipment properly sized to maintain humidity levels required by coating manufacturer.
 - b. Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24-hour basis.
 - 1) Vent exhaust gases to outdoor environment.
 - 2) No exhaust gases shall be allowed to vent into the space being coated or any adjacent space.
 - 2. Do not apply coatings in snow, rain, fog or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. High Performance Industrial Coatings:
 - a. Carboline Protective Coatings.
 - b. PPG.
 - c. The Sherwin-Williams Company.
 - d. Tnemec.
- B. "Or-Equal" Submittals:

1. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the manufacturers listed.
2. Provide satisfactory documentation from the proposed "or-equal" manufacturer that proposed materials meets or exceeds the following:
 - a. Is of the same generic resin.
 - b. Requires comparable surface preparation.
 - c. Has comparable application requirements.
 - d. Meets the same VOC levels or better.
 - e. Provides the same finish and color options.
 - f. Is suitable for the intended service.
 - g. Resistance to abrasion and physical damage.
 - h. Resistance to chemical attack.
 - i. Resistance to UV exposure.
 - j. Ability to recoat in future.
 - k. Dry film thickness per coat.
 - 1) Where manufacturer's product data sheet indicates a minimum MIL thickness per coat that is greater than specified herein, MIL thickness for entire coating system shall be increased proportionately.
 - l. Minimum and Maximum time between coats.
 - m. Compatibility with other coatings.
 - n. Temperature limitations in service and during application.
 - o. Type and quality of recommended undercoats and topcoats.
 - p. Ease of application.
 - q. Ease of repairing damaged areas.
 - r. Stability of colors.
3. The cost of all testing and analyzing of the proposed substitute materials shall be borne by the Contractor.
4. Submit request for substitution in accordance with Section 01 25 00 – Substitution Procedures.

2.2 MATERIALS

- A. Abrasive Blast Material
 1. Abrasive blast media shall be in compliance with federal, state and local regulations.
 2. Abrasive blast material shall be dry, clean, sharp and angular to allow the Contractor to achieve 3–5 mil surface anchor profile.
 3. Recycling of steel abrasive blast media, if used, will be allowed provided that the existing coating has been 100% removed and verified by QCI and the Engineer prior to beginning abrasive blasting operations.
 4. The Contractor shall supply samples of the blast media to be evaluated for size and cleanliness.
- B. All coating material must help mitigate topical corrosion.
- C. Coatings shall comply with the VOC limits of Environmental Protection Agency (EPA) and California Air Resources Control Board (CARB).
- D. For unspecified materials such as thinner, provide manufacturer's recommended products.
- E. Provide a discernible color contrast between coats if multiple coats are used.

2.3 COATING SYSTEMS:

- A. The following tables indicate coating systems for specific applications.
 1. Ferrous Metals (Ferrous Digester Lids):
 - a. AMPP SSPC Surface Preparation: SSPC SP 10 Near White Metal Blast Cleaning with minimum 2.5 mil angular profile.

| Manufacturer | Product | Coats |
|------------------|--|----------------------------------|
| PPG | Interior and Exterior: Novaguard 840 | 2 coats, 24 mils DFT per coat |
| | Finishing coat: PSX 700 | 4-6 mils DFT |
| Carboline | Interior and Exterior: Plasite 4550 S | one coat, minimum of 30 mils DFT |
| | Finish coat: Carboxane 2000 | 4-6 mils DFT |
| Sherwin Williams | Interior and Exterior: Dura-Plate 8200 | 20-30 mils DFT |
| | Finish coat: Sher Loxane | 4-6 mils DFT |

2. Galvanized Steel Pipe Supports

- a. AMPP SSPC Surface Preparation: SSPC SP 16 with a minimum 1.0 to 1.5 surface anchor profile.

| Manufacturer | Product | Coats |
|--|---|-------------|
| PPG | Amerlock 2/400 | 4-8 DFT |
| | Amershield VOC | 3-5 DFT |
| Tnemec (Total Dry Film Thickness: 5.5 – 8.0 mils) | Primer: Series 108 | 1.5-2.0 DFT |
| | Intermediate: Series 1094 Endura-Shield | 2.0-3.0 DFT |
| | Finish: Series 1094 Endura-Shield | 2.0-3.0 DFT |
| Sherwin Williams | Primer: Macropoxy 646 FF | 2-4 DFT |
| | Finish: Hi Solids Poly 250 | 3-4 DFT |

3. Ductile Iron Pipe and Fittings

- a. AMPP SSPC Surface Preparation:

- 1) Ductile Iron Pipe: Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition.
- 2) Cast Ductile Fittings - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #3 condition.

| Manufacturer | Product | Coats |
|---|---|-------------|
| PPG | Dimetcote 9H | 2-5 DFT |
| | Amerlock 2/400 | 4-8 DFT |
| | Amershield VOC | 3-5 DFT |
| Tnemec (Total Dry Film Thickness: 6.5 - 14.5 mils) | Primer: Series 94-H ₂ O Hydro-Zinc | 2.5-3.5 DFT |
| | Intermediate: Series 1224 Epoxoline WB | 2-6 DFT |
| | Finish: Series 1094 Endura-Shield | 2-5 DFT |
| Sherwin Williams | Primer: Zinc Clad III HS 100 | 2-4 DFT |
| | Intermediate: Macropoxy 646 FF | 4-6 DFT |
| | Finish: Hi Solids Poly 250 | 3-4 DFT |

PART 3 - EXECUTION

3.1 ITEMS TO BE COATED

- A. Outdoor Surfaces, including but not limited to:
 - 1. Piping, valves, fittings and supports:
 - a. All new and existing pipe, fittings, or supports in Digester Area as shown on Drawings.
 - b. As scheduled in Specification Section 40 05 00.
 - 2. Ferrous metal digester covers: All interior and exterior surfaces.
 - 3. Thermal Insulation: Digester recirculation and digester mixing piping in Digester Area.

3.2 ITEMS NOT TO BE COATED

- A. General: Do not coat items listed in this Article, unless noted otherwise.
- B. Items with Approved Factory Finish: These items may require repair of damaged coated areas or coating of welded connections.
- C. Electrical Equipment.
- D. Moving parts of mechanical and electrical units where coating would interfere with the operation of the unit.
- E. Code labels, equipment identification or rating plates and similar labels, tagging and identification.
- F. Contact surfaces of friction-type structural connections.
- G. Mechanical piping scheduled to be insulated.

3.3 PREPARATION

- A. General:
 - 1. Prepare surfaces to be coated in accordance with coating manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.

- a. Where discrepancy between coating manufacturer's instructions and this Specification Section exists, the more stringent surface preparation shall be provided unless approved otherwise, in writing, by the Engineer.
 2. Remove all dust, grease, oil, compounds, dirt, and other foreign matter which would prevent bonding of coating to surface.
 3. Adhere to manufacturer's recoat time surface preparation requirements.
 - a. Surfaces that have exceeded coating manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional coating in accordance with manufacturer's published recommendations.
- B. If during pipe surface preparation, QCI determined that the pipe corrosion damage is too excessive to be coated:
 1. Notify the Engineer within 8 hours.
 2. Provide a 48-hour waiting period for the Engineer to make a determination and provide field direction for replacement or patch.
 3. Provide all labor, tools, and equipment to perform the pipe replacement and patch.
- C. Remove and properly dispose of existing insulation materials and aluminum sleeves on digester recirculation and digester mixing piping in Digester Area.
- D. Obtain samples of existing coating and have samples tested by a recognized testing laboratory to determine if existing coating contains lead, asbestos or any other health hazard as defined by the EPA.
 1. If existing coating is found to contain lead, asbestos, or any other health hazard, notify the Engineer immediately.
 2. Prepare plan of action for safe, legal removal and disposal of contaminated coating.
 3. Engineer, Contractor and Owner shall negotiate agreement for cost associated with removal.
- E. Protection:
 1. Protect surrounding surfaces not to be coated.
 2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
 3. Protect code labels, equipment identification or rating plates and similar labels, tagging and identification.
- F. Prepare and coat before assembly all surfaces which are inaccessible after assembly.
- G. Ferrous Metal:
 1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and NAPF. The most stringent recommendations shall apply.
 2. Complete fabrication, welding or burning before beginning surface preparation.
 - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
 - b. Remove mill scale.
 - c. Grind smooth rough welds and other sharp projections in accordance with AMPP NACE SP0178.
 3. Solvent clean in accordance with SSPC-SP 1.
 4. Restore surface of field welds and adjacent areas to original surface preparation.
- H. Galvanized Steel Pipe Supports: Prepare surfaces in accordance with SSPC SP 16 with a minimum 1.0 to 1.5 surface anchor profile.
- I. Preparation by Abrasive Blasting:
 1. Schedule the abrasive blasting operation so blasted surfaces will not be wet after blasting and before coating.
 2. Provide compressed air for blasting that is free of water and oil.
 - a. Provide accessible separators and traps.
 3. Protect nameplates, valve stems, rotating equipment, motors and other items that may be damaged from blasting.

4. All abrasive-blasted surfaces shall be inspected by QCI immediately prior to application of coatings.
 - a. Inspection shall be performed to determine cleanliness and profile depth of blasted surfaces and to certify that surface has been prepared in accordance with these Specifications.
 - b. After blasting, all traces of abrasive blasting products shall be removed from the surfaces by cleaning with a vacuum, by brushing with clean brushes made of hair, bristle, or fiber, or by blowing with clean, dry compressed air
 - c. Surface preparation shall be approved in writing by the Engineer and QCI.
5. Perform additional blasting and cleaning as required to achieve surface preparation required.
 - a. Re-blast surfaces that do not meet requirements of these Specifications.
 - b. Prior to coating, re-blast surfaces allowed to set overnight and surfaces that show rust bloom.
 - c. Surfaces allowed to set overnight or surfaces which show rust bloom prior to coating shall be re-inspected prior to coating application.
6. Profile depth of blasted surface: Not less than 2.5 mils angular anchor profile unless required otherwise by coating manufacturer.
7. Ensure abrasive blasting operation does not result in embedment of abrasive particles in coating.
8. Confine blast abrasives to area being blasted.
 - a. Provide shields of polyethylene sheeting or other such barriers to confine blast material.
 - b. Plug pipes, holes, or openings before blasting and keep plugged until blast operation is complete and residue is removed.
9. Abrasive blasting media may be recovered, cleaned and reused providing Contractor submits, for Engineer's review, a comprehensive recovery plan outlining all procedures and equipment proposed in reclamation process.
10. Properly dispose of blasting material contaminated with debris from blasting operation.

3.4 APPLICATION

- A. General:
 1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
 2. Application equipment must be inspected and approved in writing by coating manufacturer.
 3. Temperature and weather conditions:
 - a. Do not coat surfaces when surface temperature is below 50 degrees F unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and coating manufacturer's technical representative.
 - b. Avoid coating surfaces exposed to direct sun.
 - c. Do not coat damp surfaces.
 4. Apply materials under adequate illumination.
 5. Provide complete coverage to MIL thickness specified: Thickness specified is dry MIL thickness.
 6. Evenly spread to provide full, smooth coverage.
 - a. All coating systems are "to cover."
 - b. In situations of discrepancy between manufacturer's square footage coverage rates and MIL thickness, MIL thickness requirements govern.
 - c. When color or undercoats show through, apply additional coats until coating is of uniform finish and color.
 - d. Finished coating system shall be uniform and without voids, bugholes, holidays, laps, brush marks, roller marks, runs, sags, or other imperfections.

7. No part of the coating system shall be applied before QCI and the Engineer has approved the surface preparation. If coating has been applied without the approval of the Engineer, the applied coat shall be removed by abrasive blasting, and the coat reapplied in accordance with this specification at no additional cost to the Owner.
8. The blasted site shall be maintained free of foot and equipment traffic prior to and during coating installation until final acceptance, except for testing, inspection, and repairs.
9. The site entrance shall be limited to authorized personnel only, including the Owner, and then only at designated traffic areas, so as not to damage the coating. Signs shall be placed conspicuously to provide warning.
10. If the equipment manufacturer has a certification program for operators of the equipment, the operators shall possess the certification.

B. Application Process

1. During the application process, perform required inspections and tests per this specification section.
2. Spray application in accordance with AMPP SSPC-PA 1. Provide a finish that is continuous, uniform in thickness, and free of holidays and other defects.
3. Apply each coat to comply with wet and dry film thicknesses for each type of material as specified in this section and per manufacturer's recommendation. In situations of discrepancy between manufacturer's square footage coverage rates and mil thickness, mil thickness requirements shall govern.
4. Number of coats specified shall be minimum number acceptable. Apply additional coats as needed to provide a smooth, even application.
5. Apply prime coat immediately after abrasive blasting and before any rusting occurs.
6. Closely adhere to re-coat times recommended by manufacturer. Allow each coat to cure thoroughly before applying next coat.
7. Employ only application equipment that is clean, properly adjusted, and in good working order, and of type recommended by coating manufacturer.
8. After surface preparation, spot primer on weld seams shall be brush applied.
9. All surfaces receiving the coating shall be visually dry and at least 5 Degrees F above the dew point prior to starting the application to prevent moisture entrapment. The relative humidity shall be within manufacturer's specified allowable range.
10. The compressed air shall be clean and free of oil and water. The compressed air shall be checked per this specification section.
11. The base and activator shall be heated to the manufacturers recommended temperature prior to use.
12. Wet film thickness shall be monitored throughout the installation by means of frequent measurements with a high range wet film thickness gage.
13. Striping:
 - a. Stripe coat all continuous welds and edges, brush-coat to ensure adequate protection of these areas. Work each application of material into corners, crevices, joints, and other difficult to coat areas.
 - b. Welds, edges, crevices, and other irregularities shall receive extra coating material (striping) to provide an additional 5 mils DFT.
 - c. Surface cracks, surface irregularities, and leading edges shall receive preparation and extra coating as recommended by the coating manufacturer and approved by the Engineer.
14. Avoid degradation and contamination of blasted surfaces and avoid inter-coat contamination.
 - a. Contractor shall clean contaminated surfaces before applying next coat.

15. Before closing the work at the end of the day, all layers of material shall be applied to minimize coating contamination, except at the "returning edge." Extreme care shall be taken to prevent contamination of the membrane surface that could affect adhesion between coats. If the coating is not completed by the end of the workday, then at the end of the workday a 3 to 12 inch "returning edge" of material will be left tapered to the substrate for the start of the next workday. The "returning edge" shall be abrasively blasted, or if necessary, solvent cleaned with a high flashpoint solvent as recommended by the manufacturer of the lining before proceeding to spray on the lining for the start-up the following workday.
 16. Final DFT shall be per manufacturer's coating recommendations described in the COATING MATERIALS Article of this Specification Section.
 17. Provide coating manufacturer's recommended details at all terminations, penetrations, embedments, cracks, joints, and changes in substrate direction.
- C. Employ services of coating manufacturer's technical representative to ensure that field-applied coatings are compatible with the substrate.

3.5 INSPECTION AND TESTS

A. General

1. At a minimum, inspections and tests shall occur at the following points:
 - a. Immediately before surface preparation.
 - b. Immediately following surface preparation.
 - c. During coating application, following application and curing of each coat.
 - d. After lining repairs are completed.
 - e. After the final application of all coats.
 - f. After Contractor final walkdown (final acceptance by the Engineer). Tests shall be performed in the presence of the Engineer. Tests performed in the absence of the Engineer shall not be accepted and re-tested.
 - g. Maintain daily records, tests and reports:
 - 1) As described herein.
 - 2) Document all qualitative and quantitative test results.

B. Inspection and Tests Before Surface Preparation

1. Prior to using compressed air for surface preparation and application, the quality of the air downstream of the oil and water separator shall be tested.
2. The test shall be conducted as close to the compressor as possible, but downstream of oil and moisture traps, by blowing the air into a clean white blotter, minimum size 9 inches x 11 inches, for two minutes to check for any contamination, oil, or moisture.
3. The ASTM D4285 blotter test shall be performed on the hoses and oil and water separator as well, at the beginning of each shift, at not less than four-hour intervals and after any interruption of the air compressor operation, or as required by the Engineer.
4. The air shall be used only if the blotter test indicates no visible contamination, oil or moisture. If contaminants are evident, the equipment deficiencies shall be corrected and the air stream re-tested.
5. Separators shall be bled continuously.
6. All lines shall be individually tested prior to use.
7. After cleaning and before blasting, the surfaces requiring coating application shall be verified to have acceptable levels of soluble salt contamination in accordance with manufacturer's requirements.

C. Inspection and Tests After Surface Preparation

1. Surfaces that are determined to have been blasted with contaminated air shall be cleaned and re-blasted with clean air and abrasive. All coatings/linings that were applied with contaminated air shall be removed and reapplied using clean air.

2. Blast-cleaned surfaces shall be compared with AMPP SSPC-VIS 1 or other acceptable standards to determine conformance with the required material surface preparation.
 3. Specified cleanliness shall be verified through the use of accepted practice according to AMPP SSPC standards. Visual comparators shall be utilized to verify the specified level of cleanliness.
 4. Surface profile shall be verified by measuring with an impresser tape or other anchor profile measurements system approved by QCI and the Engineer. Use the surface area-based selection procedures in AMPP SSPC-PA 2 to determine the number and frequency of surface profile readings required.
 5. The anchor pattern profile depth shall be verified in accordance with AMPP NACE SP0287 with a Keane-Tatar Profile Comparator, Clemtex anchor profile chips, or Testex Press-O-Film or an acceptable equivalent appropriate to the abrasive material being used.
 6. Impresser tape (or other method) used to make the test shall be permanently labeled or marked with the date, time, and specific locations where tests were taken.
 7. Surface profile test results shall be submitted to the Owner prior to lining application.
 8. Steel defects requiring repair may be apparent after abrasive blast cleaning. Advise the Engineer of all areas exhibiting defects such as excessive metal loss cracking or pitting.
 9. QCI shall use grease-free chalk to mark local areas that do not meet the specified standards and require additional surface preparation.
 10. Maintain daily records, tests, and reports:
 - a. At a minimum, record the following information during application:
 - b. Date, starting time, end time, and all breaks taken by workers.
 - c. Compressed air quality per ASTM D4285.
 - d. Report of environmental conditions prior to coating application, including substrate temperature, ambient temperature, relative humidity per ASTM E337, and dew point.
 - e. Observations of surface preparation, including anchor profile test results, prior to lining application.
 - f. Areas of rework by station number, location, (invert, springline, crown), description of rework (inadequate surface profile, etc.)
- D. Inspection and Tests During Coating Application
1. Check air for coating application as described in Article 3.5 B of this specification section.
 2. QCI shall verify the following:
 - a. All areas requiring "no coating" are protected by tape or mask.
 - b. All proper coatings and thinners are on hand and are ready for application.
 - c. The coating materials have not exceeded expiration dates.
 - d. All spray equipment is clean, in good working condition and ready to use.
 - e. Check manufacturer's coating instructions for environmental requirements, thinning and application.
 3. Contractor shall monitor all environmental readings to determine conditions are acceptable per project specifications and coating manufacturer recommendations and all other requirements are met. During material application, the Contractor shall continuously monitor materials, ambient and substrate (surface steel) temperatures, relative humidity and dew point in the immediate work area and shall be kept within application parameters. The Work shall be suspended if conditions are not within recommended limits. The Work shall not proceed if the substrate temperature falls below 5 Degrees F above the dew point.
 4. Each coat shall be applied in a manner that will produce an even film, which resembles the topography of the underlying substrate. Re-coat times, if applicable, shall be in accordance with the Manufacturer's recommendations.

5. Test adhesion per ASTM D4541 as modified by AWWA C210. Adhesion testing is generally only performed when the newly applied coating is suspected of not bonding well to the substrate. This test is destructive and is only performed as directed by the Engineer and QCI.
 6. During application, wet mil gauges shall be used to verify topcoat film thickness in accordance with ASTM D4414.
 7. The DFT shall be measured after materials have set up dry to the touch, in accordance with AMPP SSPC-PA 2 Level 1 and ASTM D7091. The DFT shall be measured by the QCI with a Type II gage.
 8. The Engineer may measure lining or coating thicknesses at any time during project to ensure conformance with these Specifications.
 9. After the coating material has cured, the coating shall be 100% visually inspected for holes, voids, defects, and thin areas prior to performing holiday testing. The Contractor shall test all coated areas for thin spots and holidays using high-voltage discontinuity testing to ensure a "holiday-free" lining system in accordance with AMPP NACE SP0188.
 10. Contractor employees assigned to perform porosity and holiday defect tests shall work under supervision of QCI and possess the experience and qualifications to accurately undertake these measurements and tests.
 11. All detected holidays shall be marked with a grease free chalk, repaired, and re-tested according to the Manufacturers' recommendations and this specification section.
 12. Prior to start of application or when extended breaks of three hours or more are involved or application equipment malfunctions, the following three material quality tests shall be performed:
 13. A ratio check to verify volumetric proportioning, by pumping the coating materials through the entire spray line and dispensing into a measuring container, shall be performed at each change of equipment or shift, or following shutting off the pump and then restarting it.
 14. A mixed material check, by spraying the mixed material onto a test surface for inspection, to verify proper mixing of components.
 15. Curing cycle test to verify the proper reaction is underway. A pint sample shall be used. The first Durometer results shall be determined after 15 minutes in accordance with ASTM D2240, or as recommended by the manufacturer.
 16. Maintain daily records, tests, and reports.
 17. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind-blown dust and debris from contaminating the wet paint film.
- E. Final Inspection
1. After the final application of all coats, the surfaces shall be visually checked by the QCI for evidence of blister, uneven coloring, poor adhesion, or improper cure.
 2. Deficiencies in the coating/lining system shall be marked by station number, location, type (blister, holiday, pinhole), and size, recorded in daily report and repaired in strict accordance with this specification section, then re-inspected. Repairs shall be noted in Contractor's daily report.
- F. Final Acceptance: A final walk-down of completed sections shall be conducted by the Engineer in conjunction with the Contractor for final acceptance.

3.6 FIELD QUALITY CONTROL

- A. Adhere to test, inspection, and record keeping requirements as outlined in this specification section.
- B. Application deficiencies:
 1. Surfaces showing runs, laps, brush marks, telegraphing of surface imperfections or other defects will not be accepted.

2. Surfaces showing evidence of fading, chalking, blistering, delamination, or other defects due to improper surface preparation, environmental controls, or application will not be accepted.
 3. Coated surfaces showing evidence of chalking or amine blush shall not be accepted.
 4. Application deficiencies shall be repaired as described in the REPAIRS Article in this Specification Section.
- C. Provide protection for painted surfaces: Surfaces showing soiling, staining, streaking, chipping, scratches, or other defects will not be accepted.
- D. Provide wet paint signs as required.
- E. Maintain Daily Records:
1. Record the following information during application:
 - a. Date, starting time, end time, and all breaks taken by applicators.
 - b. Air temperature.
 - c. Relative humidity.
 - d. Dew point.
 - e. Surface temperature of substrate.
 - f. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind-blown dust and debris from contaminating the wet coating.
- F. Repairs:
1. Touch-up and restore finishes where damaged, shall be performed in strict accordance with coating manufactures written instructions.
 2. Surfaces showing soiling, staining, streaking, chipping, scratches, or other defects will not be accepted.
 3. Surfaces showing evidence of fading, chalking, blistering, delamination, or other defects due to improper surface preparation, environmental controls or application shall not be accepted.
 - a. Coating surfaces showing evidence of amine blush shall be prepared and recoated as follows:
 - 1) Solvent clean surfaces in accordance with AMPP SSPC-SP 1.
 - 2) Apply finish coat in accordance with coating system specified herein.
 - b. Defects in finished surfaces:
 - 1) When stain, dirt, or undercoats show through final coat, correct defects, and cover with additional coats until coating is of uniform finish, color, appearance and coverage.
 - 2) Touch up damaged finish coats using same application method and same material specified for finish coat herein.
 - c. Touch-up of minor damage shall be acceptable where result is not visibly different from surrounding surfaces. Where result is visibly different, either in color, sheen, or texture, recoat entire surface.

3.7 CLEANING

- A. Clean coating spattered surfaces. Use care not to damage finished surfaces.
- B. Upon completion of coating, replace hardware, accessories, plates, fixtures, and similar items.
- C. Remove surplus materials, scaffolding, and debris.

3.8 COLOR SCHEDULE

- A. Piping: Match existing piping and banding colors.

END OF SECTION



DIVISION 10

SPECIALTIES



SECTION 10 14 00
IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tag, tape and stenciling systems for equipment, piping, valves, pumps, ductwork and similar items.
 - 2. Hazard and safety signs.
- B. Related Specification Sections include but are not necessarily limited to:

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. A13.1, Scheme for the Identification of Piping Systems.
 - 2. The International Society of Automation (ISA).
 - 3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. Z535.1, Safety Color Code.
 - b. Z535.2, Environmental and Facility Safety Signs.
 - c. Z535.3, Criteria for Safety Symbols.
 - d. Z535.4, Product Safety Signs and Labels.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 704, Standard System for the Identification of Hazards of Materials for Emergency Response.
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Catalog information for all identification systems.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Identification register, listing all items in PART 3 of this Specification Section to be identified, type of identification system to be used, lettering, location and color.
 - 3. Schedule of Hazard and Safety Signage indicating text and graphics.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. W.H. Brady Co.
 - 2. Panduit.
 - 3. Seton.
 - 4. National Band and Tag Co.
 - 5. Carlton Industries, Inc.
 - 6. Or equal.

2.2 MANUFACTURED UNITS

- A. Type A1 - Round Metal Tags:
 - 1. Materials: Stainless steel.
 - 2. Size:
 - a. Diameter: 1-1/2 inches minimum.
 - b. Thickness: 0.035 inches (20 GA) minimum.
 - 3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 - 4. Color: Natural.
- B. Type A2 - Rectangle Metal Tags:
 - 1. Materials: Stainless steel.
 - 2. Size:
 - a. 3-1/2 inches x 1-1/2 inches minimum.
 - b. Thickness: 0.036 inches (20 GA) minimum.
 - 3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
 - 4. Color: Natural.
- C. Type A3 - Metal Tape Tags:
 - 1. Materials: Stainless steel.
 - 2. Size:
 - a. Width 1/2 inches minimum.
 - b. Length as required by text.
 - 3. Fabrication:
 - a. 3/16 inches minimum mounting hole.
 - b. Legend: Embossed.
 - 4. Color: Natural.
- D. Type B1- Square Nonmetallic Tags:
 - 1. Materials: Fiberglass reinforced plastic.
 - 2. Size:
 - a. Surface: 2 x 2 inches minimum.
 - b. Thickness: 100 mils.
 - 3. Fabrication:
 - a. 3/16 inches mounting hole with metal eyelet.
 - b. Legend: Preprinted and permanently embedded and fade resistant.
 - 4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
- E. Type B2 - Nonmetallic Signs:
 - 1. Materials: Fiberglass reinforced or durable plastic.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 60 mils minimum.
 - 3. Fabrication:

- a. Rounded corners.
 - b. Drilled holes in corners with grommets.
 - c. Legend: Preprinted, permanently embedded and fade resistant for a 10-year minimum outdoor durability.
4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.
 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- F. Type C - Laminated Name Plates:
1. Materials: Phenolic or DR (high impact) acrylic.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 1/16 inches.
 3. Fabrication:
 - a. Outdoor rated and UV resistant when installed outdoors.
 - b. Two layers laminated.
 - c. Legend: Engraved through top lamination into bottom lamination.
 - d. Two drilled side holes, for screw mounting.
 4. Color: Black top surface, white core, unless otherwise indicated.
- G. Type D - Self-Adhesive Tape Tags and Signs:
1. Materials: Vinyl tape or vinyl cloth.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 mils minimum.
 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Legend: Preprinted.
 - e. Wire markers to be self-laminating.
 4. Color: White with black lettering or as specified.
 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- H. Type E - Heat Shrinkable Tape Tags:
1. Materials: Polyolefin.
 2. Size: As required by text.
 3. Fabrication:
 - a. Legend: Preprinted.
 4. Color: White background, black printing.
- I. Type F - Underground Warning Tape:
1. Materials: Polyethylene.
 2. Size:
 - a. 6 inches wide (minimum).
 - b. Thickness: 3.5 mils.
 3. Fabrication:

- a. Legend: Preprinted and permanently imbedded.
 - b. Message continuous printed.
 - c. Tensile strength: 1750 psi.
- 4. Color: As specified.
- J. Type G - Stenciling System:
 - 1. Materials:
 - a. Exterior type stenciling enamel.
 - b. Either brushing grade or pressurized spray can form and grade.
 - 2. Size: As required.
 - 3. Fabrication:
 - a. Legend: As required.
 - 4. Color: Black or white for best contrast.
- K. Underground Tracer Wire:
 - 1. Materials:
 - a. Wire:
 - 1) 12 GA AWG.
 - 2) Solid.
 - b. Wire nuts: Waterproof type.
 - c. Split bolts: Brass.

2.3 ACCESSORIES

- A. Fasteners:
 - 1. Bead chain: #6 brass, aluminum or stainless steel.
 - 2. Plastic strap: Nylon, urethane or polypropylene.
 - 3. Screws: Self-tapping, stainless steel.
 - 4. Adhesive, solvent activated.

2.4 MAINTENANCE MATERIALS

- A. Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install identification devices at specified locations.
- B. All identification devices to be printed by mechanical process, hand printing is not acceptable.
- C. Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.
- D. Attach tags with 1/8 inches round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.
 - 1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.
- E. Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.
 - 1. Several items of equipment mounted in housing to be individually tagged inside the compartment.
- F. Tracer Wire:
 - 1. Attach to pipe at a maximum of 10 feet intervals with tape or tie-wraps.

2. Continuous pass from each valve box and above grade at each structure.
3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
4. 1,000 feet maximum spacing between valve boxes.
5. If split bolts are used for splicing, wrap with electrical tape.
6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 inches of wire for splicing.
7. Use continuous strand of wire between valve box where possible.
 - a. Continuous length shall be no shorter than 100 feet.

3.2 SCHEDULES

A. Process Systems:

1. General:
 - a. Provide arrows and markers on piping.
 - 1) At 20 feet maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At valves, risers, "T" joints, machinery or equipment.
 - 4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of pipe with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to piping.
2. Valves (all new and existing valves in Digester Area, as labeled on G602):
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Nonmetallic Tags.
 - 2) Indoor noncorrosive:
 - a) Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A1 - Round Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - b. Fastener:
 - 1) Type A1: Chain of the same material.
 - 2) Type B1: Stainless steel chain.
 - c. Color: Per ASME A13.1 corresponding to the piping system.
 - d. Legend:
 - 1) Letter height: 1/4 inches minimum.
 - 2) Valve designation as indicated on G602 (e.g., "01-101").
3. Process equipment (e.g., sludge grinder, etc.):
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - 2) Type D - Self-Adhesive Tape Tags and Signs.
 - 3) Type G - Stenciling System.
 - b. Fastener:
 - 1) Self.
 - 2) Screws.
 - 3) Adhesive.
 - c. Legend:
 - 1) Letter height: 1/2 inches minimum.

- 2) Equipment designation as indicated on the Drawings (e.g., "Dewatering Grinder GRI-17-100").
4. Piping systems:
 - a. Tag type:
 - 1) Outdoor locations: Type G - Stenciling System.
 - 2) Indoor locations:
 - a) Type D - Self-Adhesive Tape Tags and Signs.
 - b) Type G - Stenciling System.
 - b. Fastener: Self.
 - c. Color: Per ASME A13.1.
 - d. Legend:
 - 1) Letter height: Manufacturers standard for the pipe diameter.
 - 2) Mark piping in accordance with ASME A13.1.
 - 3) Use piping designation shown on G601.
 - 4) Arrow: Single arrow.
 5. Equipment that starts automatically:
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - 2) Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener:
 - 1) Type B2 - Screw or adhesive.
 - 2) Type D - Self.
 - c. Size: 5 inches x 7 inches
 - d. Location: Dewatering Grinder GRI-17-100.
 - e. Legend:
 - 1) OSHA Warning Sign.
 - 2) Description of Warning: "THIS MACHINE STARTS AUTOMATICALLY".
- B. Instrumentation Systems:
1. Enclosure for instrumentation and control equipment, (e.g., control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 inches minimum.
 - 2) Equipment name (e.g., "VCP VENDOR CONTROL PANEL VCP-17-100").

END OF SECTION



DIVISION 26

ELECTRICAL



SECTION 26 05 00
ELECTRICAL - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for electrical systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Equipment - Basic Requirements.
 - 2. Section 03 00 05 - Concrete.
 - 3. Section 03 15 19 - Anchorage to Concrete.
 - 4. Section 10 14 00 - Identification Devices.
 - 5. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
 - 6. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM, Aluminum Design Manual.
 - 2. American Institute of Steel Construction (AISC):
 - a. Steel Construction Manual.
 - 3. American National Standards Institute (ANSI).
 - 4. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C2, National Electrical Safety Code (NESC).
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 7. National Electrical Manufacturers Association (NEMA):
 - 8. Underwriters Laboratories, Inc. (UL).
- B. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
 - 1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
 - 2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

1.3 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 - 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.

2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
3. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
4. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
5. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
6. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 61 03 and individual specification sections for submittal requirements for products defined as equipment.
2. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.
 - c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
 - g. See individual specification sections for any additional requirements.
3. Fabrication and/or layout drawings:
 - a. Concrete and reinforcing steel, per Division 03 requirements.

B. Operation and Maintenance Manuals:

1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content process of Operation and Maintenance Manuals.

- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 and all Specification Sections shall be submitted simultaneously.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect nameplates on electrical equipment to prevent defacing.

1.6 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.

1. Outdoor areas:

- a. Wet.
- b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

2. Indoor areas:

- a. Dry.

- b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
 - 1. Manufacturers:
 - a. Modular strut:
 - 1) Unistrut Building Systems.
 - 2) B-Line by Eaton.
 - 3) Globe Strut.
 - 4) Superstrut by Thomas & Betts.
 - 2. Material requirements:
 - a. Modular strut:
 - 1) Galvanized steel: ASTM A123/123M or ASTM A153/A153M.
 - 2) Stainless steel: AISI Type 316.
 - 3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 mil PVC coating.
 - 4) Aluminum: AA Type 6063-T6.
 - b. Structural members (e.g., I beams, L and C channels):
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6061-T6 or 6063-T6.
 - c. Mounting plates:
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6063-T6.
 - d. Mounting hardware:
 - 1) Galvanized steel.
 - 2) Stainless steel.
 - e. Anchorage per Specification Section 03 15 19.
 - f. Concrete and reinforcing steel: See Division 03 specifications.
- B. Equipment pads (interior and exterior):
 - 1. Concrete and reinforcing steel: See Division 03 specifications.
- C. Field touch-up of galvanized surfaces.
 - 1. Zinc-rich primer.
 - a. One coat, 3.0 mils, ZRC by ZRC Products.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and wire all equipment, in the location as shown in design drawings including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.

- B. Install equipment in accordance with the requirements of:
 - 1. NFPA 70.
 - 2. IEEE C2.
 - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
 - 1. The Contractor is responsible for routing and supporting all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
 - 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 - 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 - 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 - 4. See Specification Section 26 05 19 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 inches from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
 - 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 46 inches.
 - b. Receptacle in architecturally finished areas (to center): 18 inches.
 - c. Receptacle on exterior wall of building (to center): 18 inches.
 - d. Receptacle in non-architecturally finished areas (to center): 46 inches.
 - e. Telephone outlet in architecturally finished areas (to center): 18 inches.
 - f. Telephone outlet for wall-mounted phone (to center): 46 inches.
 - g. Safety switch (to center of operating handle): 54 inches.
 - h. Separately mounted motor starter (to center of operating handle): 54 inches.
 - i. Pushbutton or selector switch control station (to center): 46 inches.
 - j. Panelboard (to top): 72 inches.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
 - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 inches in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
 - 1. Dry areas:

- a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- 2. Wet areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- 3. Corrosive areas:
 - a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.
- 4. Highly corrosive areas:
 - a. PVC coated steel system consisting of PVC coated steel channels and fittings with stainless steel nuts and hardware.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
 - 1. See Specification Section 03 15 19.
 - 2. Do not cut, or weld to, building structural members.
 - 3. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide non-metallic corrosion resistant spacers to maintain 1/4 inches separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00.
- R. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- S. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - 1. Determine the SCCR rating by one of the following methods:
 - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - 2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
 - 3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

3.2 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning:
 - 1. See Specification Section 01 74 00.
- D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
 - 4. Repair surfaces which will be inaccessible after installation prior to installation.
 - 5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.
- E. Replace nameplates damaged during installation.

3.3 DEMONSTRATION

- A. Demonstrate equipment in accordance with Specification Section 46 24 23.

END OF SECTION

SECTION 26 08 13
ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for acceptance testing.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Equipment - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. InterNational Electrical Testing Association (NETA):
 - a. ATS, Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.
 - 2. Nationally Recognized Testing Laboratory (NRTL).
 - 3. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
 - a. 455-78-B, Optical Fibres - PART 1-40: Measurement Methods and Test Procedures - Attenuation.
- B. Qualifications:
 - 1. Testing firm:
 - a. An independent firm performing, as the sole or principal part of its business for a minimum of 10 years, the inspection, testing, calibration , and adjusting of systems.
 - b. Must have an established monitoring and testing equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.
 - 2. Field personnel:
 - a. Minimum of one year field experience covering all phases of electrical equipment inspection, testing, and calibration.
 - b. Relay test technician having previous experience with testing and calibration of relays of the same manufacturer and type used on project and proficient in setting and testing the types of protection elements used.
 - c. Supervisor certified by NETA or NICET.
 - 1) As an alternative, supervising technician may be certified by the equipment manufacturer
 - 3. Analysis personnel:
 - a. Minimum three years combined field testing and data analysis experience.
 - b. Supervisor certified by NETA or NICET.
 - 1) As an alternative, supervising technician may be certified by the equipment manufacturer.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Equipment Monitoring and Testing Plan.
- B. Informational Submittals:
 - 1. Prior to energizing equipment:
 - a. Coordinated phasing diagram.
 - b. Photocopies of power & control cables continuity tests.

2. Within two weeks after successful completion of Demonstration Period (Commissioning Period):
 - a. Single report containing information including:
 - 1) Summary of Project.
 - 2) Information from pre-energization testing.
 - 3) Testing and monitoring reports.

PART 2 - PRODUCTS

2.1 FACTORY QUALITY CONTROL

- A. Provide Electrical equipment with all factory tests required by the applicable industry standards or NRTL.
- B. Factory testing will not be accepted in lieu of specified field acceptance testing requirements.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. General:
 1. Complete electrical testing in three phases:
 - a. Pre-energization testing phase.
 - b. Equipment energized with no load.
 - c. Equipment energized under load.
 2. Perform testing in accordance with this Specification Section and NETA ATS.
 3. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
 - a. Contract Drawings and Specifications.
 - b. Related construction change documentation.
 - c. Approved Shop Drawings.
 - d. Approved Operation and Maintenance Manuals.
 - e. Other pertinent information as required.
- B. Equipment Monitoring and Testing Plan:
 1. Approved in accordance with Shop Drawing submittal schedule.
 2. Included as a minimum:
 - a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
 - b. List and description of testing and analysis equipment to be utilized.
 - c. List of all equipment to be testing, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
- C. Instruments Used in Equipment and Connections Quality Control Testing:
 1. Minimum calibration frequency:
 - a. Field analog instruments: Not more than 6 months.
 - b. Field digital instruments: Not more than 12 months.
 - c. Laboratory instruments: Not more than 12 months.
 - d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
 2. Carry current calibration status and labels on all testing instruments.
 3. See individual testing programs for additional instrumentation compliance requirements.

D. Testing and Monitoring Program Documentation:

1. Provide reports with tabbed sections for each piece of equipment tested.
2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
 - a. Include legible copies of all forms used to record field test information.
3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment
 - a. Include data gathering and sample test report forms that will be utilized.
4. In the final report, include as a minimum, the following information for all equipment tested:
 - a. Equipment identification, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
 - b. Date and time of each test.
 - c. Ambient conditions including temperature, humidity, and precipitation.
 - d. Visual inspection report.
 - e. Description of test and referenced standards, if any, followed while conducting tests.
 - f. Results of initial and all retesting.
 - g. Acceptance criteria.
 - h. "As found" and "as left" conditions.
 - i. Corrective action, if required, taken to meet acceptance.
 - j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
 - k. Instrument calibration dates of all instruments used in testing.
5. Provide three (3) bound final reports prior to Project final completion.

E. Electrical Equipment and Connections Testing Program:

1. See individual Division 26 Specification Sections for equipment specific testing requirements.
2. Test all electrical equipment.
 - a. Perform all required NETA testing.
 - b. Perform all required NETA testing plus the optional testing identified with each specific type of equipment in Article 3.2 of this Specification Section.

3.2 SPECIFIC EQUIPMENT TESTING REQUIREMENTS

A. Switchgear and Switchboards:

1. Perform inspections and tests per NETA ATS 7.1.
2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
3. Perform the following additional tests:
 - a. Weatherproof switchgear/switchboards:
 - 1) Verify correct location, operation and current draw of heaters.
 - b. Verify correct operation of thermostat[.

B. Low Voltage Power Circuit Breakers:

1. Perform inspections and tests per NETA ATS 7.6.1.2.
 - a. Tests shall include primary current injection testing of all breakers at final settings.
 - b. Where short-time or instantaneous settings on large frame breakers are beyond the current capability of field testing, primary injection tests at reduced currents shall be permitted if combined with secondary injection calibration test of trip unit at final settings.

2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
 3. Perform the following additional tests:
 - a. Shunt trip devices minimum tripping voltage.
 4. Record as-left settings.
- C. Low Voltage Molded Case Circuit Breakers:
1. Perform inspections and tests per NETA ATS 7.6.1.1.
 2. Components:
 - a. Test all components per applicable paragraphs of this Specification Section and NETA ATS.
 - b. Thermal magnetic breakers: Visual and mechanical inspection per NETA ATS only.
 - c. Solid state trip type: Visual and mechanical inspection and electrical tests per NETA ATS.
 3. Record as-left settings.
- D. Network Protectors:
1. Perform inspections and tests per NETA ATS 7.8.
 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
 3. Perform all tests identified as optional per NETA ATS:
 4. Perform the following additional tests:
 - a. Verify reverse current sensitivity by opening transformer primary switch with feeder energized and no load on transformer and observing that network protector opens on magnetizing current alone.
- E. Protective Relays:
1. Perform inspections and tests per NETA ATS 7.9.
 - a. Tests to be performed using secondary injection of 3 PH current and potential at final settings.
 - b. Test at manufacturer's recommended test points and critical timing points identified on relay setting sheet.
 2. Perform all tests identified as optional per NETA ATS.
 3. Perform the following additional tests:
 - a. Verification of direct trip of associated lockout relay or circuit breaker(s) by using relay test function or shorting trip contact at relay case.
 - b. Microprocessor-based relays:
 - 1) Complete commissioning procedure per manufacturer's instructions, followed by tests of each relay element at final settings.
 - 2) Verification of all internally-programmed logic.
 - c. Verification of all auxiliary input and output signals.
 - d. Verification of power supply/self-diagnostic alarm contact and remote annunciation.
 4. Record as-left settings.
- F. Grounding:
1. Perform inspections and tests per NETA ATS 7.13.
 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
- G. Ground Fault Protection:
1. Perform inspections and tests per NETA ATS 7.14.
 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.

3. Perform the following optional tests per NETA ATS:
 - a. Control wiring insulation resistance.
 4. Perform the following additional tests for four-wire systems:
 - a. Primary current injection into switchgear bus with test set configured to simulate transformer source and high current jumper used to simulate unbalanced load and ground fault conditions.
 - b. Verify no tripping for unbalanced load on each feeder and each main breaker.
 - c. Verify no tripping for unbalanced load across tie breaker for dual-source schemes.
 - d. Verify tripping for ground fault on load side of feeder each feeder and on each main bus.
 - e. Verify tripping for ground fault on a single feeder and on each main bus through tie breaker(s) for multiple-source schemes.
- H. Motors:
1. Perform inspections and tests per NETA ATS 7.15.
 2. Testing of motors:
 - a. After installation and prior to energizing the motor, perform inspections and tests per NETA ATS 7.15 for all motors 3 HP or above.
 - b. Ensure motor has been lubricated.
 - c. Bump motor to check for correct rotation.
- I. Motor Controllers:
1. Perform inspections and tests per NETA ATS 7.16.
 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
 3. Perform the following optional tests per NETA ATS:
 - a. Motor running overcurrent protection.
 - b. Control wiring insulation resistance.
 - c.

END OF SECTION

SECTION 26 09 16
CONTROL EQUIPMENT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Operator control devices (selector switches, pushbuttons, indicator lights, etc.).
 - 2. Control devices (timers, relays, contactors, etc.).
 - 3. Industrial Control Panels.
 - 4. Operator Control Stations.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Electrical - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 2, Industrial Control and System Controllers, Contactors and Overload Relays Rated 600 Volts.
 - c. ICS 5, Control Circuit and Pilot Devices.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 508, Standard for Safety Industrial Control Equipment.
 - b. 508A, Standard for Industrial Control Panels.
 - c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.

1.3 SYSTEM DESCRIPTION

- A. This Specification specifies components used within other equipment as referenced in other technical specifications.
- B. This Specification is used to specify the components and construction of following Operator Control Stations:
 - 1. Hand Switch – HS-402 with control logic per diagram on the vendor and design Drawings.
- C. This Specification is used to specify the components and construction of following Control Panels.
 - 1. Pump motor control panel

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - 1) When components are used within equipment specified in another Section, submittal data for components specified herein shall be included with the submittal for the equipment the components are used in.
 - b. Motor Control Panel bill of material.
 - c. Control Station bill of material.
 - 2. Fabrication and/or layout drawings.
 - a. Motor Control Panel with NEMA 4X FRP enclosure:
 - 1) Interior and exterior layout.

- 2) Wiring/connection diagrams.
 - 3) Copy of the UL 508A label.
 - 4) Short Circuit Current Rating (SCCR) nameplate marking for the controller as per NFPA 70. Include any required calculations.
 - b. Operator Control Station:
 - 1) Interior (if applicable) and exterior layout.
 - 2) Wiring/connection diagrams.
 - c. Associate Industrial Control Panel and Operator Control Stations with associated equipment name and tagging.
- B. Informational Submittals:
- 1. Functional Test Plan.
- C. Contract Closeout Information:
- 1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
 - b. Content of Operation and Maintenance Manual:
 - 1) Product technical data of components used within Control Panels and Operator Control Stations.
 - 2) As-constructed wiring/connection diagrams for Motor Control Panels and Operator Control Stations.
 - 3) Operating instructions.
 - 4) Functional Test Report.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
- 1. Pilot devices, relays, contactors, and termination equipment:
 - a. Allen-Bradley by Rockwell Automation, Inc.
 - b. ATC Diversified Electronics by Bellofram Group of Companies.
 - c. ASCO by Emerson Electric Co.
 - d. c3controls.
 - e. Eaton.
 - f. GE/ABB.
 - g. IDEC Corporation.
 - h. Phoenix Contact.
 - i. Potter and Brumsfield (P&B) by TE Connectivity.
 - j. Schneider Electric.
 - k. Siemens Corporation.
 - l. Time Mark Corporation.
 - 2. Alarm devices:
 - a. Edwards Signaling by United Technologies Corp.
 - b. Federal Signal Corporation.
 - 3. Enclosures:
 - a. Hoffman Engineering.
 - b. Wiegmann by Hubbell.
 - c. B-Line by Eaton.
 - d. Adalet.

- e. Stahlin by Robroy Enclosures.

2.2 PILOT DEVICES

A. General Requirements:

1. Standards: NEMA ICS 5, UL 508.
2. Heavy-duty NEMA 4/13 watertight/oiltight.
3. Heavy-duty NEMA 4/4X corrosion resistant.
4. Heavy-duty factory sealed, explosion-proof and dust ignition-proof (Class I and II).
5. Mounting hole: 30.5 mm.
6. Contact blocks: 10 amp, NEMA A600 rated, number as required to fulfill functions shown or specified.
7. Legend plate marked as indicated on Drawings or specified.

B. Selector Switches:

1. Two, three- or four-position rotary switch as required to fulfill functions shown or specified.
2. Maintained contact type.
3. Knob or lever type operators.

C. Pushbuttons:

1. Non-illuminated type:
 - a. Protective boot.
 - b. Momentary contact.
 - c. Standard flush and mushroom operators.
 - d. Black Green colored buttons for START or ON and red color for STOP or OFF.
 - e. Emergency stop pushbuttons: Mushroom head operator and maintained contact.
2. Illuminating type:
 - a. Protective boot.
 - b. Momentary contact.
 - c. Standard flush operator.
 - d. Serves as both pushbutton control and indicating light.
 - e. Green colored lenses: START or ON.
 - f. Red colored lenses: STOP or OFF.
 - g. Resistor-type full voltage light unit with lens and panel gasket.

D. Indicating Lights:

1. Allowing replacement of bulb without removal from control panel.
2. Lamp: LED, 120 V or 24 V as required.
3. Full voltage type.
4. Push-to-test indicating lights.
5. Plastic lens.
6. Color code lights as follows:
 - a. Green: ON or running; valve closed open
 - b. Amber: Standby; auto mode; ready.
 - c. Red: ON or running OFF or stopped; valve open closed

2.3 RELAYS

A. General Requirements:

1. Standards: NEMA ICS 5, UL 508.

B. Control Relays:

1. General purpose (ice cube) type:

- a. Plug-in housing.
 - b. Clear polycarbonate dust cover with clip fastener.
 - c. Coil voltage: 120 VAC or as required.
 - d. Contacts:
 - 1) 10 amp continuous.
 - 2) Silver cadmium oxide.
 - 3) Minimum of 3 SPDT contacts.
 - e. Sockets: DIN rail mounted.
 - f. Internal neon or LED indicator is lit when coil is energized.
 - g. Manual operator switch.
2. Industrial type:
- a. Coil voltage: 120 VAC or as required.
 - b. Contacts:
 - 1) 10 amp, NEMA A600 rated.
 - 2) Double break, silver alloy.
 - 3) Convertible from normally open to normally closed or vice versa, without removing any wiring.
 - 4) Expandable from 2 poles to 12 poles.
 - c. Provide contacts for all required control plus two spares.
- C. Time Delay Relays:
1. General purpose type:
- a. Timing modes: On and Off delay, interval, one shot and repeat cycle.
 - b. Plug-in housing.
 - c. Polycarbonate dust cover with clip fastener.
 - d. Coil voltage: 120 VAC or as required.
 - e. Contacts:
 - 1) 10 amp continuous.
 - 2) Silver cadmium oxide.
 - 3) Two normally open and two normally closed DPDT contacts.
 - f. Sockets: DIN rail mounted.
 - g. External timing adjustment knob.
 - h. Timing ranges: 0.05 seconds to 16.65 hours.
 - i. Repeat accuracy: +1%.
2. Solid State industrial type:
- a. Timing modes: On and Off delay and repeat cycle.
 - b. Industrial housing.
 - c. Coil voltage: 120 VAC or as required.
 - d. Contacts:
 - 1) 5 amp, NEMA B150 rated.
 - 2) Silver alloy.
 - 3) Convertible On Delay and Off Delay contacts.
 - 4) One normally open and one normally closed timed contacts.
 - 5) One normally open and one normally closed instantaneous contacts.
 - e. Furnish with "on" and "timing out" indicators.
 - f. External timing adjustment knob.
 - g. Timing ranges: 0.05 seconds to 10 hours.
 - h. Repeat accuracy: +1%.

3. Mechanical industrial type:
 - a. Timing modes: On and Off delay.
 - b. Coil voltage: 120 VAC or as required.
 - c. Contacts:
 - 1) 10 amp, NEMA A600 rated.
 - 2) Double break, silver alloy.
 - 3) Convertible On Delay and Off Delay contacts.
 - 4) Convertible normally open and normally closed timed contacts.
 - 5) Convertible normally open instantaneous contacts.
 - d. External timing adjustment knob.
 - e. Timing ranges: 0.2 - 60 seconds or 5 - 180 seconds.
 - f. Repeat accuracy: Greater than +10%.

2.4 CONTACTORS

- A. General Requirements:
 1. Standards: NEMA ICS 2, UL 508.
- B. Lighting and Remote Control Switches:
 1. Electrically operated, electrically held .
 2. Coil voltage: 120 VAC or as required.
 3. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
 4. Rated for ballasted lighting, tungsten and general use loads.
 5. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.
 6. Auxiliary control relays, as indicated on Drawings or as specified.
 7. Auxiliary contacts, as indicated on Drawings or as specified.
- C. Definite Purpose:
 1. Coil voltage: 120 VAC or as required.
 2. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
 3. Resistive load and horsepower rated.
 4. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.
 5. Auxiliary contacts, as indicated on Drawings or as specified.

2.5 ALARM DEVICES

- A. Alarm Horns:
 1. Vibrating horn type.
 2. PLC compatible as required.
 3. Heavy-duty die cast housing with corrosion resistant finish.
 4. Adjustable volume: 78 to 103 dB at 10 feet.
 5. Voltage: 120 VAC or as required.
 6. Enclosures/mountings:
 - a. Flush wall or panel mounting in dry areas.
 - b. NEMA 4X panel mounting in wet areas.
 - c. Surface mounting in dry areas.
 - d. NEMA 4X surface mounting in wet areas.
 - e. NEMA 4X, hazardous location surface mounting in wet and hazardous areas.
 - 1) Fixed volume: 97 dB at 10 feet.
- B. Alarm Lights:

1. Panel mounted:
 - a. Strobe type.
 - b. Shatter resistant polycarbonate lens and base.
 - c. Lens color as indicated on Drawings.
 - d. NEMA 4X enclosure.
 - e. PLC compatible.
 - f. Voltage: 120 VAC.
2. Wall mounted:
 - a. Heavy-duty strobe type.
 - b. Weatherproof shatter resistant polycarbonate lens and cast base.
 - c. Optically designed fresnel lens with color as indicated on Drawings.
 - d. Immune to shock and vibration, no moving parts.
 - e. Xenon flash tube providing a minimum of 65 single flashes per minute.
 - f. Mounting: Wall or corner wall brackets.
3. Hazardous and corrosive locations:
 - a. Heavy-duty strobe type.
 - b. Weatherproof and rated for the indicated hazardous location.
 - c. Body: Zinc plated cast iron or cast copper free aluminum and/or coated with 20 mils of PVC.
 - d. High impact glass dome with guard.
 - e. Shatter resistant polycarbonate lens with color as indicated on Drawings.
 - f. Immune to shock and vibration, no moving parts.
 - g. Xenon flash tube providing a minimum of 65 single flashes per minute.
 - h. Mounting: Wall bracket or pendant.

2.6 MISCELLANEOUS DEVICES

- A. Run Time Meters:
 1. Six-digit wheels including a 1/10 digit.
 2. Non-reset type.
 3. Time range in hours.
 4. Automatic recycle at zero.
 5. Accuracy: 1%.
 6. Sealed against dirt and moisture.
 7. Tamperproof.
- B. Control Power Transformer:
 1. Primary voltage: 480 V.
 2. Secondary voltage: 120 V.
 3. Sized for 125% of required load.
 4. Fused on primary and secondary.
 5. Standard: NEMA ST 1.

2.7 TERMINATION EQUIPMENT

- A. General Requirements:
 1. Modular type with screw compression clamp.
 2. Screws: Stainless steel.
 3. Current bar: Nickel-plated copper alloy.
 4. Thermoplastic insulation rated for -40 to +90 degrees C.
 5. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.

6. End sections and end stops at each end of terminal strip.
 7. Machine-printed terminal markers on both sides of block.
 8. Spacing: 6 mm.
 9. Wire size: 22-12 AWG.
 10. Rated voltage: 600 V.
 11. DIN rail mounting.
- B. Standard-Type Block:
1. Rated current: 30 A.
 2. Color: Gray body.
- C. Bladed-Type Disconnect Block:
1. Terminal block with knife blade disconnect which connects or isolated the two sides of the block.
 2. Rated current: 10 A.
 3. Color:
 - a. Panel control voltage leaves enclosure - normal: Gray body, orange switch.
 - b. Foreign voltage entering enclosure: Orange body, orange switch.
- D. Grounded-Type Block:
1. Electrically grounded to mounting rail.
 2. Terminal ground wires and analog cable shields.
 3. Color: Green and yellow body.
- E. Fuse Holders:
1. Blocks can be ganged for multi-pole operation.
 2. Spacing: 9.1 mm.
 3. Wire size: 30-12 AWG.
 4. Rated voltage: 300 V.
 5. Rated current: 12 A.
 6. Fuse size: 1/4 x 1-1/4.
 7. Blown fuse indication.
 8. DIN rail mounting.

2.8 ENCLOSURES

- A. Industrial Control Panels:
1. NEMA 4 rated:
 - a. Seams continuously welded and ground smooth.
 - b. No knockouts.
 - c. External mounting flanges.
 - d. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
 - e. Cover with oil resistant gasket.
 2. NEMA 4X rated:
 - a. Body and cover: 14 GA Type 304 or 316 stainless steel.
 - b. Seams continuously welded and ground smooth.
 - c. No knockouts.
 - d. External mounting flanges.
 - e. Hinged door and stainless steel screws and clamps.
 - f. Door with oil-resistant gasket.
- B. Operator Control Stations:

1. NEMA 4/13 rated:
 - a. Die cast aluminum body with manufacturer's standard finish.
 - b. Gasketed die cast aluminum cover with manufacturer's standard finish.
 - c. Number of device mounting holes as required.
2. NEMA 4X rated:
 - a. Type 304 or 316 stainless steel body.
 - b. Gasketed Type 304 or 316 stainless steel cover.
 - c. Number of device mounting holes as required.
3. NEMA 7 and 9 rated:
 - a. Zinc plated cast iron or die-cast copper free aluminum, with threaded hubs, grounding screw and with manufacturer's standard finish.
 - b. "EDS" or "EFS" style.
 - c. Single or multiple gang or tandem.
 - d. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.

2.9 FABRICATION

- A. Supplier of Industrial Control Panels shall build control panel under the provisions of UL 508A or UL 698A.
 1. Entire assembly shall be affixed with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
 2. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - a. Determine the SCCR rating by one of the following methods:
 - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
 3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.
- B. Control Panels:
 1. Size as required to mount the equipment.
 2. Permitted uses of NEMA 4 enclosure:
 - a. Surface mounted in areas designated as wet.
 3. Permitted uses of NEMA 4X enclosure:
 - a. Surface mounted in areas designated as wet and/or corrosive or highly corrosive.
 4. Permitted uses of NEMA 7 enclosure:
 - a. Surface mounted in areas designated as Class I hazardous.
 5. Permitted uses of NEMA 12 enclosure:
 - a. Surface mounted in areas designated as dry and/or dusty architecturally or non-architecturally finished areas.
- C. Operator Control Stations:

1. Permitted uses of NEMA 4/13 enclosure:
 - a. Surface mounted in areas designated as dry and/or dusty architecturally or non-architecturally finished areas and wet.
2. Permitted uses of NEMA 4X enclosure:
 - a. Surface mounted in areas designated as wet and/or corrosive or highly corrosive.
3. Permitted uses of NEMA 7 enclosure:
 - a. Surface mounted in areas designated as Class I hazardous with PVC coating in corrosive and highly corrosive areas when PVC coated conduit is used.

3.2 FIELD QUALITY CONTROL

- A. See Section 26 05 00.
- B. Industrial Control Panel(s) and Operator Control Station Functional Test:
 1. The test is to prove the control philosophy, correct interaction of all sensing, functioning, processing and remote operation/action devices.
 2. Develop a test plan and parameters for the purpose of evaluating the performance of the system.
 - a. Plan shall have witness signature lines for the contractor and owner and submitted when system pass the test.
 3. Perform the following tests:
 - a. Verify functionality of all control states.
 - b. Verify the correct operation of all interlock safety devices for fail-safe functions
 - c. Verify the correct operation of all sensing devices, alarms and indicating devices.

3.3 TRAINING

- A. A qualified supplier representative shall provide the Owner with on-site training in the operation and maintenance of the Industrial Control Panel(s) and its components.

END OF SECTION



DIVISION 33

UTILITIES



SECTION 33 42 36
STORMWATER TRENCH DRAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Prefabricated trench drain system.

1.2 QUALITY ASSURANCE

- A. Qualifications:
1. Components for prefabricated trench drains shall be products of a manufacturer specializing in precast polymer concrete trenches for a minimum of three years.

1.3 SUBMITTALS

- A. Shop Drawings:
1. Fabrication and/or layout drawings:
 - a. Layout plan(s) showing dimensions, elevations etc.
 - b. Details showing connections, installation, rough-in locations, etc.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Chemical-resistance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Prefabricated trench drain systems:
 - a. Polycast by Strongwell.
 - b. Poly Drain by ABT, Inc.
 - c. Jay R. Smith MFG Co.
 - d. ACO USA.

2.2 ACCESSORIES

- A. Grating:
1. Heavy-duty ductile iron rated for Class E loading removable for cleaning but designed to install into the trench drain system for a complete flush installation to facilitate roll of bin movement.
 - a. Furnish with locking devices to lock grating to trench sections.
 - b. Furnish grate or frame with studs for anchoring to the surrounding concrete.
 - c. See Specification Section 05 50 00 – Metal Fabrication for additional grating requirements.
- B. Catch Basins:
1. Fabricated from same material as trench sections.
 2. Nominal inside sizes: 12 square inches x 24 inches deep.
 3. Provide knockouts for 6 inches diameter piping.
 4. Provide removable galvanized steel trash bucket.

2.3 FABRICATION

A. Trench Sections:

1. Pre-cast polymer concrete modular channel sections.
2. Nominal dimensions: 4 inches interior width, with pre-sloped bottom of 0.5 to 1.0% slope, 116 inches length, 4 inches interior depth.
3. Vertical side walls and a radiused or trapezoidal bottom.
4. Tongue and groove ends with interlocking adjoining sections.
5. Neutral sections: Same material and basic size as sloped sections with flat bottoms used for extending overall length of sloped trenches.
6. End caps: Same material as channel, design that allows the caps to interlock with channel sections and either close off the end of the channel or provide for drain pipe connection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install trench sections with the top edges level and straight at elevations indicated no more than 1/8 of inch below surrounding concrete.
 1. Support channel sections in place while concrete is placed under and around sections as indicated.

END OF SECTION



DIVISION 40

PROCESS INTERCONNECTIONS



SECTION 40 05 00
PIPE AND PIPE FITTINGS - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Process piping systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 09 96 00 - High Performance Industrial Coatings.
 - 2. Section 10 14 00 - Identification Devices.
 - 3. Section 40 05 07 - Pipe Support Systems.
 - 4. Section 40 05 19 - Ductile Iron Process Pipe.
 - 5. Section 40 05 51 - Common Requirements for Process and Utility Valves.
 - 6. Section 40 05 62 - Plug Valves
 - 7. Section 40 42 00 - Pipe, Duct and Equipment Insulation.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36, Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760).
 - b. M190, Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - c. M252, Standard Specification for Corrugated Polyethylene Drainage Tubing.
 - d. M294, Interim Specification for Corrugated Polyethylene Pipe 12 to 24 Inch Diameter.
 - 2. American Iron and Steel Institute (AISI).
 - 3. American Society of Mechanical Engineers (ASME):
 - a. B16.3, Malleable Iron Threaded Fittings.
 - b. B16.5, Pipe Flanges and Flanged Fittings.
 - c. B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
 - d. B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings.
 - e. B16.26, Cast Copper Alloy Fittings for Flared Copper Tubes.
 - f. B36.19, Stainless Steel Pipe.
 - g. B40.100, Pressure Gauges and Gauge Attachments.
 - 4. ASTM International (ASTM):
 - a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - b. A74, Standard Specification for Cast Iron Soil Pipe and Fittings.
 - c. A106, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
 - d. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - e. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
 - f. A197, Standard Specification for Cupola Malleable Iron.
 - g. A234, Standard Specification for Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 - h. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - i. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - j. A518, Standard Specification for Corrosion-Resistant High-Silicon Iron Castings.

- k. A536, Standard Specification for Ductile Iron Castings.
 - l. A587, Standard Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry.
 - m. A760, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
 - n. A774, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
 - o. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
 - p. B88, Standard Specification for Seamless Copper Water Tube.
 - q. C14, Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - r. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - s. C425, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
 - t. C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - u. C564, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - v. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
 - w. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - x. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - y. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - z. D4101, Standard Specification for Polypropylene Plastic Injection and Extrusion Materials.
 - aa. F439, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - bb. F441, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
5. American Water Works Association (AWWA):
 - a. B300, Standard for Hypochlorites.
 - b. C200, Standard for Steel Water Pipe - 6 inches and Larger.
 - c. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - d. C208, Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
 - e. C606, Standard for Grooved and Shouldered Joints.
 - f. C651, Standard for Disinfecting Water Mains.
 - g. C800, Standard for Underground Service Line Valves and Fittings.
 6. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
 - b. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - c. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - d. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - e. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
 7. Chlorine Institute, Inc. (CI):
 - a. Pamphlet 6, Piping Systems for Dry Chlorine.
 8. Cast Iron Soil Pipe Institute (CISPI):
 - a. 301, Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
 9. International Plumbing Code (IPC).

- 10. National Fire Protection Association (NFPA):
 - a. 54, National Fuel Gas Code.
 - b. 69, Standard on Explosion Prevention Systems.
- 11. Underwriters Laboratories, Inc. (UL).

B. Coordinate flange dimensions and drillings between piping, valves, and equipment.

1.3 DEFINITIONS

- A. Hazardous Gas Systems: Digester gas, chlorine gas, sulfur dioxide gas, carbon dioxide gas, lab gases.
- B. HPIC: High performance industrial coating.
- C. PVDF: Polyvinylidene fluoride.

1.4 SYSTEM DESCRIPTION

- A. Piping Systems Organization and Definition:
 - 1. Piping services are grouped into designated systems according to the chemical and physical properties of the fluid conveyed, system pressure, piping size and system materials of construction.
 - 2. See PIPING SYSTEMS SCHEDULE in PART 3.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
 - c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
 - 1) Attach technical product data on gaskets, pipe, fittings, and other components.
 - 2. Fabrication and/or Layout Drawings:
 - a. Exterior yard piping drawings (minimum scale 1 inch equals 10 feet) with information including:
 - 1) Dimensions of piping lengths.
 - 2) Invert or centerline elevations of piping crossings.
 - 3) Acknowledgement of bury depth requirements.
 - 4) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.
 - 5) Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.
 - 6) Line slopes and vents.
 - b. Interior piping drawings (minimum scale 1/8 inches equals 1 foot) with information including:
 - 1) Dimensions of piping from column lines or wall surfaces.
 - 2) Invert dimensions of piping.
 - 3) Centerline elevation and size of intersecting ductwork, conduit/conduit racks, or other potential interferences requiring coordination.
 - 4) Location and type of pipe supports and anchors.
 - 5) Locations of valves and valve actuator type.
 - 6) Details of fittings, tapping locations, equipment connections, flexible expansion joints, connections to equipment, and related appurtenances.
 - 7) Acknowledgement of valve, equipment and instrument tag numbers.
 - 8) Provisions for expansion and contraction.
 - 9) Line slopes and air release vents.
 - 10) Rough-in data for plumbing fixtures.
 - c. Schedule of interconnections to existing piping and method of connection.

- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- C. Informational Submittals:
 - 1. Qualifications of lab performing disinfection analysis on water systems.
 - 2. Test reports:
 - a. Copies of pressure test results on all piping systems.
 - b. Reports defining results of dielectric testing and corrective action taken.
 - c. Disinfection test report.
 - d. Notification of time and date of piping pressure tests.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe coating during handling using methods recommended by manufacturer.
 - 1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
- B. Prevent damage to pipe during transit.
 - 1. Repair abrasions, scars, and blemishes.
 - 2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Double Ball Flexible Expansion Joints:
 - a. EBAA Iron, flex-tend double ball style

2.2 PIPING SYSTEMS SCHEDULE

- A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping systems schedule located at the end of PART 3 of this Specification Section.

2.3 COMPONENTS AND ACCESSORIES

- A. Flexible Connections:
 - 1. Install 8" flexible expansion joint as shown on the Drawings. Equipment has been purchased by Owner and is onsite.
 - 2. Examine connections and quality of existing expansion joint prior to purchasing any new piping to connect to joint.
 - 3. Field verify lay length of joint and existing connecting pipes.
- B. Reducers:
 - 1. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections.
 - 2. Connection size requirements may change from those shown on Drawings depending on equipment furnished.
- C. Protective Coating and Lining:
 - 1. Include pipe, fittings, and appurtenances where coatings, linings, coating, tests and other items are specified.
 - 2. Field coating pipe in accordance with Specification Section 09 96 00.
- D. Valves:
 - 1. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 INTERIOR AND EXPOSED EXTERIOR PIPING INSTALLATION

- A. Install piping in vertical and horizontal alignment as shown on Drawings.
- B. Alignment of piping smaller than 4 inches may not be shown; however, install according to Drawing intent and with clearance and allowance for:
 - 1. Expansion and contraction.
 - 2. Operation and access to equipment, doors, windows, hoists, moving equipment.
 - 3. Headroom and walking space for working areas and aisles.
 - 4. System drainage and air removal.
- C. Enter and exit through structure walls, floor and ceilings using penetrations and seals as shown on the Drawings.
- D. Install vertical piping runs plumb and horizontal piping runs parallel with structure walls.
- E. Pipe Support:
 - 1. Use methods of piping support as shown on Drawings and as required in Specification Section 40 05 07.
 - 2. Piping support systems for piping 12 inches and greater are shown on the Drawings.
 - a. Support systems for piping smaller than 12 inches diameter are not shown on the Drawings.
 - b. Contractor is responsible for design of these support systems per Specification Section 40 05 07.
 - 3. Where pipes run parallel and at same elevation or grade, they may be grouped and supported from common trapeze-type hanger, provided hanger rods are increased in size as specified for total supported weight.
 - a. The pipe in the group requiring the least maximum distance between supports shall set the distance between trapeze hangers.
 - 4. Size pipe supports with consideration to specific gravity of liquid being piped.
- F. Locate and size sleeves and castings required for piping system.
 - 1. Arrange for chases, recesses, inserts or anchors at proper elevation and location.
- G. Use reducing fittings throughout piping systems.
 - 1. Bushings will not be allowed unless specifically approved.
- H. Equipment Drainage and Miscellaneous Piping:
 - 1. Provide drip pans and piping at equipment where condensation may occur.
 - 2. Hard pipe stuffing box leakage to nearest floor drain.
 - 3. Avoid piping over electrical components such as motor control centers, panelboards, etc.
 - a. If piping must be so routed, utilize 16 GA, 316 stainless steel drip pan under piping and over full length of electrical equipment.
 - b. Hard pipe drainage to nearest floor drain.
 - 4. Collect system condensate at drip pockets, traps and blowoff valves.
 - 5. Provide drainage for process piping at locations shown on Drawings in accordance with Drawing details.
 - 6. For applications defined above and for other miscellaneous piping which is not addressed by a specific piping service category in PART 1, provide 304 stainless steel piping and fittings.
 - a. Size to handle application with 3/4 inches being minimum size provided.
- I. Unions:
 - 1. Install in position which will permit valve or equipment to be removed without dismantling adjacent piping.
 - 2. Mechanical type couplings may serve as unions.

- 3. Additional flange unions are not required at flanged connections.
- J. Install expansion devices as necessary to allow expansion/contraction movement.
- K. Provide full face gaskets on all systems.
- L. Anchorage and Blocking:
 - 1. Block, anchor, or harness exposed piping subjected to forces in which joints are installed to prevent separation of joints and transmission of stress into equipment or structural components not designed to resist those stresses.
- M. Equipment Pipe Connections:
 - 1. Equipment - General:
 - a. Exercise care in bolting flanged joints so that there is no restraint on the opposite end of pipe or fitting which would prevent uniform gasket pressure at connection or would cause unnecessary stresses to be transmitted to equipment flanges.
 - b. Where push-on joints are used in conjunction with flanged joints, final positioning of push-on joints shall not be made until flange joints have been tightened without strain.
 - c. Tighten flange bolts at uniform rate which will result in uniform gasket compression over entire area of joint.
 - 1) Provide tightening torque in accordance with manufacturer's recommendations.
 - d. Support and match flange faces to uniform contact over their entire face area prior to installation of any bolt between the piping flange and equipment connecting flange.
 - e. Permit piping connected to equipment to freely move in directions parallel to longitudinal centerline when and while bolts in connection flange are tightened.
 - f. Align, level, and wedge equipment into place during fitting and alignment of connecting piping.
 - g. Grout equipment into place prior to final bolting of piping but not before initial fitting and alignment.
 - h. To provide maximum flexibility and ease of alignment, assemble connecting piping with gaskets in place and minimum of four bolts per joint installed and tightened.
 - 1) Test alignment by loosening flange bolts to see if there is any change in relationship of piping flange with equipment connecting flange.
 - 2) Realign as necessary, install flange bolts and make equipment connection.
 - i. Provide utility connections to equipment shown on Drawings, scheduled or specified.
 - 2. Plumbing and HVAC equipment:
 - a. Make piping connections to plumbing and HVAC equipment, including but not limited to installation of fittings, strainers, pressure reducing valves, flow control valves and relief valves provided with or as integral part of equipment.
 - b. Furnish and install sinks, fittings, strainers, pressure reducing valves, flow control valves, pressure relief valves, and shock absorbers which are not specified to be provided with or as integral part of equipment.
 - c. For each water supply piping connection to equipment, furnish and install union and gate or angle valve.
 - 1) Provide wheel handle stop valve at each laboratory sink water supply.
 - 2) Minimum size: 1/2 inches.
 - d. Furnish and install "P" trap for each waste piping connection to equipment if waste is connected directly to building sewer system.
 - 1) Size trap as required by IPC.
 - e. Stub piping for equipment, sinks, lavatories, supply and drain fittings, key stops, "P" traps, miscellaneous traps and miscellaneous brass through wall or floor and cap and protect until such time when later installation is performed.
- N. Provide insulating components where dissimilar metals are joined together.

- O. Instrument Connections:
 - 1. See drawing details.

3.2 CONNECTIONS WITH EXISTING PIPING

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with service to customers affected by such operation.
- C. Undertake connections in fashion which will disturb system as little as possible.
- D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.
- F. Where connection involves potable water systems, provide disinfection methods as prescribed in this Specification Section.
- G. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.

3.3 ACCESS PROVISIONS

- A. Provide access doors or panels in walls, floors, and ceilings to permit access to valves, piping and piping appurtenances requiring service.
- B. Size of access panels to allow inspection and removal of items served, minimum 10 x 14 inches size.
- C. Fabricate door and frame of minimum 14 GA, stretcher leveled stock, zinc-nickel plated or galvanized after fabrication and fitted with screw driver lock of cam type.
- D. Provide with key locks, keyed alike, in public use areas.
- E. Furnish panels with prime coat of HPIC. See Specification Section 09 96 00.
- F. Style and type as required for material in which door installed.
- G. Where door is installed in fire-rated construction, provide door bearing UL label required for condition.

3.4 FIELD QUALITY CONTROL

- A. Pipe Testing - General:
 - 1. Test piping systems as follows:
 - a. Test exposed, non-insulated piping systems upon completion of system.
 - b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
 - c. Test concealed interior piping systems prior to concealment and, if system is insulated, prior to application of insulation.
 - d. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.
 - e. Test buried piping after backfilling has been complete.
 - f. Provide complete retesting of buried systems after backfilling has been completed.
 - 2. Isolate equipment which may be damaged by the specified pressure test conditions.
 - 3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
 - a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
 - b. Notify the Engineer 24 hours prior to each test.

4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
5. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.
6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Pressure Testing:

1. Testing medium: Unless otherwise specified in the PIPING SYSTEMS SCHEDULE, utilize the following test media.
 - a. Process systems:

| PIPE LINE SIZE | SPECIFIED TEST PRESSURE | TESTING MEDIUM |
|-----------------------|-------------------------|----------------|
| 2 inches and smaller | 75 psi or less | Water |
| 2 inches and smaller | Greater than 75 psi | Water |
| Greater than 2 inches | 3 psi or less | Water |
| Greater than 2 inches | Greater than 3 psi | Water |

- b. Laboratory gases and natural gas systems: Cylinder nitrogen.
- c. Liquid systems:

| PIPE LINE SIZE (DIA) | GRAVITY OR PUMPED | SPECIFIED TEST PRESSURE | TESTING MEDIUM |
|-------------------------------|-------------------|-------------------------|----------------|
| Up to and including 48 inches | Gravity | 25 psiG or less | Water |
| Above 48 inches | Gravity | 25 psiG or less | Water |
| All sizes | Pumped | 250 psiG or less | Water |

2. Allowable leakage rates:
 - a. Hazardous gas systems, all exposed piping systems, all pressure piping systems and all buried, insulated piping systems which are hydrostatically pressure tested shall have zero leakage goal at the specified test pressure throughout the duration of the test.
 - b. Hydrostatic exfiltration and infiltration for sanitary and stormwater sewers (groundwater level is below the top of pipe):
 - 1) Leakage rate: 200 GAL per inch diameter per mile of pipe per day at average head on test section of 3 feet.
 - 2) Average head is defined from groundwater elevation to average pipe crown.
 - 3) Acceptable test head leakage rate for heads greater than 3 feet: Acceptable leakage rate (gallons per inch diameter per mile per day) equals 115 by (actual test head to the 1/2 power).
 - c. Hydrostatic infiltration test for sanitary and stormwater sewers (groundwater level is above the top of pipe):
 - 1) Allowable leakage rate: 200 GAL per inch diameter per mile of pipe per day when depth of groundwater over top of pipe is 2 to 6 feet.
 - 2) Leakage rate at heads greater than 6 feet: Allowable leakage rate (gallons per inch diameter per mile of pipe per day) equals 82 by (actual head to the 1/2 power).
 - d. Large diameter (above 48 inches) gravity plant piping systems shall have a maximum exfiltration of 25 GPD per inch-mile.

- e. Non-hazardous gas and air systems which are tested with air shall have a maximum pressure drop of 5% of the specified test pressure throughout the duration of the test.
- f. For low pressure (less than 25 psiG) air testing, the acceptable time for loss of 1 psiG of air pressure shall be:

| PIPE SIZE (IN DIA) | TIME, MINUTES/100 feet |
|--------------------|------------------------|
| 4 | 0.3 |
| 6 | 0.7 |
| 8 | 1.2 |
| 10 | 1.5 |
| 12 | 1.8 |
| 15 | 2.1 |
| 18 | 2.4 |
| 21 | 3.0 |
| 24 | 3.6 |
| 27 | 4.2 |
| 30 | 4.8 |
| 33 | 5.4 |
| 36 | 6.0 |
| 42 | 7.3 |
| 48 | 7.6 |

- 3. Hydrostatic pressure testing methodology:
 - a. General:
 - 1) All joints, including welds, are to be left exposed for examination during the test.
 - 2) Provide additional temporary supports for piping systems designed for vapor or gas to support the weight of the test water.
 - 3) Provide temporary restraints for expansion joints for additional pressure load under test.
 - 4) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
 - 5) Do not coat or insulate exposed piping until successful performance of pressure test.
 - b. Soil, waste, drain and vent systems:
 - 1) Test at completion of installation of each stack or section of piping by filling system with water and checking joints and fittings for leaks.
 - 2) Eliminate leaks before proceeding with work or concealing piping.
 - 3) Minimum test heights shall be 10 feet above highest stack inlet.
 - c. Larger diameter (above 36 inches) gravity plant piping:
 - 1) Plug downstream end of segment to be tested.
 - a) Provide bracing as required.
 - 2) Fill segment and upstream structure to normal operating level as per hydraulic profile.
 - 3) Allow 24 hours for absorption losses.
 - a) Refill to original level.
 - 4) Provide reservoir to maintain constant head over duration of test.
 - 5) Record reservoir water volume at beginning and end of test.
- 4. Natural gas systems - testing methodology:

- a. Maintain specified test pressure until each joint has been thoroughly examined for leaks by means of soap suds and glycerin.
- b. Wipe joints clean after test.
- 5. Air testing methodology:
 - a. General:
 - 1) Assure air is ambient temperature.
 - b. Low pressure air testing:
 - 1) Place plugs in line and inflate to manufacturer's designated seal pressure.
 - 2) Check plugs for proper sealing.
 - 3) Introduce low pressure air into sealed line segment until air pressure reaches 4 psiG greater than ground water or allowable limits of ASTM F1417.
 - a) Use test gage conforming to ASME B40.100 with 0 to 15 psi scale and accuracy of 1% of full range.
 - 4) Allow 2 minutes for air pressure to stabilize.
 - 5) After stabilization period (3.5 psiG minimum pressure in pipe) discontinue air supply to line segment.
 - 6) Record pressure at beginning and end of test.
- C. Dielectric Testing Methods and Criteria:
 - 1. Provide electrical check between metallic non-ferrous pipe or appurtenances and ferrous elements of construction to assure discontinuity has been maintained.
 - 2. Wherever electrical contact is demonstrated by such test, locate the point or points of continuity and correct the condition.

3.5 CLEANING, DISINFECTION AND PURGING

- A. Cleaning:
 - 1. Clean interior of piping systems thoroughly before installing.
 - 2. Maintain pipe in clean condition during installation.
 - 3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
 - a. Pig high pressure air piping before connecting to valves or instruments.
 - 4. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
 - a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
 - b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.
 - 5. After erection of piping and tubing, but prior to installation of service outlet valves, blow natural gas and digester gas systems clear of free moisture and foreign matter by means of air, nitrogen or carbon dioxide.
 - a. Oxygen shall never be used.
 - 6. Clean chlorine piping in accordance with CI Pamphlet 6.
 - 7. Purge all neat liquid polymer tubing or piping between the neat polymer storage tank or tote and the polymer blending units with mineral oil to remove residual water prior to introducing neat polymer. Following purging, drain as much of the mineral oil out of the system as possible. Dispose of purged fluids and waste mineral oil in accordance with local environmental regulations.
- B. Disinfection of Potable Water Systems:
 - 1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
 - 2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
 - 3. Perform disinfection using sodium hypochlorite complying with AWWA B300.

4. Flush each segment of system to provide flushing velocity of not less than 2.5 feet per second.
 5. Drain flushing water to sanitary sewer.
 - a. Do not drain flushing water to receiving stream.
 6. Use continuous feed method of application.
 - a. Tag system during disinfection procedure to prevent use.
 7. After required contact period, flush system to remove traces of heavily chlorinated water.
 8. After final flushing and before placing water in service, obtain an independent laboratory approved by the Owner to collect samples and test for bacteriological quality.
 - a. Repeat entire disinfection procedures until satisfactory results are obtained.
 9. Secure and deliver to Owner, satisfactory bacteriological reports on samples taken from system.
 - a. Ensure sampling and testing procedures are in full compliance to AWWA C651, local water purveyor and applicable requirements of State of California.
- C. Purging Natural gas and Digester Gas:
1. Existing piping:
 - a. Turn off gas supply.
 - b. Vent line pressure outdoors.
 - c. If section exceeds the following, then remaining gas shall be displaced with an inert gas.
 - 1) 50 feet for 2-1/2 inches pipe.
 - 2) 30 feet for 3 inches pipe.
 - 3) 15 feet for 4 inches pipe.
 - 4) 10 feet for 6 inches pipe.
 - 5) Any length for 8 inches or larger pipe.
 2. New piping:
 - a. Including but not limited to:
 - 1) All fuel gas piping.
 - 2) Digesters.
 - 3) Digester gas equipment.
 - 4) Fuel gas trains.
 - b. Purge air filled system with fuel gas:
 - 1) Providing piping length is less than:
 - a) 30 feet for 3 inches pipe.
 - b) 15 feet for 4 inches pipe.
 - c) 10 feet for 6 inches pipe.
 - d) Any length for 8 inches and larger pipe.
 - 2) Providing a moderately rapid and continuous flow of fuel gas is introduced.
 - a) Introduce fuel gas at one end.
 - b) Vent air at opposite end.
 - 3) Provided fuel gas flow is continuous without interruption until vented gas is free of air.
 - 4) The point of discharge shall not be left unattended during purging.
 - c. If the piping is 3 inches or larger and exceeds lengths stated above.
 - 1) Purge air with inert gas in accordance with NFPA 54 and NFPA 69.
 - 2) Purge inert gas with fuel gas.
 3. Discharge of purged gases:
 - a. Open end of piping shall not discharge into confined spaces or areas where there are sources of ignition.

3.6 LOCATION OF BURIED OBSTACLES

- A. Furnish exact location and description of buried utilities encountered and thrust block placement.

- B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

3.7 PIPE INSULATION

- A. Insulate pipe and pipe fittings in accordance with Specification Section 40 42 00.

3.8 PIPING SYSTEM SCHEDULES

- A. Piping System 3 – Buried and Exposed, Ductile Iron and Steel, Process Piping Operating Under Pressure at up to 100 psiG.
 - 1. General:
 - a. Piping symbol and service:
 - 1) DF – Digester Feed
 - 2) DM – Digester Mixing
 - 3) DR – Digester Recirculation
 - b. Test requirements:
 - 1) Test medium: Water.
 - 2) Pressure: 1.25 x working pressure.
 - 3) Duration: 6 hours.
 - c. Gaskets:
 - 1) Flanged, push-on and mechanical joints (ductile iron): Rubber, AWWA/ANSI C111/A21.11.
 - 2) Grooved coupling joints (ductile and steel): Rubber, AWWA C606.
 - 3) Flanged joints (steel): AWWA C207.
 - 2. System components:
 - a. Pipe size 3 inches through 24 inches:
 - 1) Exposed service:
 - a) Material:
 - (1) Flanged: Ductile iron, Class 53.
 - (2) Grooved type joint system: Use pipe thickness per AWWA C606.
 - b) Reference: AWWA/ANSI C115/A21.15.
 - c) Lining: Glass.
 - d) Coating: HPIC; See Specification Section 09 96 00.
 - e) Fittings: Either AWWA/ANSI C110/A21.10 ductile or gray iron.
 - f) Joints:
 - (1) Flanged or grooved type mechanical coupling (AWWA C606) joints.
 - (2) With both systems, provide screwed-on flanges at equipment, valves and structure penetrations.
 - 2) Buried service:
 - a) Materials: Ductile iron, Class 53.
 - b) Reference: AWWA/ANSI C151/A21.51.
 - c) Lining: Glass.
 - d) Coating: Bituminous.
 - e) Fittings:
 - (1) Either AWWA/ANSI C110/A21.10 ductile or gray iron.
 - (2) Optional: AWWA/ANSI C153/A21.53 ductile iron compact fittings for sizes 3 inches to 16 IN.
 - f) Joints: Push-on with mechanical (stuffing box type) joints at fittings and valves.

3.9 SERVICE SYSTEM SUMMARY

- A. Service System is defined in Table B:

TABLE B - SERVICE SYSTEM SUMMARY

| SYMBOL | SERVICE | SYSTEM NO | CONSTRUCTION | SIZE (IN) | PIPE MATERIAL | TEST PRESSURE SPECIFIER (PSI) |
|--------------|----------------------|-----------|--------------------|-----------------|-----------------------|-------------------------------|
| DF & DM & DR | Digested Sludge (DS) | 3 | Exposed and Buried | 3-24 | Ductile (glass lined) | 125 |
| | | | Exposed and Buried | Greater than 24 | Steel (glass lined) | |

END OF SECTION

SECTION 40 05 07
PIPE SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe support and anchor systems.
 - 2. Design of Pipe Support Systems as specified.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 81 10 - Wind and Seismic Design Criteria
 - 2. Section 03 15 19 - Anchorage to Concrete.
 - 3. Section 05 50 00 - Metal Fabrications.
 - 4. Section 09 96 00 - High Performance Industrial Coatings.
 - 5. Section 40 42 00 - Pipe, Duct and Equipment Insulation.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B31.3, Process Piping.
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A123/123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - d. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - e. A575, Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - f. A576, Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - g. A917, Standard Specification for Steel Sheet, Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface (General Requirements).
 - h. A918, Standard Specification for Steel Sheet, Zinc-Nickel Alloy Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.
 - i. B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - b. D1.6, Structural Welding Code - Stainless Steel.
 - 4. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
 - a. SP-58, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.
 - 5. California Building Code:
 - a. California Health and Human Services Agency:
 - 1) Office of Statewide Health Planning and Development (OSHPD).
- B. Responsibility:
 - 1. Design complete support systems for piping where supports are not shown on the Drawings and/or explicitly called out in the Drawings.

2. Design support systems for all piping where supports are not shown on the Drawings.
 3. Replace existing Unistrut pipe supports and bent or corroded pipe hangers as shown on Drawings.
 4. Provide all labor, materials, equipment and incidentals as shown, specified and required to design, furnish and install the system of hangers, supports, guidance, anchorage and appurtenances.
 5. General piping support details are included in the Drawings.
 6. Incorporate those details with requirements of this Specification Section to provide the piping support system.
- C. Each type of pipe hanger or support shall be the product of one manufacturer.
- D. Qualifications:
1. Pipe support designer:
 - a. Licensed Professional Engineer registered in the state of California.
 - b. Minimum of five years of experience designing pipe supports for projects of similar size and complexity.

1.3 SUBMITTALS

- A. Action Submittals:
1. Shop Drawings:
 - a. Scaled drawings showing location, installation, material, loads and forces, and deflection of all hangers and supports.
 - b. Analyze each pipe system for all loads and forces on hangers and supports and their reaction forces to the structure to which they are fastened.
 - c. Where Contract Documents indicate contractor is to design pipe support systems, submit detail design calculations and scaled drawings signed by Pipe support designer.
 2. Product data:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Itemized list of wall sleeves, anchors, support devices and all other items related to pipe support system.
- B. Informational Submittals:
1. Certifications.
 - a. Pipe support designer qualifications

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Empire Industries, Inc.
 2. ASC Engineered Solutions (ANVIL).
 3. National Pipe Hanger Corp.
 4. PHD Manufacturing, Inc.
 5. Atkore International (Unistrut, Powerstrut and Aickinstrut).
 6. Or Equal.

2.2 MANUFACTURED UNITS

- A. General:
1. Galvanized components:
 - a. Hot-dip galvanized components:

- 1) General: ASTM 123/123M.
- 2) Fasteners and hardware: ASTM 153/153M.
2. Dissimilar metals protection:
 - a. Galvanized-to-galvanized and galvanized-to-aluminum: No protection required.
 - b. All other galvanized-to-dissimilar metal connections: Neoprene or nylon pads, shims, grommets, etc.
3. Fiberglass Reinforced Plastic (FRP) components:
 - a. Material: Polyester.
 - b. Channels: similar to Aickinstrut F2000 or F2100.
 - c. Pipe Clamps: similar to Aickinstrut FPS or FRPC.
 - d. Clevis Hangers: similar to Aickinstrut FMCH.
 - e. Beam Clamp: similar to Aickinstrut FMBC.
 - f. Column Base: similar to Aickinstrut F2852, F5853 or 5854

B. Hanger Rods:

1. Material:
 - a. ASTM A36.
 - b. ASTM A575, Grade M1020.
 - c. ASTM A576, Grade 1020.
 - d. Minimum allowable tensile stress of 12,000 psi at 650 degrees F per MSS SP-58.
 - e. Corrosion resistant: 316 stainless steel per ASTM A276.
2. Continuously threaded.
3. Load limit:

| NOMINAL ROD DIAMETER | MAXIMUM SAFE LOAD, (LBS) |
|---------------------------|--------------------------|
| 3/8 inches diameter (min) | 610 |
| 1/2 inches diameter | 1,130 |
| 5/8 inches diameter | 1,810 |
| 3/4 inches diameter | 2,710 |
| 7/8 inches diameter | 3,770 |
| 1 inches diameter | 4,960 |

C. Hangers:

1. Materials for corrosive areas: 316 stainless steel.
2. Hangers for use directly on copper pipe: Copper plated, or PVC coated.
3. Hangers for use other than directly on copper pipe: 316 stainless steel.
4. Hanger type schedule:

| APPLICATION | PIPE SIZE | HANGER TYPE |
|---|-------------------|---|
| All except noted | 4 inches and less | MSS Type 1 or 12 Similar to Empire Figure 41. |
| All except noted | Over 4 inches | MSS Type 1 Similar to Empire Figure 11. |
| Steam, condensate, and hot water | All | MSS Type 43 Similar to Empire Figure 272 w/ spring hanger. |
| Service in chemical storage areas and as indicated on drawings for corrosion resistance | All | FRP trapeze hangers or clevis hangers as specified below. |

- D. Concrete Inserts for Hanger Rods:
 - 1. Continuous slots: Unistrut #P1000.
 - 2. Individual inserts: Similar to ANVIL Figure 281.
 - 3. See Specification Section 03 15 19 – Anchorage to Concrete.
- E. Beam Clamps for Hanger Rods:
 - 1. MSS SP-58, Type 21.
 - 2. Material: 316 stainless steel.
 - 3. Heavy duty.
 - 4. Similar to Empire Industries Figure 155.
- F. Trapeze Hangers for Suspended Piping:
 - 1. General:
 - a. Material: 316 stainless steel.
 - b. Angles, channels, or other structural shapes.
 - c. Curved roller surfaces at support point corresponding with type of hanger required.
 - d. See Specification Section 05 50 00.
 - 2. In chemical storage and feed areas and as indicated on the drawings:
 - a. Materials: FRP.
 - b. Aikinstrut fiberglass channel or equal.
 - 3. Corrosive areas:
 - a. Material: 316 stainless steel.
 - b. Angles, channels or other structural shapes.
- G. Vertical Pipe Supports:
 - 1. At base of riser.
 - a. Material: 316 stainless steel.
 - 2. Lateral movement:
 - a. Clamps or brackets:
 - 1) MSS SP-58, Type 8 or 42.
 - 2) Stainless steel.
 - 3) Similar to Empire Industries Figure 50.
- H. Expanding Pipe Supports:
 - 1. Spring hanger type.
 - 2. MSS SP-58, Type 51.
- I. Pipe Support Saddle:
 - 1. For pipe located 3 feet or less from floor elevation, except as otherwise indicated on Drawings.
 - 2. MSS SP-58 Type 38.
 - 3. Material: 316 stainless steel.
 - 4. Similar to Empire Industries Figure 426.
- J. Pipe Support Risers/Stanchions:
 - 1. Schedule 40 pipe.
 - 2. Material: match pipe support saddle.
 - 3. Size: As recommended by saddle manufacturer.
 - 4. Provide low carbon stainless steel for welded fabrications.
- K. Pipe Support Base Plate:
 - 1. 4 inches larger than support.
 - 2. Collar 3/16 inches thickness, circular in shape, and sleeve type connection to pipe.
 - 3. Collar fitted over outside of support pipe and extended 2 inches from floor plate.
 - 4. Collar welded to floor plate.
 - 5. Edges ground smooth.
 - 6. Material: match pipe support saddle.

7. Provide low carbon stainless steel for welded fabrications.
- L. Pipe Covering Protection Saddle:
1. For insulated pipe at point of support.
 2. MSS SP-58 Type 40.
 3. Material: 316 stainless steel.
 4. Stainless steel: Similar to Empire Industries Figure 167.
- M. Wall Brackets:
1. For pipe located near walls and 8 feet or more above floor elevation or as otherwise indicated on the Drawings.
 2. MSS SP-58, Type 33.
 3. Material: 316 stainless steel.
 4. Similar to Empire Industries Figure 802.
- N. Pipe Anchors:
1. For locations shown on the Drawings.
 2. 1/4 inches steel plate construction.
 3. Hot-dip galvanized after fabrication.
 4. Designed to prevent movement of pipe at point of attachment.
- O. Pipe Guides:
1. For locations on both sides on each expansion joint or loop.
 2. To ensure proper alignment of expanding or contracting pipe.
 3. Material: 316 stainless steel.
 4. Similar to Empire Industries Figure 255.

2.3 DESIGN REQUIREMENTS

- A. All support systems must be designed for a corrosive environment.
- B. Supports capable of supporting the pipe for all service and testing conditions.
1. Provide 5 to 1 safety factor.
- C. Allow free expansion and contraction of the piping to prevent excessive stress resulting from service and testing conditions or from weight transferred from the piping or attached equipment.
- D. Design supports and hangers to allow for proper pitch of pipes.
- E. Check all physical clearances between piping, support system and structure.
1. Provide for vertical adjustment after erection.
- F. Support vertical pipe runs in pipe chases at base of riser.
1. Support pipes for lateral movement with clamps or brackets.
- G. Place hangers are to be installed on outside of pipe insulation.
1. Use a pipe covering protection saddle for insulated pipe at support point.
 2. Insulated piping 1-1/2 inches and less:
 - a. Provide a 9 inches length of high density perlite or high density calcium silicate at saddle.
 3. Insulated piping over 1-1/2 inches: Provide a 12 inches length of high density perlite or high density calcium silicate at saddle.
 4. See Specification Section 40 42 00.
- H. Provide 20 GA pipe saddle for fiberglass and plastic pipe support points to ensure minimum contact width of 4 inches.
1. Material: match support.
- I. Pipe Support Spacing:
1. General:

- a. Factor loads by specific weight of liquid conveyed if specific weight is greater than water.
 - b. Locate pipe supports at maximum spacing scheduled unless indicated otherwise on the Drawings.
 - c. Provide at least one support for each length of pipe at each change of direction and at each valve.
2. Steel, stainless steel, cast-iron pipe support schedule:

| PIPE SIZES - IN | MAXIMUM SPAN - FT |
|-----------------|-------------------|
| 1-1/2 and less | 5 |
| 2 thru 4 | 10 |
| 5 thru 8 | 15 |
| 10 and greater | 20 |

3. Space supports for soil and waste pipe and other piping systems not included above every 5 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide piping systems exhibiting pulsation, vibration, swaying, or impact with suitable constraints to correct the condition.
 - 1. Included in this requirement are movements from:
 - a. Trap discharge.
 - b. Water hammer.
 - c. Similar internal forces.
- B. Weld Supports:
 - 1. AWS D1.1.
 - 2. Weld anchors to pipe in accordance with ASME B31.3.
 - 3. AWS D1.6 for stainless steel supports.
- C. Locate piping and pipe supports as to not interfere with open accesses, walkways, platforms, and with maintenance or disassembly of equipment.
- D. Inspect hangers for:
 - 1. Design offset.
 - 2. Adequacy of clearance for piping and supports in the hot and cold positions.
 - 3. Guides to permit movement without binding.
 - 4. Adequacy of anchors.
- E. Inspect hangers after erection of piping systems and prior to pipe testing and flushing.
- F. Anchorage to Concrete - reference Specification Section 03 15 19.
- G. Install individual or continuous slot concrete inserts for use with hangers for piping and equipment.
 - 1. Install concrete inserts as concrete forms are installed.
- H. Welding:
 - 1. Welding rods: ASTM and AWS standards.
 - 2. Integral attachments:
 - a. Include welded-on ears, shoes, plates and angle clips.
 - b. Ensure material for integral attachments is of good weldable quality.
 - 3. Preheating, welding and postheat treating: ASME B31.3, Chapter V.

- I. Field Painting:
 1. Comply with Specification Section 09 96 00.

END OF SECTION

SECTION 40 05 19
DUCTILE IRON PROCESS PIPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ductile iron piping, fittings, and appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 40 05 00 - Pipe and Pipe Fittings: Basic Requirements.

1.2 REFERENCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. ASTM International (ASTM):
 - a. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - b. A536, Standard Specification for Ductile Iron Castings
 - c. B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - 3. American Water Works Association (AWWA):
 - a. C203, Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied.
 - b. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe.
 - c. C606, Standard for Grooved and Shouldered Joints.
 - 4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C105/A21.5, Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - b. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
 - c. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - d. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - e. C150/A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
 - f. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - g. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
 - h. C217, Microcrystalline Wax and Petrolatum Tape Coating Systems for Steel Water Pipe and Fittings.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Comply with Section 40 05 00 - Pipe - Basic Requirements.
 - 2. Certification of factory hydrostatic testing.
 - 3. If mechanical coupling system is used, submit piping, fittings, and appurtenant items which will be utilized to meet system requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Flanged Adaptors (flanged coupling adaptors):
 - a. Smith Blair, Style 912 (cast iron).
 - b. Dresser, Style 127 (cast iron).
 - c. Romac Style FCA501 (cast iron).
 2. Restrained Flanged Adaptors (restrained flanged coupling adaptors):
 - a. Romac Style Alpha FC (ductile iron).
 - b. Smith Blair Style 911 (ductile iron).
 3. Compression Sleeve Coupling:
 - a. Smith Blair, Style 431 (cast iron).
 - b. Dresser, Style 153 (cast iron).
 - c. Romac Industries, Style EC501 (ductile iron).
 4. Mechanical (Grooved) coupling:
 - a. Victaulic, Style 31.
 5. Insulating Couplings:
 - a. Smith Blair, Style 416.
 - b. Dresser, Style 39.
 - c. Romac, Style IC400
 6. Reducing Couplings:
 - a. Smith Blair, Style 415.
 - b. Dresser, Style 62.
 - c. Romac, Style RC501 (ductile).
 7. Transition Coupling:
 - a. Smith Blair, Style 413.
 - b. Dresser, Style 62.
 - c. Romac, Style TC400
 8. Glass Lining:
 - a. C&B Piping: CBGL911 Porcelain Glass Lining.
 - b. US Pipe: Vitco SG-14 Glass Lining.
 9. Restrained joints:
 - a. American (Flex-Ring) - 4 inches to 54 inches.
 - b. American (Lok-Ring) - 54 inches to 64 inches.
 - c. U.S. Pipe (TR-Flex) - 4 inches to 36 inches.
 - d. U.S. Pipe (HP Lok) - 30 inches to 64 inches.
 - e. Or equal.
 10. Expansion joints:
 - a. EBAA Iron FLEX-TEND double ball joint
 - b. Smith-Blair {(Style 611)} {(Style 612)}.
 - c. Dresser (Style 63).
 - d. Or equal.
 11. Dismantling joints:
 - a. Smith-Blair (Style 975).
 - b. Dresser (Style 131).
 - c. Or equal.

2.2 MATERIALS

- A. Ductile Iron Pipe:
1. AWWA/ANSI C115/A21.15.
 2. AWWA/ANSI C150/A21.50.
 3. AWWA/ANSI C151/A21.51.

- B. Fittings and Flanges:
 - 1. AWWA/ANSI C110/A21.10.
 - 2. AWWA/ANSI C153/A21.53
 - a. Do not use for pump suction piping.
 - 3. AWWA/ANSI C115/A21.15.
 - 4. Flanges drilled and faced per ASME B16.1 for both 125 and 250 psi applications.
- C. Nuts and Bolts:
 - 1. Buried:
 - a. T-Bolts for mechanical joints: Per AWWA/ANSI C111/A21.1
 - b. Other bolts and nuts: ASTM A193/A194 Grade B8M, Class 1.
 - 2. Exposed: ASTM A193/A194 Grade B8M, Class 1.
 - 3. Heads and dimensions per ASME B1.1.
 - 4. Threaded per ASME B1.1.
 - 5. Project ends 1/4 to 1/2 inches beyond nuts.
- D. Gaskets: See individual piping system requirements in Section 40 05 00.
- E. If mechanical coupling system is used, utilize pipe thickness and grade in accordance with AWWA C606.
 - 1. Manufactured from ductile iron conforming to ASTM A536.
 - 2. Gaskets: Flushseal® type, grade to suit the intended service.
- F. Polyethylene Encasement: Per AWWA/ANSI C105/A21.5.
- G. See Piping Schedules in Section 40 05 00.

2.3 MANUFACTURED UNITS

- A. Couplings:
 - 1. Flanged adaptors:
 - a. Unit consisting of steel or carbon steel body sleeve, flange, followers, Grade 30 rubber gaskets.
 - b. Provide units specified in the MANUFACTURERS Article.
 - c. Supply flanges meeting standards of adjoining flanges.
 - d. Rate entire assembly for test pressure specified on piping schedule for each respective application.
 - 2. Compression sleeve coupling:
 - a. Unit consisting of steel sleeve, followers, Grade 30 rubber gaskets.
 - b. Provide units specified in the MANUFACTURERS Article.
 - c. Supply flanges meeting standards of adjoining flanges.
 - d. The working pressure rating of the entire assembly shall be greater than or equal to the test pressure specified on piping schedule for each respective piping application.
 - e. Provide field coating for buried couplings per AWWA C203.
 - 3. Mechanical (grooved) couplings:
 - a. Use of mechanical couplings and fittings in lieu of flanged joints is acceptable where specifically specified in Section 40 05 00.
 - b. Provide all mechanical groove couplings, flange adapters, fittings, and appurtenant items from the same manufacturer.
 - c. Utilize units defined in the MANUFACTURERS Article.

2.4 FABRICATION

- A. Furnish and install without outside coatings of bituminous material any exposed pipe scheduled to be painted.
- B. Furnish cast parts with lacquer finish compatible with finish coat.

2.5 LININGS AND COATINGS

- A. Glass Lining:
 - 1. Minimum two-coat process.
 - a. Base coat heated to solidly fuse glass to pipe surface.
 - b. Subsequent coat(s) heated to form integral bond with preceding coat.
 - 2. Final finish parameters:
 - a. Thickness: 8-12 mils.
 - b. Hardness: Above 5 on MOHS scale.
 - c. Density: 2.5-3.0 grams per cubic centimeter.
 - d. Metal to lining bonding: Capable of withstanding strain of 0.0001 inches/IN without damage to lining.
 - 3. Complete compatibility between fittings and piping.
 - 4. Provide in accordance with ASTM B1000.

2.6 SOURCE QUALITY CONTROL

- A. Factory Test:
 - 1. Subject pipe to hydrostatic test of not less than 500 psi with the pipe under the full test pressure for at least 10 seconds.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Joining Method - Push-On Mechanical (Gland-Type) Joints:
 - 1. Install in accordance with AWWA/ANSI C111/A21.11.
 - 2. Assemble mechanical joints carefully according to manufacturer's recommendations.
 - 3. If effective sealing is not obtained, disassemble, thoroughly clean, and reassemble the joint.
 - 4. Do not overstress bolts.
 - 5. Where piping utilizes mechanical joints with tie rods, align joint holes to permit installation of harness bolts.
- B. Joining Method - Push-On Joints:
 - 1. Install in accordance with AWWA/ANSI C151/A21.51.
 - 2. Assemble push-on joints in accordance with manufacturer's directions.
 - 3. Bevel and lubricate spigot end of pipe to facilitate assembly without damage to gasket.
 - a. Use lubricant that is non-toxic, does not support the growth of bacteria, has no deteriorating effects on the gasket material, and imparts no taste or odor to water in pipe.
 - 4. Assure the gasket groove is thoroughly clean.
 - 5. For cold weather installation, warm gasket prior to placement in bell.
 - 6. Taper of bevel shall be approximately 30 degrees with centerline of pipe and approximately 1/4 inches back.
- C. Joining Method - Flanged Joints:
 - 1. Install in accordance with AWWA/ANSI C115/A21.15.
 - 2. Extend pipe completely through screwed-on flanged and machine flange face and pipe in single operation.
 - 3. Make flange faces flat and perpendicular to pipe centerline.
 - 4. When bolting flange joints, exercise extreme care to ensure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress, bending or torsional strains to be applied to cast flanges or flanged fittings.
 - 5. Allow one flange free movement in any direction while bolts are being tightened.

6. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
 7. Gradually tighten flange bolts uniformly to permit even gasket compression.
- D. Joining Method – Mechanical (Grooved) Coupling Joint:
1. Arrange piping so that pipe ends are in full contact.
 2. Groove and shoulder ends of piping in accordance with manufacturer's recommendations.
 3. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.
 4. Utilize grooving tools from the same manufacturer of the couplings and fittings.
- E. Flange Adaptors 12 inches and Less:
1. Locate and drill holes for anchor studs after pipe is in place and bolted tight.
 2. Drill holes not more than 1/8 inches larger than diameter of stud projection.
- F. Cutting:
1. Do not damage interior lining material during cutting.
 2. Use abrasive wheel cutters or saws.
 3. Make square cuts.
 4. Bevel and free cut ends of sharp edges after cutting.
- G. Support exposed pipe in accordance with Section 40 05 00.
- H. Install buried piping in accordance with Section 40 05 00.
- I. Install restrained joint systems where specified in Section 40 05 00 under specific piping system.

3.2 FIELD QUALITY CONTROL

- A. Test piping systems in accordance with Section 40 05 00.

END OF SECTION

SECTION 40 05 51
COMMON REQUIREMENTS FOR PROCESS AND UTILITY VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valving and valving appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Equipment - Basic Requirements.
 - 2. Section 09 96 00 - High Performance Industrial Coatings.
 - 3. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
 - 4. Section 40 05 62 - Plug Valves.

1.2 REFERENCES

- A. Definitions:
 - 1. The following are definitions of abbreviations used in this Specification Section or one of the individual valve sections:
 - a. CWP: Cold water working pressure.
 - b. SWP: Steam working pressure.
 - c. WOG: Water, oil, gas working pressure.
 - d. WWP: Water working pressure.
- B. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - b. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
 - c. C504, Standard for Rubber-Seated Butterfly Valves.
 - d. C507, Standard for Ball Valves, 6 inches through 48 inches (150 mm through 1200 mm).
 - e. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.
 - f. C550, Standard for Protective Coatings for Valves and Hydrants.
 - g. C606, Standard for Grooved and Shouldered Joints.
 - 4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. National Electrical Manufacturers Association (NEMA):

- a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
- b. MG 1, Motors and Generators.
- 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
- B. Informational Submittals:
 - 1. Test reports if required in the individual valve specification.
- C. Closeout Submittals:
 - 1. Operation and Maintenance Data:
 - a. Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

- A. Refer to individual valve Specification Sections.

2.3 FABRICATION

- A. End Connections:
 - 1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 40 05 00 or as shown on the Drawings.
 - 2. Comply with the following standards:
 - a. Threaded: ASME B1.20.1.
 - b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
 - c. Bell and spigot or mechanical (gland) type: AWWA/ANSI C111/A21.11.
 - d. Soldered: ASME B16.18.
 - e. Grooved: Rigid joints per Table 5 of AWWA C606.
- B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.
- C. Nuts, Bolts, and Washers:
 - 1. Wetted or internal to be bronze or stainless steel.
 - a. Exposed to be zinc or cadmium plated.
 - 2. Exposed: ASTM A193/A194 Grade B8M, Class 1.
 - 3. Heads and dimensions per ASME B1.1.
 - 4. Threaded per ASME B1.1.
 - 5. Project ends 1/4 to 1/2 inches beyond nuts.

- D. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.
- E. Epoxy Interior Coating: Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Painting Requirements: Comply with Section 09 96 00 for High Performance Industrial Coatings.
- C. Setting Buried Valves:
 - 1. Locate valves installed in pipe trenches where buried pipe indicated on Drawings.
 - 2. Set valves and valve boxes plumb.
 - 3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
 - 4. Install in closed position.
 - 5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.
 - 6. After installation, backfill up to top of box for a minimum distance of 4 feet on each side of box.
- D. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- E. For grooved coupling valves, install rigid type couplings or provide separate support to prevent rotation of valve from installed position.
- F. Wax Tape Coating System:
 - 1. After installation, coat all buried nuts and bolts with a wax tape coating system in accordance with:
 - a. AWWA C217.
 - b. Manufacturer's printed instructions.
 - 2. Cut strips of wax tape and apply them around all bolts and nuts so that there are no voids or spaces under the tape.
 - 3. Apply a sufficient amount of tape to completely encapsulate all bare metal.
- G. For threaded valves, provide union on one side within 2 feet of valve to allow valve removal.
- H. Install valves accessible for operation, inspection, and maintenance.
- I. Reinstall existing chain actuators or new chain actuators on all valves with hand wheel more than 6 feet above operating deck. On all chain actuators, supply new 316 SST operating chain.

3.2 FIELD QUALITY CONTROL

- A. Wax Tape Coating Testing:
 - 1. Inspect each wax tape-wrapped component.
 - a. Verify primer was applied to substrate surfaces.
 - b. Ensure the wax tape has fully encapsulated all portions of the substrate.
 - c. Ensure that the wax tape is in intimate contact with the substrate.
 - d. Verify that the wax tape has been applied to the specified thickness.
 - 2. Do not backfill until this inspection is complete and the wax tape application is approved by the Engineer.

3.3 VALVE SCHEDULE

A. The following list of manual 6" and 8" valves will be provided for Contractor installation:

| Valve Tag | Service ¹ | Type | Actuator ² | Open / Close or Modulating ³ |
|---------------------|----------------------|------|-----------------------|---|
| 01-105 | DS | Plug | M | O/C |
| 01-106 | DS | Plug | M | O/C |
| 01-109 | DS | Plug | M | O/C |
| 01-114 | DS | Plug | M | O/C |
| 01-116 | DS | Plug | M | O/C |
| 01-117 | DS | Plug | M | O/C |
| 01-118 | DS | Plug | M | O/C |
| 01-201 | DS | Plug | M | O/C |
| 01-202 | DS | Plug | M | O/C |
| 01-205 | DS | Plug | M | O/C |
| 01-206 | DS | Plug | M | O/C |
| 01-207 | DS | Plug | M | O/C |
| 01-208 | DS | Plug | M | O/C |
| 01-210 | DS | Plug | M | O/C |
| 01-301 | DS | Plug | M | O/C |
| 01-302 | DS | Plug | M | O/C |
| 01-401 | DS | Plug | M | O/C |
| 01-402 | DS | Plug | M | O/C |
| 01-403 | DS | Plug | M | O/C |
| 01-404 | DS | Plug | M | O/C |
| 01-405 | DS | Plug | M | O/C |
| 01-406 | DS | Plug | M | O/C |
| 02-102 | DS | Plug | M | O/C |
| 02-103 | DS | Plug | M | O/C |
| 02-204 | DS | Plug | M | O/C |
| 02-301 | DS | Plug | M | O/C |
| 02-401 | DS | Plug | M | O/C |
| 02-402 | DS | Plug | M | O/C |
| 02-403 | DS | Plug | M | O/C |
| 02-404 | DS | Plug | M | O/C |
| 02-405 | DS | Plug | M | O/C |
| 02-406 | DS | Plug | M | O/C |
| Grinder Inlet Valve | DS | Plug | M | O/C |

1. Service defined in section 40 05 00
2. M = Manual, E = Electric, P = Pneumatic
3. O/C = Open/Close, MOD = modulating

END OF SECTION

SECTION 40 05 62 PLUG VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plug valves.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 51 - Common Requirements for Process and Utility Valves.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125 and 250.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - b. A536, Standard Specification for Ductile Iron Castings.
 - c. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C517 Resilient-Seated Cast-Iron Eccentric Plug Valves

1.3 SUBMITTALS

- A. Submit valve orientation under this Specification Section or with shutdown planning submittal for Specification Section 01 11 00 – Summary of Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed under the specific valve types are acceptable.

2.2 NON-LUBRICATED ECCENTRIC PLUG VALVES (SEWAGE, SLUDGE, SEWAGE GAS APPLICATIONS)

- A. Manufacturers:
 - 1. DeZurik.
 - 2. Henry Pratt.
 - 3. Or equal.
- B. Materials:
 - 1. Body: Cast-iron ASTM A126, Class B.
 - 2. Plug: One or two-piece construction ductile iron, ASTM A536 65-45-12 or cast iron, ASTM A126 Class B.
 - 3. Plug facing: Grease and/or petroleum-resistant resilient Neoprene or Buna-N compound, 70 Type A durometer hardness per ASTM D2240.
 - 4. Shaft bearing bushings: Permanently lubricated TFE or Delrin sleeve type stainless steel or bronze.
 - 5. Valve seats: Welded-in overlay of 90% nickel, (minimum 1/8 inches thick).
 - 6. Stem seal: per AWWA C517, Section 4.4.7.

2.3 DESIGN REQUIREMENTS

- A. Non-Lubricated Eccentric Plug Valves (Wastewater, Sludge):
 - 1. Port area:

- a. Valves 4 inches through 20 inches: Equal to or exceed 80% of full pipe area.
- b. Valves greater than 20 inches: 100% equivalent full pipe area.
2. Valve body: Fitted with bolted bonnet.
3. End connections: See Specification Section 40 05 51.
4. Stem seal: Adjustable and replaceable without disassembling valve or bonnet.

5. Designed for seating drip tight in any flow direction.
6. Rating:
 - a. 1/2 through 12 inches, 175 psi working pressure.
 - b. 14 through 36 inches, 150 psi working pressure.
 - c. Three-way valves, 125 psi working pressure.
7. Actuator:
 - a. Actuator gearing in enclosure suitable for running in oil with seals on shaft to prevent entry of dirt or water.
 - b. Positive identification on actuator indicating valve position.
 - c. Adjustable stop to set closing torque.

2.4 FABRICATION

- A. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Specification Section 40 05 51.
- B. If possible, install valves with valve stem horizontal, plug seat on inlet side and with plug rotating up into the open position for valves in horizontal lines. Confirm valve orientation with Owner prior to installation of valve. Contractor may install valve in same orientation as previous valve if preferred installation results in the need to reorientate gear box. Submit orientation to Owner and Engineer for approval prior to installation.
- C. Install valve with actuator above pipe or plug centerline.

END OF SECTION

SECTION 40 10 15
FIBERGLASS REINFORCED PLASTIC DUCT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiberglass reinforced plastic (FRP) ductwork and accessories as specified and as shown on the Contract Documents for Odor Control Ductwork in Screw Press Room.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Air Movement and Control Association (AMCA):
 - a. 500-D, Laboratory Methods of Testing Dampers for Rating.
2. American National Standards Institute (ANSI).
3. American Society of Mechanical Engineers (ASME).
4. ASTM International (ASTM):
 - a. C582, Standard Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion-Resistant Equipment.
 - b. D2310, Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - c. D2563, Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
 - d. D2996, Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
 - e. D3982, Standard Specification for Contact Molded "Fiberglass" (Glass Fiber Reinforced Thermosetting Resin) Ducts.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
5. Sheet Metal and Air-Conditioning National Contractors Association (SMACNA):
 - a. Thermoset FRP Duct Construction Manual, 1997.

B. Manufacturer's FRP Quality Assurance Program:

1. Either in-house program or retained from qualified and approved outside source.
2. Independent from manufacturing production personnel.
3. Quality control manager experienced in the FRP industry with at least five years of verifiable experience in fabrication of fiberglass structures.
 - a. QC manager is to be approved by the Engineer based on qualifications submitted by the biotower system supplier before fabrication is started.
4. All steps of the duct fabrication to be witnessed by the quality control manager
5. Maintain fabrication logs including:
 - a. Record of each level of quality control inspections
6. All areas of the facility where duct is manufactured or stored must be available for inspection by Owner's representative during normal working hours. Inspection will be at the Owner's discretion.

- C. Manufacturer's Qualifications: Manufacturer shall have experience in manufacturing FRP duct of similar size and configuration to the duct specified herein. For a manufacturer to be determined acceptable for providing the FRP duct on this project, they must show evidence of a minimum of five installations and five years experience in the design and manufacturer of FRP duct of similar size and type as specified herein. Verifiable installations with contact numbers are required for at least three similar applications.

- D. Except where shown in the Contract Documents, the manufacturer is responsible for locating flexible connections and expansion joints to accommodate installation and thermal expansion, respectively.
- E. Provide, coordinate, service, and guarantee duct and duct accessories specified in this Specification, from one supplier.

1.3 SUBMITTALS

- A. Shop Drawings and Product Data shall include the following:
 - 1. Technical Data:
 - a. Technical bulletins, technical data sheets from “soft-cover” catalogs with name of the manufacturer and all the manufacturer details for systems and products being provided. Items being provided are to be specifically identified in a summary listing.
 - b. All illustrations, detailed drawings, and instructions necessary for installing, operation, and maintenance repair.
 - c. Drawings for each shop fabricated ductwork assembly, flexible couplings, expansion/contraction joints, dampers, or blast gates.
 - d. Ductwork pressure, vacuum, and temperature ratings.
 - e. Blast gate and damper information including pressure ratings, leakage data and performance data. Include copies of AMCA 500D certified leakage rate test reports for sample dampers of every size.
 - f. Flexible Connections and Expansion Joints: Expansion and contraction characteristics and limits.
 - g. Manufacturer’s recommended spare parts list.
 - h. Manufacturer’s delivery, storage, handling and installation instructions.
 - i. Acknowledgement that products submitted fully complies with the requirements of referenced standards and specifications.
 - 2. System Design sealed by a California Registered Engineer.
 - a. Duct support location Drawings.
 - b. Duct system flexible connectors, expansion joint, fittings and appurtenances location and detail Drawings.
 - c. Duct interfacing requirements with duct accessories and method of fastening or support.
 - d. Duct support reactions at each support for all applicable loads including dead load, live load, wind load and thermal expansion and contraction loads.
 - e. Fabricator’s detailed structural calculations for fiberglass laminate design.
 - 1) Design for pressure, vacuum, expansion, wind, snow loading as well as deflection for support spacing shown on Drawings.
 - 2) Detailed structural calculations for wall thickness, stress and strain support reactions (including expansion/contraction forces) and expected loadings.
 - 3. Scaled installation Drawings for all foul air duct system shown on the Drawings which shall include the following minimum information:
 - a. Dimensioned locations.
 - b. Elevations (centerline).
 - c. Duct and joint description.
 - d. Location of dampers and fittings.
 - e. Location of supports.
 - f. Location of expansion and contraction joints.
 - g. Details of duct supports (frames, stanchions, towers, etc.) including modifications (if any) to details shown on Drawings.
 - 4. Samples of duct materials.

- B. Operation and Maintenance Manuals:
 - 1. Submit for all applicable equipment.
 - 2. See Section 01 78 23.
- C. Warranty Certificate: Submit manufacturer's sample warranty certificate with product data submittal for Engineer's review. Warranty certificate shall reflect the warranty requirements and duration and as specified herein.
- D. Testing:
 - 1. Preliminary source and field quality control testing format to be used as basis for final quality control reporting.
 - 2. Source quality control test reports in accordance with Article 2.4 of this Specification.
 - 3. Field quality control test reports in accordance with Article 3.3 of this Specification.

1.4 SYSTEM DESCRIPTION

- A. Coordinate with the existing odor control duct work to ensure compatibility of the ductwork with the other components of the odor control system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Ductwork and Dampers:
 - a. Augusta Fiberglass.
 - b. Belco Manufacturing Company, Inc.
 - c. Daniel Company.
 - d. Viron International Corp.
 - 2. Flexible Connections and Expansion Joints:
 - a. Mercer Rubber Co.
 - b. Holz Rubber Co., Inc.

2.2 SERVICE CONDITIONS

- A. Outdoors and Indoors.
- B. Temperature: -10 to +110 degrees F.
- C. Design operating conditions:
 - 1. Vacuum service, inches water: -20.
 - 2. Pressure service, inches water: 20.
- D. Gases conveyed: Odorous air from municipal wastewater process sources. Foul air will have high moisture content, including water droplets, high ammonia and hydrogen sulfide concentrations.
- E. Relative humidity: 50 to 100% with ammonia vapor and hydrogen sulfide.
- F. Maximum velocity: 3,000 feet per minute.
- G. Hydrogen sulfide exposure: up to 200 PPM.

2.3 COMPONENTS

- A. Ductwork:
 - 1. Duct shall consist of a filament-wound, exterior, structural layer and an internal corrosion barrier composed of a resin-rich inner surface followed by a layered-up interior layer.

2. The internal corrosion barrier shall be in compliance with ASTM C582, ASTM D3982, and Thermoset FRP Duct Construction Manual, 1997.
3. Resin:
 - a. Hetron 992FR, Derakane 510B.
 - b. Premium grade and corrosion resistant.
 - c. Shall not contain thixotropic agents or fillers unless specified.
 - d. Shall not contain dyes, pigments or colorants except in the exterior gel coats.
 - e. Include ultraviolet absorbers added to outer layers to improve weather resistance.
 - f. May contain up to 3% antimony oxide in order to meet the class I flame spread rating per ASTM E84.
4. Inner surface:
 - a. Minimum of 20 mils thick and consist of a "C" glass surfacing veil with approximately 90% resin content by weight.
 - b. Free of cracks and crazing with a smooth finish comparable to that achieved by the rotary contact molding method, with an average of not over two pits/SQ FT, providing the pits are less than 1/8 inches diameter and not over 1/32 inches deep. Pits shall be covered with sufficient resin to avoid exposure of interior layer.
5. Interior layer:
 - a. Reinforced by not less than two plies of 1-1/2 oz/SQFT chopped strand mat with approximately 75% resin and 25% glass content by weight. Total thickness shall be at least 100 mils.
6. Exterior layer:
 - a. The exterior layer or body of the laminate shall be of chemically resistant construction suitable for operating in the service conditions above and providing additional mechanical strength necessary to meet the tensile and flexural requirements.
 - b. For rectangular duct and transitions, the exterior layer shall conform to the requirements of ASTM D3982 unless otherwise specified and consist of alternating layers of chopped-strand mat or equivalent chopper roving and woven roving to form composite construction of approximately 70% resin by weight. A continuous layer shall be achieved by staggering and lipping layers. The exterior surface shall be relatively smooth and coated to ensure no exposed fiber.
 - c. For round duct, the exterior layer shall conform to the requirements of ASTM D2310 Type I, Grade 2, Class E and be in compliance with ASTM C582 and Thermoset FRP Duct Construction Manual, 1997 unless otherwise specified. The exterior layer shall be constructed of continuous roving by filament winding per ASTM D2996 with a single layer of woven roving to be applied after every 3/8 inches of filament winding to allow for exotherming.
 - d. Woven roving: Type E glass, nominal 24 oz per square yard, four by five weave, with silane type finish.
 - e. Continuous roving used in chopper gun for spray-up: Type E glass.
 - f. Continuous roving used in filament winding: Type E glass, with silane type finish.
 - g. Shop applied resin gel coat of a color selected by the Engineer shall be provided to the exterior of the duct.
7. Laminate quality: Meet requirements of the visual acceptance criteria in ASTM D2563, Level II for the interior and Level III for the exterior.
8. Wall thickness for rectangular duct shall be calculated using a safety factor of five to one for both vacuum and positive pressure per ASTM D3982. Wall thickness for round duct shall be calculated using a safety factor of five to one for vacuum pressure and 10 to 1 for positive pressure per ASTM D3982. Calculations shall be based on the structural fiberglass reinforced portion of the wall only. Where calculated structural wall thickness is less than the corresponding minimum wall thickness provided below, the minimum wall thickness dictated by the schedule shall be used.

| Duct Size | Round Ducting (wall thickness, IN) | Rectangular Ducting (wall thickness, IN) |
|-------------------------------|---------------------------------------|---|
| For 18 inches & smaller ducts | 0.25 | 0.375 |
| 20 to 36 inches ducts | 0.375 | 0.50 |
| 40 to 54 inches ducts | 0.50 | 0.625 |
| 60 to 72 inches ducts | 0.625 | 0.75 |

9. Duct shall be supplied in the largest possible fabricated sections, allowing as few field joints as possible while assuring maximum quality control.
 - a. Minimize the use of flanges with butt wrapped joints where required for installation.
 - b. Shop spool duct and fittings as much as possible.
10. Reinforcing shall be factory installed with spacing between reinforcing located to avoid all hangers and support saddles.

B. Flanges:

1. Drill per ASTM D3982 Table 1 for all duct-to-duct connections and drilled to match for all equipment connections.
2. Spot-faced back, flat and parallel with the flange face, of sufficient diameter to accept a SAE metal washer under the bolt head or nut.
3. Provide full-faced, 1/8 inches thick, fabricated from ethylene propylene rubber (EPR) gaskets at each flanged connection.
4. Flat washers shall be provided on all flange back faces.

C. Fasteners:

1. Bolts for flanges: ASTM A193, Type 316 L stainless steel, Grade B8M hex head bolts fabricated in accordance with ANSI B18.2.
2. Nuts: ASTM A194, Type 316 L stainless steel, Grade 8M hex head nuts.
3. Washers: ASME B18.22.1, Type 316 L stainless steel.
4. Interior bolts for dampers: FRP bolts.

D. Joints:

1. All joints shall be of the same resin as, and equal or superior in strength to, the adjacent duct section, and shall have the same internal dimensions as the adjacent duct.
2. Total width of overlay for butt-wrap joints: 6 inches minimum.
3. Bell and spigot joints shall be sealed with a standard butt joint overlay as per ASTM D3982. The interior opening between the bell and spigot joint shall be sealed with a resin paste so that no glass fibers are exposed and all voids are filled.

E. Fittings:

1. All fittings shall be of the same resin as, and equal or superior in strength to, the adjacent duct section, and shall have the same internal dimensions as the adjacent duct.
2. Construction: Spray-up/contact molding or mitered/hand lay-up methods.
3. Unless restricted by space constraints, bends shall have a minimum radius of 1.5 times the duct diameter. Under no circumstances shall bends have a radius less than 1.0 times the duct diameter.

F. Flexible Connections and Expansion Joints:

1. Flexible connections shall be provided for connections to draw-offs and equipment including as indicated on the Drawings. Supports shall be provided where necessary to avoid strain on the flexible connections.

2. Flexible connections and expansion joints shall be furnished and installed as determined by the manufacturer and where indicated on the Drawings. Expansion joints shall be used for lateral, torsional, angular and axial movement due to expansion/contraction and vibration or where required to accommodate thermal expansion.
3. Flexible connections and expansion joints shall be constructed of multiple layers of vulcanized polyester tire cord fabric reinforcement, sandwiched between 60 - 70 durometer EPDM elastomer inner liner and exterior cover. Tire cord fabric shall be layered at an optimal bias angle with Resorcinol Formaldehyde latex for superior rubber-to-fabric bonding.
4. Flexible connections and expansion joints shall be of seamless construction, built as one continuous piece with integral molded, hollow arched volutes permitting up to 4 inches of axial contraction and expansion.
5. Type 316 L stainless steel back up retainers and Type 316 L stainless steel nuts, bolts and washers shall be provided.
6. Flexible connections shall be able to withstand the 25 inches water column, positive and negative pressure.
7. Flexible connections shall be designed to withstand a maximum temperature of 220 degrees F continuous service with 250 degrees F intermittent spikes.
8. Flexible connections and expansion joints shall be UV resistant.
9. Flexible connections shall be designed to allow for a minimum of 1 inch of offset movement in any direction.
10. Flanges shall be provided in accessible locations for removal of flexible connections and expansion joints. Flanges shall be drilled per ASTM D3982 Table 1 for all duct-to-duct connections and drilled to match for all equipment connections.
11. Manufacturers.
 - a. RM Holtz.
 - b. Mercer.

G. FRP Butterfly Dampers:

1. Butterfly balancing dampers for odorous air service shall be fiberglass reinforced plastic body, disc, and shaft. All dampers shall be flanged.
2. Dampers must be suitable for service conditions previously mentioned.
3. Laminate construction shall conform to ASTM C582. Laminating resins for exposed dampers shall contain compounds for fire retardance. All inner surfaces shall be reinforced with C-glass. All interior layers shall be a minimum of 0.1 inches thick, reinforced with chopped strand mat applied in a minimum of two piles. The structural layer shall be alternating layers of chopped strand mat and woven roving.
4. The final resin coat color shall be the same as the adjacent ductwork.
5. Connections to FRP ductwork shall conform to ASTM D3982.
6. Isolation Dampers are to be bubble tight, no leak. These include dampers to isolate fans and individual scrubber systems.
7. Construction:
 - a. Round, flange ends matching inside diameter of connecting ductwork.
 - b. Single blade type complete with channel type frame.
 - c. Full circumference blade seal.
 - d. Angle type blade stop.
 - e. Body material: FRP.
 - f. Disc material: FRP.
 - g. Shaft: Type 316 stainless steel.
 - h. Shaft seal: EPDM or Teflon.
 - i. Blade stop: FRP bar or angle.

- j. Blade seal: EPDM.
 - k. Sleeve bearings: Molded Teflon.
8. Dampers shall carry the AMCA Certified Ratings Seal for air leakage and shall be tested as specified herein.
- a. Leakage: 2 cfm/SQFT at 30 inches WG, maximum.
9. Manufacturers:
- a. Daniel Mechanical Company.
 - b. Indusco.
 - c. Belco.
 - d. Augusta Fiberglass.
- H. FRP Butterfly Damper Operators:
- 1. Manual Operator:
 - a. Operator force not to exceed 40 pounds under any operating condition, including initial breakaway. Gear reduction operator when force exceeds 40 pounds.
 - b. Operator self-locking type or equipped with self-locking device.
 - c. Worm and gear operators 1-piece design worm gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling nut type operators threaded steel reach rods with internally threaded bronze or ductile iron nut.
 - d. For dampers less than 30 inches diameter, provide Type 316 stainless steel shaft, lever operators, and accessories. For dampers 30 inches diameter or larger, provide handwheel and necessary hardware in lieu of lever operator.
 - e. Chainwheel operators with tiebacks, extension stem, and other accessories will be required at all FRP dampers with the operator mounted higher than 6 feet.
 - f. All dampers must permit operation from normal operation level. The operator shall maintain the damper in a fixed position, preventing accidental movement.
 - g. Provide damper position indicator such that position can be identified from a distance of 15 feet.
 - h. Provide motorized operators where shown on the drawings.
- I. Accessories:
- 1. Extra Tappings:
 - a. Test port tappings shall be positioned as necessary for air balancing. Manufacturer shall ensure tapping points are accessible for measurement.
 - b. Drain tappings shall be positioned as indicated on Drawings. Drains shall be FRP threaded couplings glassed into the bottom of the duct. The fitting shall be trimmed flush with the interior surface of the duct and the duct shall be recoated at the connection.
 - 2. Hangers and Supports:
 - a. System design for supports shall include thermal and seismic loads as specified in the building code and as indicated on the Drawings.
 - b. All hangers and supports shall be manufactured from 316 stainless steel for corrosion resistance, unless shown otherwise on the Drawings.
 - c. Saddles, guides, sleeves, sleeve liners, etc. shall be provided as recommended by the Manufacturer and meeting Design Detail requirements in the Drawings.
 - d. Design the necessary supports to ensure maximum deflection of 1/2% of duct diameter.
 - e. All duct hangers shall be provided per SMACNA recommendations and the requirements of the Manufacturer. Hangers are to be securely fastened to avoid vibration and care shall be taken to install hangers so as to avoid creating conditions of stress in the finished installation.

- f. Supports shall be designed to accommodate thermal expansion of the FRP ducts for a temperature range of 100 degrees F through the use of sliding surfaces or location of expansion joints.

2.4 SOURCE QUALITY CONTROL

- A. Factory inspection: Inspect fabrications for required construction, intended function, and conformance with referenced standards.
- B. Inspection of products is required prior to shipment, unless specifically waived in writing by Engineer.
- C. Notify Engineer one week prior to estimated date of factory inspection.
- D. Engineer has the option to test FRP duct materials and inspect the manufacturing facility at any time to assure compliance with specifications.

PART 3 - EXECUTION

3.1 DESIGN

- A. Project Engineer's Bidding Drawings contain information on duct support locations which are only estimates. Duct support design shall be the responsibility of the Duct supplier and Contractor. Sealed layout drawings are to be provided for review and approval prior to fabrication and installation.
- B. Coordinate final location of supports may be affected by below grade piping or utilities.

3.2 INSTALLATION

- A. Install duct systems as shown on plans in conformance with duct manufacturer's instructions.
 - 1. The manufacturer shall have a qualified employee at the job site to instruct the Contractor's personnel in proper installation procedures for a minimum of three days.
 - 2. Instruction should include review of material safety data sheets as well as storage and handling of materials.
 - 3. Install to the lines and grades shown on the Drawings and approved duct layout submittals.
 - 4. Whenever duct laying is stopped, close open end of the duct with an end board closely fitting the end of the duct to keep foreign material out of the duct.
- B. Field joints:
 - 1. Field assembly joints must be completed in a neat and orderly manner, in compliance with manufactures instructions.
 - 2. Provide material for each field joint in kit form. One kit shall make one joint.
 - 3. Make field joints only when temperature is between 40 and 100 degrees F.
 - 4. Provide craftsmen who are trained and certified by the manufacturer to perform field joints.
 - 5. The Engineer shall inspect the first field joint made for quality purposes. No additional field joints shall be made without approval of the Engineer. The first joint will set the quality standard for all subsequent joints.
- C. After laminate inspection has been completed, touch-up duct with field applied resin gel coat. Match color to factory applied gel coat, using resin supplied from duct manufacturer. Obtain Engineer's approval for uniform quality of field and factory applied gel coats.

3.3 FIELD QUALITY CONTROL

- A. Testing:
 - 1. Testing shall not start without an approved leak testing procedure from the Duct Supplier. Unless otherwise approved in this procedure the following is required.
 - 2. Prior to testing, pressurize system to 1.0 psi and survey all joints for audible or visual leaks.
 - a. Repair/seal as necessary to seal all audible leaks.

3. After all audible leaks have been eliminated, test duct system at 0.75 psi pressure with air for one hour.
 4. Pressure drop during test shall be less than 5%.
 5. Repair all leaks and repeat test.
 6. Determine leakage by loss of pressure.
 7. Plug or cap branch lines as required during testing.
 8. All testing shall be at the expense of the Contractor.
- B. Identification:
1. Identify each shop fabricated duct section with a permanent marker on the inside near the ends.
 2. Project Engineer has option to test FRP duct during construction to ensure compliance with specifications.
- C. Engineer has the option to require testing of FRP duct materials and inspect the manufacturing facility at any time to assure compliance with specifications.

END OF SECTION

SECTION 40 42 00
PIPE, DUCT AND EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Insulation:
 - a. Piping insulation.
 - 2. Adhesives, mastics, sealants, and finishes.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 07 - Pipe Support Systems.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of Guarded-Hot-Plate Apparatus.
 - b. C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - c. C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - d. C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - e. C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - f. C1071, Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
 - g. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - h. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - i. F25, Standard Test Method for Sizing and Counting Airborne Particulate Contamination in Cleanrooms and Other Dust-Controlled Areas.
 - j. C518, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - k. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - l. E119 Standard Method of Fire Tests of Building Construction, 2 Hour Wall Panel Test, 2 Hour External Total Engulfment Test, hose stream evaluation.
 - m. E136, Combustion Characteristics of Building Materials in a Vertical Tube Furnace.
 - n. E162, Surface Flammability of Materials.
 - o. E814, Through-Penetration, 2-Hour Firestop Test.
 - p. E2336: Standard Test Methods Fire Resistive Grease Duct Enclosure Systems.
 - 2. ISO 6944-1985, Method of Determining Fire Resistance of Ventilation Ducts.
 - 3. National Fire Protection Association (NFPA):
 - a. 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 723, Standard for Test for Surface Burning Characteristics of Building Materials.
 - 5. National Commercial and Industrial Insulation Standards (2013 seventh edition).
 - a. Published by Midwest Insulation Contractors Association (MICA).

- b. Endorsed by National Insulation Association (NIA).
- c. MICA plate numbers listed in this specification reference this document.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Submit complete specification of insulation materials, adhesives, cement, together with manufacturer's recommended methods of application and coverage for coatings and adhesives.
 - 2. Submit itemized schedule by building of proposed insulation systems showing density, thermal conductivity, thickness, adhesive, jackets and vapor barriers.
 - 3. Certifications: Products will meet the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Fiberglass insulation:
 - a. CertainTeed Corporation.
 - b. Johns Manville.
 - c. Owens Corning.
 - d. Knauf.
 - 2. High density perlite:
 - a. Johns Manville.
 - b. Industrial Insulation Group (LIC).
 - 3. High density calcium silicate:
 - a. Industrial Insulation Group (LIC).

2.2 PIPING INSULATION - FIBERGLASS

- A. Pipe and Fitting Insulation:
 - 1. Preformed fiberglass pipe insulation:
 - a. Density: 4 pounds/CUFT.
 - b. Temperature rated: 650 degrees F.
 - c. Average thermal conductivity not to exceed 0.23 (BTU-IN)/(HR-FT²-DEGF) at mean temperature of 75 degrees F.
 - d. Fire hazard rating:
 - 1) UL 723, ASTM E84, NFPA 255.
 - 2) Flame spread not exceeding 25 and smoke developed not exceeding 50.
 - 2. Moisture adsorption:
 - a. ASTM C553.
 - b. Not greater than 5% moisture by volume when exposed to moisture laden air at 120 degrees F and 96% RH.
 - 3. Fungi and bacteria resistance:
 - a. ASTM C665.
 - b. Does not breed or promote growth.
 - c. Flame attenuated glass fibers bonded with thermosetting resin.

4. Piping jackets (general applications):
 - a. Aluminum: 16 mil embossed aluminum.
 - b. PVC: Preformed 0.028 inches thick PVC jackets fabricated from Johns Manville, or approved equal, PVC sheeting V-66 with proven resistance to ultraviolet degradation when temperatures do not exceed the limits of PVC.
 - c. Piping jacket not required on concealed piping.
5. Provide minimum insulation thickness conforming to schedules or as shown on the Drawings.

2.3 PIPE INSULATION INSERTS AT HANGERS

- A. High Density Perlite:
 1. Pre-formed.
 2. Fire hazard rating:
 - a. UL 723, ASTM E84, NFPA 255.
 - b. Flame spread: Zero.
 - c. Smoke developed: Zero.
 3. Average density: 13 pounds/CUFT.
 4. Compressive strength: 80 psi to produce 5% compression.
 5. Maximum surface temperature: 1,200 degrees F.
- B. High Density Calcium Silicate:
 1. Pre-formed.
 2. Fire hazard rating:
 - a. UL 723, ASTM E84, NFPA 255.
 - b. Flame spread: Zero.
 - c. Smoke developed: Zero.
 3. Average density: 14 pounds/CUFT.
 4. Compressive strength: 100 psi to produce 5% compression.
 5. Maximum surface temperature: 1,200 degrees F.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. General:
 1. Piping below ground covered with earth will not be insulated except as specified in Specification Section 40 05 25.
 2. Consider ductwork, piping and equipment as exposed, except as otherwise indicated.
 3. Consider ductwork, piping and equipment in walls, partitions, floors, pipe chases, pipe shafts and duct shafts as concealed.
 - a. Consider ductwork, piping and equipment above ceilings as concealed.
 4. Provide release for insulation application after installation and testing is complete.
 - a. Apply insulation on clean, dry surfaces after inspection.
 5. Provide insulation continuous through wall, roof and ceiling openings, pipe hangers, supports and sleeves.
 6. Provide insulation with vapor barrier for piping, ductwork and equipment where surfaces may be cooler than surrounding air temperatures.
 - a. Provide vapor barrier (0.17 perm-IN; ASTM C553) continuous and unbroken.

- b. Hangers, supports, anchors, and related items that are secured directly to cold surfaces must be adequately insulated and vapor-sealed to prevent condensation.
 - 7. Apply specified adhesives, mastics and coatings at the manufacturer's recommended coverage per unit volume.
- C. Piping Insulation - Fiberglass:
 - 1. Apply over clean dry pipe.
 - a. Butt all joints together firmly.
 - 2. Seal joints, slits, miter-cuts and other exposed edges of insulation as recommended by the insulation manufacturer.
 - 3. Insulate fittings, valves, and flanges with insulation thickness equal to adjacent pipe.
 - 4. PVC pipe jacket:
 - a. Apply jacketing with a minimum of 1 inch overlap.
 - 1) Weld longitudinal and circumferential seams with adhesives as recommended by manufacturer.
 - b. Provide slip-joints every 30 feet and between fittings if distance exceeds 8 feet.
 - 1) Construct slip-joints by overlapping jacket sections 6 to 10 inches.
 - c. Provide pre-molded PVC covers of same material and manufacturer as jacket for fittings, valves, flanges, and related items in insulated piping systems.
 - 5. Aluminum pipe jacket:
 - a. Field-applied aluminum jacket with vapor-sealed longitudinal and butt joints.
 - b. Provide smooth and straight joint with a minimum 2 inches overlap.
 - c. Secure joints with corrosion-resistant screws spaced 0.25 to 0.50 inches back from edge.
 - d. Center spacing of screws 5 inches maximum or as required to provide smooth tight-fitted joints.
 - e. Place joints on least exposed side of piping to obtain neat appearance.

3.2 REPAIR

- A. Whenever any factory applied insulation or job-applied insulation is removed or damaged, replace with the same quality of material and workmanship.

3.3 SCHEDULES

- A. Match existing insulation for any new, existing or replaced lengths of DR or DM pipe to Primary Digester outside in the Digester Area. In cases where active Primary Digester pipes connect to piping that proceeds to Secondary Digester, insulate the first 5 feet connected to tee.
- B. Pipe, Fittings and Valves:
 - 1. Fiberglass.

| APPLICATION | ESTIMATED TOTAL INSULATION LENGTH | PIPE SIZE | THICKNESS | JACKET |
|-----------------------------|-----------------------------------|----------------|----------------|--------|
| Digester Recirculation (DR) | 250 ft | 4 to 10 inches | Match existing | Alum |
| Digester Mixing (DM) | 100 ft | 4 to 10 inches | Match existing | Alum |

END OF SECTION



DIVISION 46

WATER AND WASTEWATER EQUIPMENT



SECTION 46 01 73
DIGESTER CLEANING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. Contractor shall provide all labor, materials and equipment required to complete the scope of work as described in Part II, Scope of Work of these Special Conditions.
- B. Contractor shall cooperate with Owner in every way to include conduct of work, use of safety equipment and work at the agreed times and work schedule(s).
- C. Contractor shall submit a plan that includes the methods, schedule and sequences of cleaning to Engineer for approval prior to starting work.
- D. Contractor shall coordinate work with Owner in order to minimize and interruptions or interference with plant operations.
- E. Contractor shall provide for all necessary technical expertise and support services necessary to complete work.
- F. Related Sections include but are not necessarily limited to:
 - 1. Section 01 35 44 – Spill Prevention Control and Countermeasures Plan
 - 2. Section 01 52 53 – Temporary Pumping and Sludge Screening
 - 3. Section 03 64 23 – Crack Repair and Injection
 - 4. Section 09 96 00 – High Performance Industrial Coatings

1.2 SAFETY CONSIDERATIONS

- A. Contractor shall adhere to all CALOSHA standards and EPA guidelines while engaged in the service of decommissioning and cleaning the digesters.
- B. All equipment brought on to the job site shall be approved as to its application and shall include the appropriate items from the following list:
 - 1. Explosion meter
 - 2. Ladders and safety apparatus
 - 3. Self-contained breathing apparatus
 - 4. Safety harness
 - 5. Explosion-proof lights
 - 6. Explosion-proof ventilation fans
 - 7. Non-sparking tools
- C. Pumps shall be lowered into the digesters by hoists or approved method.
- D. Sludge pumps – satisfactory positive displacement or centrifugal with special adopted impellers or explosion-proof pumps and motors if used near or within the digesters.
- E. Contractor shall ensure that no hazardous conditions relevant to basic hygiene protection, odors, vectors, unsightly spills, or explosive conditions shall exist or develop that could be of concern to public or operator safety or health.
- F. NO SMOKING signs will be posted in the work area and smoking shall not be permitted within 50 feet of the digesters.

1.3 DIGESTERS (2)

- A. Primary Digester:
 - 1. Diameter = 25 ft.

2. Height = 36 ft.
 3. Cover: fixed, steel.
- B. Secondary Digester:
1. Diameter = 25 ft.
 2. Height = 36 ft.
 3. Cover: floating, steel.
- C. Size measurements are approximate, and Contractor shall verify prior to bid. Any error in measurement will be the responsibility of Contractor.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Work will be performed under conditions best suited to the production of acceptable work.
- B. All work will be subject to approval by Engineer and Owner. Contractor will be required to correct all work that does not comply with the intent of the specifications at no extra cost to Owner.
- C. Protect all adjacent areas and surfaces from damage from power equipment.
- D. Immediately clean up all accidental spillage of any materials and restore the affected area to its original condition.
- E. It will be Contractor's responsibility to examine the site where the work is to be performed. If any conditions are noted that might affect the execution of this job, they must be brought to the Engineer's attention prior to submitting a bid.
- F. No allowances will be made for any existing and obvious condition after bids have been opened.

3.2 WORKMANSHIP

- A. Contractor is responsible for providing the best quality of workmanship performed by and under the supervision of skilled craftsman.

3.3 VESSEL CLEANING

- A. Using all the proper safety equipment, strip and remove all sidewall scum and debris. Final cleaning shall be done by water blasting.
- B. Remove all remaining scum and grit from floor of Digester. Final cleaning shall be done by water blasting.
- C. Tank shall be completely free of surface debris, grease, sand and sediment as will be the internal sludge sump area.
- D. Coordinate with Engineer to inspect the vessel. Repair any cracks marked by Engineer for repair. Get Engineer approval of repairs and cleanliness prior to concluding work on Digester.
- E. Clean Digester cover. Coordinate with Engineer to inspect cover. Coat, repair, and reinstall cover. Get Engineer approval of repairs and cleanliness before reinstalling cover.
- F. Should inspection prove the work to be unsatisfactory, Contractor will redo any unsatisfactory work at no additional cost to Owner.

END OF SECTION

SECTION 46 24 23 SLUDGE GRINDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. In-line mounted sludge grinders with motor and control panel
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Equipment - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A536, Standard Specification for Ductile Iron Castings.
 - 2. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section 01 61 03.
 - 2. Net weight of grinder only.
 - 3. Net weight with baseplate and couplings.
 - 4. Capacity versus percent solids and horsepower.
 - 5. Rotative speed.
 - 6. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations per Section 01 61 03.
- B. Contract Closeout Information:
 - a. Operation and Maintenance Data:
 - 1) See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Sludge grinders:
 - a. JWC Environmental. (Muffin Monster).
 - b. Substitutes and "or equals" are unacceptable.

2.2 MATERIALS

- A. Grinder GRI-17-100:
 - 1. Housing: Cast iron.
 - 2. Shafts: 4140 alloy steel, minimum tensile strength 180,000 psi.
 - 3. Cutting elements: 4130 alloy steel hardened to Rockwell "C" 43-48.
 - 4. Side rails: ASTM A536, ductile iron.

2.3 EQUIPMENT

A. Performance and Configuration Requirements:

1. Grinder GRI-17-100:
 - a. Capacity: 50 GPM at 2% solids.
 - b. Pressure drop at specified capacity: max 1 PSI.
 - c. Inlet/outlet size: 6 inches.
 - d. TEFC Motor size: 3 HP.
 - e. Operating pressure: 20 PSIG.
 - f. Drive shaft speed: 60 RPM.

2.4 ACCESSORIES

A. See Section 01 61 03.

B. Controls:

1. Utilize solid state electronics and PLC interface.
2. Furnish "run-off-auto" selector switch with lockout provision and indication lamps.
3. Provide reversing starters with thermal magnetic overloads.
4. Furnish dry contacts for remote indication of grinder running in forward and reverse direction and alarm condition.
5. Use current switch (Jam current sensor) to indicate jam and initiate reversing of grinder.
6. If overload (jam) occurs momentarily reverses to clear obstruction and returns to forward direction.
7. If second overload occurs, repeat action as for first overload.
8. If third overload occurs within 30 seconds, unit reverses, shuts down, and alarm bell and light come on.
9. Provide power on, (control Transformer is energized and fuses are good) forward, reverse and alarm indicating lights.
10. Provide fuse protection on all logic circuits.
11. Provide line transient protected to 1000 V.
12. Mount in wall-mounted enclosure within pump room rated for area classification.
13. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes. See Section 01 61 03 for information on how to determine the available fault current, such that, the SCCR rating meets or exceeds the available fault current.

2.5 FABRICATION

A. General:

1. Use double shaft design.
2. Fabricate to start under loaded conditions.
3. Furnish with 125 pound flanges.
4. Design for vertical or horizontal in-line mounting.
5. Design capability to operate continuously wet or dry.

B. Cutting Assembly:

1. Rotate driven shaft at approximately two-thirds the speed of the drive shaft.
2. Counter rotate shafts.
3. Equip with spacers and intermeshing five-tooth cutters.
4. Design cutters with two cutting edges on each tooth, reversible to lengthen life.
5. Entire grinder capable of reversing to utilize opposite sides of cutter teeth.

6. Furnish clean out and cover in casing.
 7. Support shafts on each end by heavy duty sealed bearings.
- C. Speed Reducer:
1. Planetary gear type.
 2. Service factor (minimum): 1.9.
 3. Load class: Heavy shock.
 4. Grease filled.
 5. Direct coupled to grinder drive shaft.
- D. Seal Configuration:
1. Mechanical-type seal:
 - a. Reverse pressure principle.
 - b. Oversized bearings.
 - c. Tungsten-carbide.
 - d. Labyrinth shield.
- E. Side Rails:
1. Provide concave inside profile of side rail to follow radial arc of cutters.
 2. Provide clearance not to exceed 5/16 inches between major diameter of the cutter and concave arc of the side rail.
- F. Couplings:
1. Provide two- and three-piece couplings.

2.6 MAINTENANCE MATERIALS

- A. Extra Materials:
1. Furnish Owner the following total extra parts for a double shaft unit:
 - a. Cutting blades: Two sets.
 - b. Seals: Two sets.
 - c. Bearings: Two sets.

PART 3 - EXECUTION

3.1 PROCUREMENT

- A. Equipment lead time can be very long (16+ weeks). Coordinate with vendor and 01 32 16 – Construction Progress Schedule to include lead time in progress schedule.

3.2 INSTALLATION

- A. See Section 01 61 03.
- B. Vertically and horizontally align, level, and plumb units to match piping interfaces as shown on Drawings.
- C. Exercise care in bolting flanged joints so that there is no restraining on the opposite end of pipe or fitting which would prevent uniform gasket pressure at connection or would cause unnecessary stresses to be transmitted to equipment flanges.
- D. Tighten flange bolts at uniform rate for uniform gasket compression. Provide tightening torque in accordance with manufacturer's recommendations.
- E. Support and match flange faces to uniform contact over their entire face area prior to installation of any bolt between the piping flange and equipment connecting flange.
- F. Permit piping connecting to equipment to freely move in directions parallel to longitudinal centerline when and while bolts in connection flange are tightened.

G. Mount controller at locations shown on Drawings.

3.3 FIELD QUALITY CONTROL

A. Employ and pay for services of equipment manufacturer's field service representative(s) to:

1. Inspect equipment covered by these Specifications.
2. Supervise pre-startup adjustments and installation checks.
3. Conduct initial startup of equipment and perform operational checks.
4. Provide Owner written statement that manufacturer's equipment has been installed properly, started up, and is ready for operation by Owner's personnel.

B. Testing, Start Up, and Commissioning:

1. All control functions of the local control panel shall be verified by Contractor and witnessed by Engineer.
2. Grinder shall complete a 7-day demonstration period with no more than 10% downtime with operating process.

END OF SECTION