EAST BAY MUNICIPAL UTILITY DISTRICT

September 3, 2024

ADDENDUM # 1

TO PROSPECTIVE BIDDERS OF SD-428, MWWTP OXYGEN PLANT REHABILITATION

Notice is hereby given that Volumes I-A, I-B, II-A, II-B, III, and IV of the SD-428 Contract Documents have been revised as follows:

VOLUME I-A – BIDDING DOCUMENTS AND SPECIFICATIONS (DIVISIONS 00-01)

1. On the Cover of Volume I-A: **REMOVE** the bid opening date of "Wednesday, September 11, 2024" and **REPLACE** with new bid opening date "Wednesday, October 9, 2024."

2. Document 00 11 13 Notice to Contractors: In the first paragraph, **REMOVE** the bid opening date of "Wednesday, September 11, 2024" and **REPLACE** with new bid opening date "Wednesday, October 9, 2024."

3. Document 00 11 13 Notice to Contractors: In the third paragraph, **REMOVE** the Operational Completion deadline of "730 calendar days" and **REPLACE** with the Operation Completion deadline of "751 calendar days."

4. Document 00 11 13 Notice to Contractors: In the third paragraph, **REMOVE** the Final Completion deadline of "790 calendar days" and **REPLACE** with the Final Completion deadline of "811 calendar days."

5. Document 00 73 05 Supplementary Requirements: Section 1.1.C.1 **REMOVE** sentence and **REPLACE** with "All work shall be operationally complete within 751 calendar days after receipt by the Contractor of the Notice to Proceed."

6. Document 00 73 05 Supplementary Requirements: Section 1.1.C.2 **REMOVE** sentence and **REPLACE** with "All work shall be complete within 811 calendar days after receipt by the Contractor of the Notice to Proceed."

7. Document 00 73 05 Supplementary Requirements: Section 1.1.C.4 **REMOVE** sentence and **REPLACE** with "One of the two oxygen plants shall be made "ready for integration programming" within three hundred eighty-six (386) calendar days after the Notice to Proceed."

8. Document 00 73 05 Supplementary Requirements: Section 1.2.A.1 **REMOVE** paragraph and **REPLACE** with "Each oxygen plant can only operate a maximum 386 days before needing to be taken offline for maintenance. For delays to the first oxygen plant's readiness for integration programming, Contractor shall deduct as liquidated damages the cost to the District for any liquid oxygen delivered to the MWWTP to allow the District to take offline the in-service oxygen plant for maintenance."

VOLUME I-B – APPENDICES

9. On the Cover of Volume I-B: **REMOVE** the bid opening date of "Wednesday, September 11, 2024" and **REPLACE** with new bid opening date "Wednesday, October 9, 2024."

10. Following Appendix B Environmental Assessment Information, B1. Metals Analysis of Paints for SD-428, **INSERT** Appendix B.2 V&A O2 Plant Corrosion Assessment Report and Appendix B.3 SW Hi-Solids Polyurethane 250 Literature.

VOLUME II-A – TECHNICAL SPECIFICATIONS (DIVISIONS 02-26)

11. On the Cover of Volume II-A: **REMOVE** the bid opening date of "Wednesday, September 11, 2024" and **REPLACE** with new bid opening date "Wednesday, October 9, 2024."

12. Specification 22 05 00 Air Compressor Motor Replacement – **REMOVE** and **REPLACE** with REVISED Specification 22 05 00 Air Compressor Motor Replacement.

13. Specification 22 05 53.05 Pipe Identification – **REMOVE** and **REPLACE** with REVISED Specification 22 05 53.05 Pipe Identification.

14. Specification 26 05 19 Low Voltage Electrical Power Conductors and Cables – **REMOVE** and **REPLACE** with REVISED Specification 26 05 19 Low Voltage Electrical Power Conductors and Cables.

    Note: Changes to Specifications 22 05 00, 22 05 53.05, and 26 05 19 are shown as follows: additions are underlined and deletions are crossed out.

VOLUME II-B – TECHNICAL SPECIFICATIONS (DIVISIONS 27-40)

15. On the Cover of Volume II-B: **REMOVE** the bid opening date of "Wednesday, September 11, 2024" and **REPLACE** with new bid opening date "Wednesday, October 9, 2024."

VOLUME III - DRAWINGS

The following listed Drawings have been revised under this Addendum. These REVISED Drawings shall **REPLACE** the respective Drawings provided with the original bid documents.

REVISED DRAWINGS		
Item No.	**Drawing Number**	**Rev No.**
	GENERAL	
17.	SD428-W4400-G001	1
MECHANICAL		
18.	SD428-W4400-M102.1D	1
19.	SD428-W4400-M102.1	1
20.	SD428-W4400-M102.2D	1
21.	SD428-W4400-M102.2	1
22.	SD428-W4400-M301	1
23.	SD428-W4400-M302	1
ELECTRICAL		
24.	SD428-W4400-E102.3D	1
25.	SD428-W4400-E102.3	1
26.	SD428-W4400-E102.4D	1
27.	SD428-W4400-E102.4	1
28.	SD428-W4400-E122	1
29.	SD428-W4400-E123	1
30.	SD428-W4400-E230D	1
31.	SD428-W4400-E230	1
32.	SD428-W4400-E317	1
33.	SD428-W4400-E503	1
34.	SD428-W4400-E503-E510	1
35.	SD428-W4400-E503-511	1
36.	SD428-W4400-E504	1
37.	SD428-W4400-E504-E510	1
38.	SD428-W4400-E504-511	1
39.	SD428-W4400-E505	1
40.	SD428-W4400-E505-E510	1
41.	SD428-W4400-E505-511	1
42.	SD428-W4400-E506	1
43.	SD428-W4400-E506-E510	1
44.	SD428-W4400-E506-E511	1

Changes to the drawings are bubbled.

VOLUME IV - DRAWINGS

The following listed Drawings have been revised under this Addendum. These REVISED Drawings shall **REPLACE** the respective Drawings provided with the original bid documents.

REVISED DRAWINGS		
Item No.	**Drawing Number**	**Rev No.**
	STRUCTURAL	
45.	SD428-W4400-S011	1
FIRE PROTECTION		
46.	SD428-W4400-FP101	1

Changes to the drawings are bubbled.

BIDDERS MUST ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE BID FORM FOR CONSIDERATION OF THE BID BY THE DISTRICT.

Garin Warren
GARIN D. WARREN
Manager of Wastewater Engineering

APPENDIX B
ENVIRONMENTAL ASSESSMENT
INFORMATION

B2. V&A O2 Plant Corrosion Assessment Report

APPENDIX B

B2. V&A O2 Plant Corrosion Assessment Report

Cryogenic High Purity Oxygen Facilities Condition Assessment

East Bay Municipal Utilities District







Prepared for:

Jason Jancaitis
Project Manager
Woodard & Curran
101 Montgomery Street, Suite 1850
San Francisco, CA 94104

Date: July 13, 2021

Prepared by:

V&A consulting engineers

V&A Project No. 20-0273

In the promotion of environmental consciousness, this document is designed to be printed double-sided, if at all. V&A strives to do all it can to be a green company. Think twice before printing. Reduce. Reuse. Recycle.

Table of Contents

1 Executive Summary 1
1.1 North Cold Box and Piping 1
1.2 South Cold Box and Piping 1
2 Introduction 2
3 Approach 3
3.1 Protective Coating Assessment Methods 3
3.1.1 Dry Film Thickness (DFT) 3
3.1.2 Coating Condition 3
3.1.3 Coating Sample Testing 4
3.2 Metal Assessment Methods 5
3.2.1 Pit Depth 5
3.2.2 Ultrasonic Testing (UT) Measurements 5
3.3 Visual Assessment 6
3.3.1 VANDA® Metal Condition Index 7
4 Findings 8
4.1 North Cold Box and Piping 8
4.1.1 Visual Assessment 8
4.1.2 Dry Film Thickness (DFT) 11
4.1.3 Coating Sample Testing 11
4.1.4 Ultrasonic Testing (UT) Measurements 13
4.2 South Cold Box and Piping 14
4.2.1 Visual Assessment 14
4.2.2 Dry Film Thickness (DFT) 15
4.2.3 Coating Sample Testing 15
4.2.4 Ultrasonic Testing (UT) Measurements 16
4.3 Recoating Options 17
4.3.1 Surface Preparation 17
4.3.2 Coating Application 18
5 Conclusions 20
5.1 North Cold Box and Piping 20
5.2 South Cold Box and Piping 20

6 Recommendations 21
6.1 North Cold Box and Piping 21
6.2 South Cold Box and Piping 21

Tables

Table 3-1. Rating Guide for Coating Condition per ASTM D610 4
Table 3-2. Tested Metals in Coating Sample 5
Table 3-3. VANDA® Metal Condition Index 7
Table 4-1. Summary of DFT Measurements for North Cold Box and Piping 11
Table 4-2. Summary of Coating Sample Testing – North Cold Box Exterior Coating 12
Table 4-3. Summary of Coating Sample Testing – North Cold Box Exterior Base Coating 12
Table 4-4. Summary of UT Measurements for the North Cold Box and Piping 13
Table 4-5. Summary of DFT Measurements for South Cold Box and Piping 15
Table 4-6. Summary of Coating Sample Testing – South Cold Box Exterior Coating 16
Table 4-7. Summary of UT Measurements for the South Cold Box and Piping 17
Table 4-4. Comparison of Recoating vs. Overcoating the Tank Exterior 19

Figures

Figure 2-1. Satellite View of HPO Facilities 2
Figure 3-1. Examples of General Rust Grade Ratings per ASTM D610 3
Figure 3-2 Grid Testing Pattern on Tank Wall 6
Figure 3-3 Clock Positions on Pipe Looking D/S 6

Photo Log

Photo 4-1. Lower north side of the tank shell exhibits coating delamination and light corrosion. 8
Photo 4-2.Typical coating delamination on the pipe penetrations and ice forming at the threads. 8
Photo 4-3. Light corrosion on the turbine duct on the northwest side of the cold box. 9
Photo 4-4. Side view of turbine duct box exhibits light corrosion. Underside is in VANDA Level 3 condition. 9
Photo 4-5. Ice forming on piping and tank wall is in VANDA Level 2 condition. 9
Photo 4-6. Melting ice has contributed to the light corrosion observed on the tank lower surfaces. 9
Photo 4-7. VANDA Level 2 corrosion on a manifold on the south side of the tank. 9
Photo 4-8. No significant corrosion was visible on the non-insulated areas of the switch valve 9
Photo 4-9. Typical VANDA Level 2 condition on the piping due to corrosion failures. 10
Photo 4-10. Typical VANDA Level 2 condition on the edges of the flanges, nuts, and bolts. 10
Photo 4-11. Ice forming on the valve at the second platform down from the top of the tank. 10
Photo 4-12. Cracked coating on an elbow at the second platform. 10
Photo 4-13. VANDA Level 2 condition on the underside of the Turbine Duct. 14
Photo 4-14. Detail view of VANDA Level 2 condition on the underside of the Turbine Duct. 14
Photo 4-15. VANDA Level 2 condition on the lower piping leading to the Thaw Heater. 14
Photo 4-16. Detail view of the lower piping leading to the Thaw Heater. 14
Photo 4-17. Coating failures on the surfaces of the upper pipe. 15
Photo 4-18. The tank shell is in good condition. Minor corrosion observed on the valve cover. 15
Photo 4-19. Power tool cleaning only removes loose coating.(Photo courtesy of Line 10 Tools). 18
Photo 4-20. Ultra high pressure water jetting on a concrete structure. 18
Photo 4-21. Application with rollers and brushes. 18
Photo 4-22. Full containment is required for abrasive blasting. 18

Abbreviations and Acronyms

Abbreviations/Acronyms	Definition
ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AVG.	Average
CCR	California Code of Regulations
CFR	Code of Federal Regulations
DFT	Dry Film Thickness
DIA.	Diameter
DIRECT.	Direction
EBMUD	East Bay Municipal Utilities District
EPA	Environmental Protection Agency
FT.	Feet
HPO	High Purity Oxygen
IN.	Inch
ISO.	International Standard Organization
LOTO	Lockout/tag-out
MWWTP	Main Wastewater Treatment Plant
MAX.	Maximum
MG	Million of Gallons
MIN.	Minimum
N/A	Not applicable
SSPC	Steel Structures Painting Council
TCLP	Toxicity Characteristic Leaching Procedure
TTLC	Total Threshold Limit Concentration
UHPWJ	Ultra-High Pressure Water Jetting
UT	Ultrasonic Thickness
V&A	V&A Consulting Engineers, Inc.
VANDA®	V&A Condition Index
WS	Welded Steel

1 Executive Summary

V&A Consulting Engineers, Inc. (V&A) was retained by Woodard & Curran to complete the condition assessment of the two cryogenic high purity oxygen (HPO) production plants located at the East Bay Municipal Utilities District (EBMUD) Main Wastewater Treatment Plant (MWWTP) in Oakland, California. The two cryogenic HPO production plants were built in 1973 and supply 80 to 85 tons/day of 95 percent purity oxygen each. EBMUD intends to rehabilitate the existing facility to prolong its useful life by an additional 20 to 30 years.

On April 20, 2021 and May 11, 2021, V&A completed the condition assessment of the north cold box, south cold box, and associated piping using numerous methods to characterize the condition of the metal and coatings. The results will be used by V&A to prepare the coating specification as a part of the HPO production plants rehabilitation design.

Based on the results of the assessment, V&A offers the following recommendations for Woodard & Curran and EBMUD to consider:

1.1 North Cold Box and Piping

1. Due to the difficulty of trying to scan the entire lower exterior surface of the cold box to determine the remaining thickness, it is recommended that an interior assessment of the cold box be conducted to determine extent of corrosion. If this is not possible, install a weld repair plate above the box shown in Photo 4-11 on the northeast side of the tank.
2. Repair the leaks on the piping between the Make and Add valves, V350X pipe, and V330A pipe penetrations.
3. Repair the leak on the flow control valve FV340N.
4. Require all coatings work to be done in accordance with Title 29 CFR 1926.62 lead paint exposure protections of the OSHA standards and any state and local regulations.
5. Remove all existing exterior coatings using UHPWJ or soft media blasting and lead abatement measures on the lower 8 feet of the cold box. The coating specification should require a protection plan for all of the piping and tubing that exists on the exterior of the piping. The protection plan may include temporary shrouds or PVC pipe wrapped around the pipes. Provide a complete recoating to the entire exterior surface using one coat of a zinc primer, one coat of epoxy, and one finish coat of a polysiloxane or aliphatic polyurethane (Option 1 per Table 4-4).

1.2 South Cold Box and Piping

1. Require all coatings work to be done in accordance with Title 29 CFR 1926.62 lead paint exposure protections of the OSHA standards and any state and local regulations.
2. Remove all existing exterior coatings using UHPWJ or soft media blasting and lead abatement measures on the lower 8 feet of the cold box. The coating specification should require a protection plan for all of the piping and tubing that exists on the exterior of the piping. The protection plan may include temporary shrouds or PVC pipe wrapped around the pipes. Provide a complete recoating to the entire exterior surface using one coat of a zinc primer, one coat of epoxy, and one finish coat of a polysiloxane or aliphatic polyurethane (Option 1 per Table 4-4).

2 Introduction

V&A Consulting Engineers, Inc. (V&A) was retained by Woodard & Curran to complete the condition assessment of the two cryogenic high purity oxygen (HPO) production plants located at the East Bay Municipal Utilities District (EBMUD) Main Wastewater Treatment Plant (MWWTP) in Oakland, California. The two cryogenic HPO production plants were built in 1973 and supply 80 to 85 tons/day of 95 percent purity oxygen each. EBMUD intends to rehabilitate the existing facility to prolong its useful life by an additional 20 to 30 years.

V&A performed a condition assessment of the north cold box, south cold box, and associated piping on April 20, 2021 and May 11, 2021. Assessment of the LOX storage tanks were not included under this project scope. The purpose of the assessment was to assess the integrity of the metal and existing coating systems on the HPO facilities. The results will be used by V&A to prepare the coating specification as a part of the HPO production plants rehabilitation design. Figure 1-1 shows a satellite view of the HPO facilities.

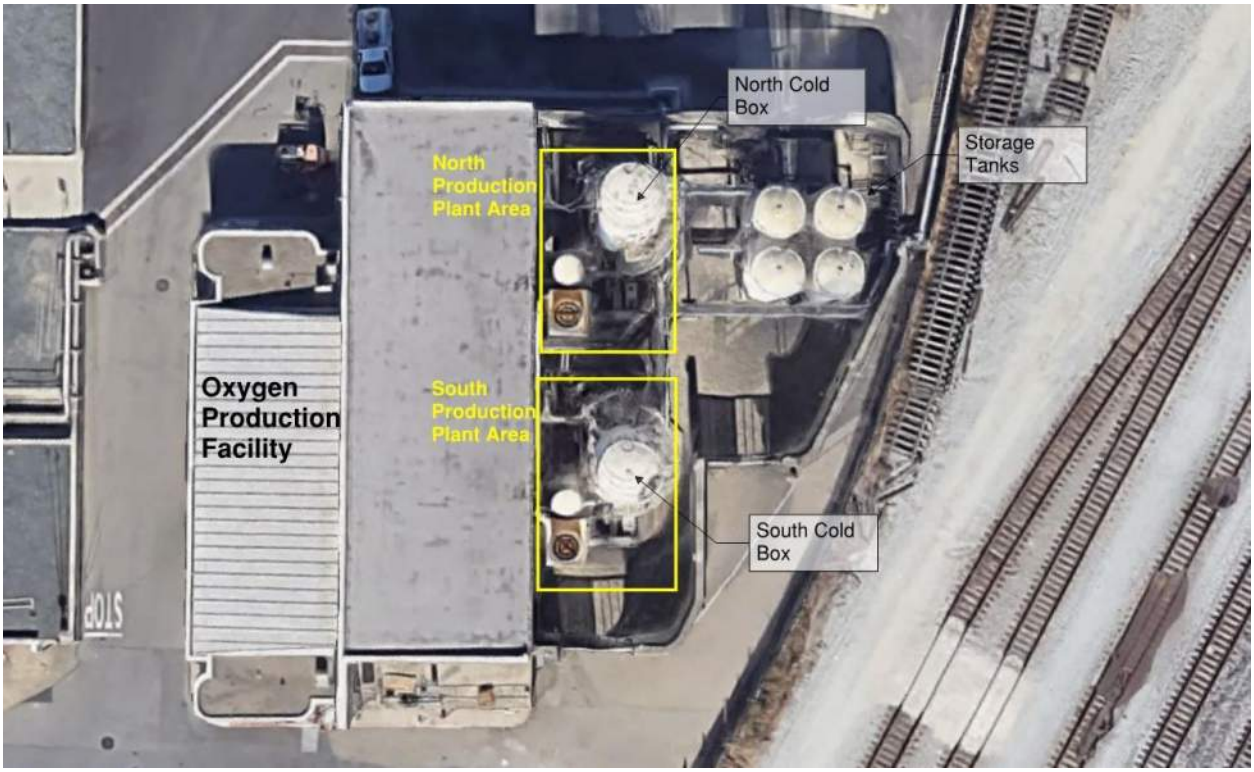


Figure 2-1. Satellite View of HPO Facilities

3 Approach

3.1 Protective Coating Assessment Methods

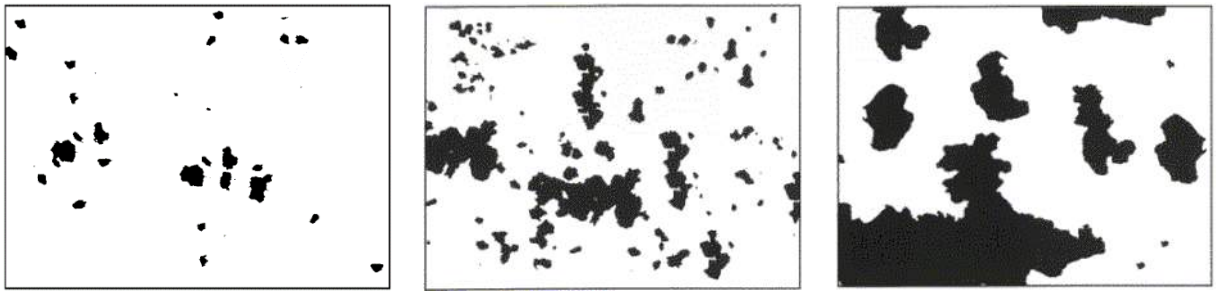
3.1.1 Dry Film Thickness (DFT)

V&A conducted dry film thickness (DFT) testing on the exterior surfaces of the tanks. DFT is the thickness of a coating after it has cured. A DFT gauge uses electromagnetic induction or eddy current technology to measure the thickness of a wide variety of coatings on metal surfaces. V&A used a gauge that can measure coatings up to 0.2 inches (200 mils) in thickness.

International Standard Organization (ISO) No. 12944 recommends a protective coating system thickness of 12 to 15 mils for very high corrosive industrial and marine service environments similar to the EBMUD WWTP.

3.1.2 Coating Condition

Coating condition was evaluated using ASTM D610-01, Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces, which provides ratings for coating condition. Figure 3-1 shows pictorial examples of general corrosion ratings. Similar rating scales are available for pinpoint and spot corrosion. Table 3-1 summarizes the rating scale developed by ASTM D610-01, which V&A used for assessing coating condition on various structures and pipelines.



Rust Grade 5-G, 3% Rusted | Rust Grade 3-G, 16% Rusted | Rust Grade 2-G, 33% Rusted

Figure 3-1. Examples of General Rust Grade Ratings per ASTM D610

Table 3-1. Rating Guide for Coating Condition per ASTM D610

Rating Scale	Percent of Surface Exhibiting Corrosion	Spot	General	Pinpoint
9	Greater than 0.01% and up to 0.03%	9-S	9-G	9-P
8	Greater than 0.03% and up to 0.1%	8-S	8-G	8-P
7	Greater than 0.1% and up to 0.3%	7-S	7-G	7-P
6	Greater than 0.3% and up to 1%	6-S	6-G	6-P
5	Greater than 1% and up to 3%	5-S	5-G	5-P
4	Greater than 3% and up to 10%	4-S	4-G	4-P
3	Greater than 10% and up to 16%	3-S	3-G	3-P
2	Greater than 16% and up to 33%	2-S	2-G	2-P
1	Greater than 33% and up to 50%	1-S	1-G	1-P
0	Greater than 50%	No rating given		

3.1.3 Coating Sample Testing

Coating samples collected at the evaluator's discretion were tested at Enthalpy Analytical for heavy metals in accordance with Environmental Protection Agency (EPA) Method 6010B and 7471A. The Total Threshold Limit Concentration (TTLC) from California Code of Regulations (CCR) Title 22, §66261.24 Table II is presented for each tested metal in parts per million (ppm) in Table 3-2. The TTLC values are used as a preliminary screening test to plan for hazardous waste disposal procedures and to determine if lead abatement procedures will be required. If a paint sample exceeds the TTLC limit, any work that is performed on the coating, such as welding or abrasive blasting, will require hazardous material handling for personnel.

If the California lead concentration limit of 600 ppm (0.06% by weight) is exceeded, it will require lead abatement procedures per CCR Title 8, §1532.1. The requirement for worker health and safety measures during the removal of a lead-based paint depends on the amount of airborne lead to which the workers will be exposed during a specified length of time as outlined in CCR Title 8 §1532.1. It states that "…the employer shall not expose an employee to lead at a concentration greater than 30 micrograms per cubic meter of air ($\mu g/m^3$) averaged over an 8-hour period." V&A recommends including lead abatement in coating specifications whenever lead concentrations of existing coatings exceed 600 ppm.

The waste that is generated during the abrasive blasting of the surfaces to be coated must be tested per Toxicity Characteristic Leaching Procedure (TCLP) before the waste can be removed from the job site. If the TCLP results from the waste exceed the limits of CCR Title 22, §66261.24 Table I, then it must be classified as hazardous waste requiring an EPA manifest and permit before being disposed of at a hazardous waste disposal site.

Table 3-2. Tested Metals in Coating Sample

Metal	TTLC (ppm)
Antimony	500
Arsenic	500
Barium	10,000
Beryllium	75
Cadmium	100
Chromium	2,500
Cobalt	8,000
Copper	2,500
Lead	1,000
Mercury	20
Molybdenum	3,500
Nickel	2,000
Selenium	100
Silver	500
Thallium	700
Vanadium	2,400
Zinc	5,000

3.2 Metal Assessment Methods

3.2.1 Pit Depth

Pitting corrosion, or pitting, is a form of extremely localized corrosion that creates small holes in metal. If pits were encountered, the pit depths were measured using a pit depth gauge. If the nominal thickness of the metal is known, the percent of metal wall thickness loss can be calculated. The gauge is held above the pit to be measured with the lower edge flush against the metal surface. The pointer is inserted into the pit and the depth is read off the calibrated scale on the right. If the pit depth is greater than the wall thickness, then a through-hole has been identified.

3.2.2 Ultrasonic Testing (UT) Measurements

Ultrasonic testing (UT) is a non-destructive evaluation technique used for the determination of metal wall thickness. High-frequency sound waves are transmitted through one side of a metal wall from a transducer. When the sound waves reach the other side of the metal wall, a fraction of the waves will echo back to the transducer. The metal thickness is determined by recording the time it takes for the sound wave to travel through the metal and return.

A-scan point measurements were performed for the tanks and piping. For tank walls, measurements were recorded at about 1-foot intervals up and across the wall exterior surface (Figure 3-2). For pipes, measurements were made around the pipe circumference and were referenced to clock positions (e.g., 12:00, 3:00, 6:00, or 9:00) viewed in the downstream direction (Figure 3-3).

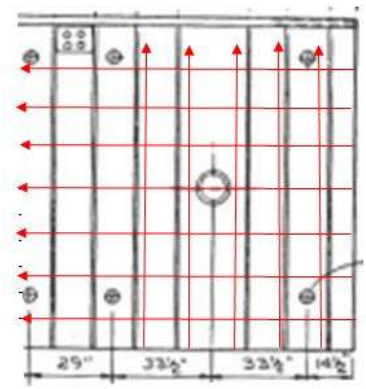


Figure 3-2 Grid Testing Pattern on Tank Wall

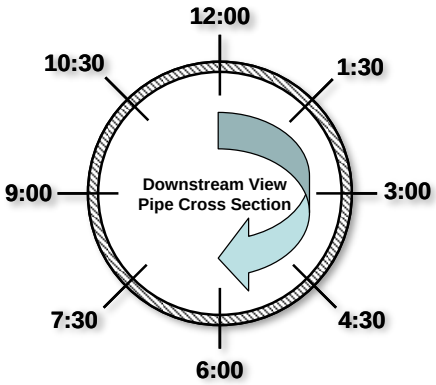


Figure 3-3 Clock Positions on Pipe Looking D/S

3.2.2.1 Metal Loss Calculations

When record drawings are not available, the number of UT readings taken, the consistency of the readings, and a review of the standards for the material that is tested allow V&A to assume a nominal wall thickness. The wall loss calculations are calculated by dividing the lowest metal thickness recorded and dividing it by the assumed nominal thickness. The maximum wall loss value does not indicate that metal loss is uniform throughout the whole structure tested. A more detailed survey would be required to make that determination and it is not part of the scope of this project. Note that the actual nominal thickness may differ from the value V&A has assumed due to manufacturing tolerances, and, as a result, the actual wall loss calculations would also differ from the wall loss presented in this report.

3.3 Visual Assessment

Metal defects, such as metallic corrosion, pitting, were documented with digital photographs. Visual assessments are subjective in nature and are based on V&A's experience evaluating metallic structures in water and harsh atmospheric environments.

3.3.1 VANDA® Metal Condition Index

V&A created the VANDA Metal Condition Index (Table 3-3) to provide consistent reporting of corrosion damage based on objective criteria. Metal condition is rated from Level 1 to Level 5 based upon field observations and measurements, with Level 1 indicating the best case and Level 5 indicating severe damage. The individual criteria are applied based on engineering judgment to arrive at the overall rating.

Table 3-3. VANDA® Metal Condition Index

Condition Rating	Description	Representative Photograph
Level 1	**Little or no corrosion** ▪ Wall thickness loss, general .....none ▪ Wall thickness loss, pitting.....none to minimal ▪ Extent (area) of corrosion.....may be widespread but superficial	
Level 2	**Minor corrosion** ▪ Wall thickness loss, general .....up to 20% ▪ Wall thickness loss, pitting.....up to 20% ▪ Extent (area) of corrosion.....localized	
Level 3	**Moderate corrosion** ▪ Wall thickness loss, general .....20% to 40% ▪ Wall thickness loss, pitting.....20% to 60% ▪ Extent (area) of corrosion.....up to half of surface	
Level 4	**Severe corrosion** ▪ Wall thickness loss, general .....40% to 60% ▪ Wall thickness loss, pitting.....60% to 100% (pinholes) ▪ Extent (area) of corrosion.....most of surface	
Level 5	**Failure or imminent failure** ▪ Wall thickness loss, general .....greater than 60% ▪ Wall thickness loss, pitting.....100% (holes) ▪ Extent (area) of corrosion.....most or all of surface	

© 2020 V&A Consulting Engineers, Inc. All rights reserved.

4 Findings

4.1 North Cold Box and Piping

The North Cold Box is a carbon steel tank with a nominal diameter of 12.5 feet and a nominal height of 64 feet. V&A's condition assessment of the North Cold Box and Piping consisted of a visual assessment, dry film thickness measurements, coating sample analysis, and ultrasonic thickness measurements.

4.1.1 Visual Assessment

The upper seven shell courses and dome roof are in very good condition and are rated 9G in accordance with ASTM D610. The bottom shell course is rated 4G due to the light corrosion observed.

Photo 4-1 and Photo 4-2 show the typical condition of the existing coating system on the tank wall and around the pipe penetrations. The coating is delaminated and cracked, which has exposed the steel to the marine atmosphere. Photo 4-3 and Photo 4-4 show the turbine box on the north side of the tank, which also has light corrosion. Photo 4-5 and Photo 4-6 show the leak at a pipe segment between the Make and Add Masoneilan valves, which has allowed ice to form on the exterior. The melting ice has contributed to some of the corrosion observed on the cold box shell. Photo 4-7 shows the corrosion on a manifold on the south side of the cold box. UT measurements indicated negligible corrosion. Photo 4-8 shows minor corrosion on the flanges, but otherwise fair condition of the switch valve. Photo 4-9 and Photo 4-10 show the coating failures on the Thaw Heater on the west side of the cold box. A small formation of ice was observed on the northeast side of the tank above a box that was welded on the shell of the tower. The formation of ice shown in Photo 4-11 indicates that there is likely a perforation in the shell of the tank. Photo 4-12 shows poor adhesion of the coating near the bottom of the x-cut test per ASTM D6677. Photo 4-13 shows ice forming around a leaking valve on the upper surfaces of the cold box. Photo 4-14 shows the cracked coating on the elbow on the second platform from the top of the tank.



Photo 4-1. Lower north side of the tank shell exhibits coating delamination and light corrosion.



Photo 4-2.Typical coating delamination on the pipe penetrations and ice forming at the threads.



Photo 4-3. Light corrosion on the turbine duct on the northwest side of the cold box.



Photo 4-4. Side view of turbine duct box exhibits light corrosion. Underside is in VANDA Level 3 condition.



Photo 4-5. Ice forming on piping and tank wall is in VANDA Level 2 condition.



Photo 4-6. Melting ice has contributed to the light corrosion observed on the tank lower surfaces.



Photo 4-7. VANDA Level 2 corrosion on a manifold on the south side of the tank.



Photo 4-8. No significant corrosion was visible on the non-insulated areas of the switch valve .



Photo 4-9. Typical VANDA Level 2 condition on the piping due to coating failures.



Photo 4-10. Typical VANDA Level 2 condition on the edges of the flanges, nuts, and bolts.



Photo 4-11. Ice forming on a pinhole leak and coating delamination surrounding it.



Photo 4-12. Coating adhesion test indicates a rating of 6 out of 10 per ASTM D6677.



Photo 4-13. Ice forming on the valve at the second platform down from the top of the tank.



Photo 4-14. Cracked coating on an elbow at the second platform.

4.1.2 Dry Film Thickness (DFT)

A total of 29 coating thickness (or DFT) measurements were taken on the coating of the tank. The minimum, average, and maximum DFT measurements from each location are summarized in Table 4-1. International Standard Organization (ISO) No. 12944 recommends a protective coating system thickness of 12 to 15 mils for very high corrosive industrial and marine service environments similar to the EBMUD WWTP.

The average DFT of the exterior coating of Shell Course 7 meets the recommended DFT of ISO 12944. Shell Course 8 does not meet the recommended DFT.

Table 4-1. Summary of DFT Measurements for North Cold Box and Piping

Location	Minimum (mils)	Maximum (mils)	Average (mils)
Shell Course 7	10.1	24.0	15.3
Shell Course 8	5.9	16.5	10.8

4.1.3 Coating Sample Testing

Two coating samples were collected from the exterior of the North Cold Box. One sample was collected from a pipe penetration and one from a steel anchor near the bottom of the tank. The sample contained the red primer and the white topcoat. The samples were analyzed for seventeen heavy metals by Enthalpy Analytical, using EPA Method 6010B and 7471A. The results of the coating sample testing are summarized in Table 4-2 and Table 4-3.

The results from the laboratory analysis indicate elevated levels of lead in both samples. The reported level of lead in the exterior coating requires the use of extensive lead containment encapsulation structures and personal exposure monitoring if the coating is removed by abrasive blasting. All work should be in accordance with CCR Title 8, §1532.1and any state and local regulations.

Pressure washing and power tool cleaning the existing coating will require capturing and testing the run-off water and will require the use of HEPA filters on power tools. These methods can provide effective environmental and worker protection at a reduced cost.

Table 4-2. Summary of Coating Sample Testing – North Cold Box Exterior Coating

Tested Metal	Sample Result (ppm)	Over TTLC?
Antimony	ND	No
Arsenic	2.9	No
Barium	4,700	No
Beryllium	ND	No
Cadmium	3.3	No
Chromium	220	No
Cobalt	120	No
Copper	190	No
Lead	3,000	Yes
Mercury	ND	No
Molybdenum	110	No
Nickel	50	No
Selenium	ND	No
Silver	ND	No
Thallium	ND	No
Vanadium	ND	No
Zinc	830	No

Table 4-3. Summary of Coating Sample Testing – North Cold Box Exterior Base Coating

Tested Metal	Sample Result (ppm)	Over TTLC?
Antimony	ND	No
Arsenic	3.9	No
Barium	4,300	No
Beryllium	ND	No
Cadmium	46	No
Chromium	370	No
Cobalt	110	No
Copper	240	No
Lead	3,100	Yes
Mercury	ND	No
Molybdenum	41	No
Nickel	400	No
Selenium	ND	No
Silver	ND	No
Thallium	ND	No
Vanadium	3.2	No
Zinc	1,900	No

4.1.4 Ultrasonic Testing (UT) Measurements

UT measurements were recorded at each shell course and on accessible piping around the cold box. The thickness readings recorded, and associated conclusions only apply to where the measurements were taken. The minimum, average, and maximum UT measurements from each location is summarized in Table 4-4. Pitting was not observed on the cold box and piping; therefore, a pit gauge was not used.

The schedule number could not be determined in the field or from available drawings; therefore, an assumed thickness was used to determine the appropriate maximum wall loss. The wall loss analysis does not account for differences in nominal thicknesses due to manufacturing tolerances.

The maximum metal loss on the cold box was 9%, which was measured at shell 8. The maximum metal loss on the piping was 43%, which was measured at the box weld plates shown in Photo 4-11.

Table 4-4. Summary of UT Measurements for the North Cold Box and Piping

Location	Minimum (inch)	Average (inch)	Maximum (inch)	Nominal (inch)	Maximum Metal Loss (%)
Cold Box Shell 1	0.243	0.243	0.243	0.250	3
Cold Box Shell 2	0.252	0.252	0.253	0.250	0
Cold Box Shell 3	0.249	0.250	0.250	0.250	0
Cold Box Shell 4	0.239	0.240	0.242	0.250	4
Cold Box Shell 5	0.302	0.303	0.304	0.313	3
Cold Box Shell 6	0.382	0.382	0.383	0.375	0
Cold Box Shell 7	0.504	0.504	0.504	0.500	0
Cold Box Shell 8 (South)	0.523	0.527	0.539	0.563	7
Cold Box Shell 8 (Northeast)	0.512	0.517	0.529	0.563	9
Cold Box Shell 8 (Southwest)	0.515	0.517	0.519	0.563	8
3” Pipe to Thaw Heater	0.212	0.223	0.231	0.216	2
8” Top Pipe to Thaw Heater	0.264	0.276	0.283	0.322	18
8” Bottom Pipe to Thaw Heater	0.283	0.289	0.296	0.322	12
Turbine Duct, Northwest	0.249	0.255	0.265	0.250	0
Turbine Duct, Northeast	0.240	0.243	0.245	0.250	4
Turbine Duct, Underside Plate	0.497	0.509	0.520	0.500	0
Turbine Duct, Side Plate	0.245	0.245	0.245	0.250	2
Northeast Lower Nozzle (Photo 4-6)	0.492	0.510	0.542	0.500	2
East Box Weld Plates	0.502	0.665	0.827	0.875	43
East Box Vertical Plates	0.826	0.913	0.999	1.000	17
2” V350X / V350A Piping	0.498	0.509	0.519	0.500	0
6” S330A Pipe	0.274	0.282	0.290	0.280	2
6” S600X Pipe	0.272	0.279	0.289	0.280	3
12” S330 Reducer	0.365	0.372	0.379	0.375	3
12” S330 Pipe	0.253	0.259	0.276	0.250	0
12” S330 Cap	0.391	0.403	0.409	0.406	4

4.2 South Cold Box and Piping

The upper seven shell courses and dome roof are in very good condition and are rated 9G in accordance with ASTM D610. The bottom shell course is rated 4G due to the light corrosion observed.

The South Cold Box is a carbon steel tank with a nominal diameter of 12.5 feet and a nominal height of 64 feet. V&A's condition assessment of the South Cold Box and Piping consisted of a visual assessment, dry film thickness measurements, coating sample analysis, and ultrasonic thickness measurements. The cold box was not in service during V&A's site visit and, therefore, may not be representative of normal operating conditions.

4.2.1 Visual Assessment

Photo 4-15 and Photo 4-16 show the underside of the turbine duct box on the north side of the cold box. Metal thickness measurements on these surfaces indicated up to 46% metal loss which assumes a 0.522 inch nominal thickness. Photo 4-17 and Photo 4-19 show the coating failures on the Thaw Heater piping on the west side of the cold box. Photo 4-20 shows the good condition of the tank shell and minor corrosion on the valve cover.



Photo 4-15. VANDA Level 2 condition on the underside of the Turbine Duct.



Photo 4-16. Detail view of VANDA Level 2 condition on the underside of the Turbine Duct.



Photo 4-17. VANDA Level 2 condition on the lower piping leading to the Thaw Heater.



Photo 4-18. Detail view of the lower piping leading to the Thaw Heater.



Photo 4-19. Coating failures on the surfaces of the upper pipe.



Photo 4-20. The tank shell is in good condition. Minor corrosion observed on the valve cover.

4.2.2 Dry Film Thickness (DFT)

A total of 34 coating thickness, or DFT, measurements were taken on the coating of the tank. The minimum, average, and maximum DFT measurements from each location are summarized in Table 4-5. International Standard Organization (ISO) No. 12944 recommends a protective coating system thickness of 12 to 15 mils for very high corrosive industrial and marine service environments similar to the EBMUD WWTP.

The average DFT of the exterior coating at the two lower shell courses meets the DFT requirements of ISO 12944.

Table 4-5. Summary of DFT Measurements for South Cold Box and Piping

Location	Minimum (mils)	Maximum (mils)	Average (mils)
South Cold Box Shell 7	10.5	15.9	12.7
South Cold Box Shell 8	8.8	21.9	13.9

4.2.3 Coating Sample Testing

A coating sample was collected from the piping on the lower exterior of the South Cold Box. The sample contained the red primer and the white topcoat. The sample was analyzed for seventeen heavy metals by Enthalpy Analytical, using EPA Method 6010B and 7471A. The results of the coating sample testing are summarized in Table 4-6.

The results from the laboratory analysis indicate elevated levels of lead. The reported level of lead in the exterior coating requires the use of extensive lead containment encapsulation structures and personal exposure monitoring if the coating is removed by abrasive blasting. All work should be in accordance with CCR Title 8, §1532.1and any state and local regulations.

Pressure washing and power tool cleaning the existing coating will require capturing and testing the run-off water, and will require the use of HEPA filters on power tools. These methods can provide effective environmental and worker protection at a reduced cost.

Table 4-6. Summary of Coating Sample Testing – South Cold Box Exterior Coating

Tested Metal	Sample Result (ppm)	Over TTLC?
Antimony	ND	No
Arsenic	6.8	No
Barium	3,800	No
Beryllium	ND	No
Cadmium	8.4	No
Chromium	230	No
Cobalt	97	No
Copper	120	No
Lead	1,900	Yes
Mercury	ND	No
Molybdenum	25	No
Nickel	67	No
Selenium	ND	No
Silver	ND	No
Thallium	ND	No
Vanadium	ND	No
Zinc	2,400	No

4.2.4 Ultrasonic Testing (UT) Measurements

UT measurements were recorded at each shell course, on the roof, and on accessible piping around the cold box. The thickness readings recorded, and associated conclusions only apply to where the measurements were taken. The minimum, average, and maximum UT measurements from each location are summarized in Table 4-7.

The schedule number could not be determined in the field or from available drawings; therefore, an assumed thickness was used to determine the appropriate maximum wall loss. The wall loss analysis does not account for differences in nominal thicknesses due to manufacturing tolerances.

The maximum metal loss on the cold box was 11%, which was measured at shell 8. The maximum metal loss on the piping was 26%, which was measured at the 2” V330A Pipe.

Pitting was not observed on the cold box and piping; therefore, a pit gauge was not used.

Table 4-7. Summary of UT Measurements for the South Cold Box and Piping

Location	Minimum (inch)	Average (inch)	Maximum (inch)	Nominal (inch)	Maximum Metal Loss (%)
Cold Box Roof	0.308	0.312	0.316	0.313	1
Cold Box Shell 1, top	0.249	0.251	0.252	0.250	0
Cold Box Shell 2	0.245	0.246	0.247	0.250	2
Cold Box Shell 3	0.237	0.238	0.239	0.250	5
Cold Box Shell 4	0.255	0.256	0.256	0.250	0
Cold Box Shell 5	0.302	0.303	0.304	0.313	3
Cold Box Shell 6	0.359	0.360	0.361	0.375	4
Cold Box Shell 7	0.503	0.504	0.504	0.500	0
Cold Box Shell 8, bottom	0.498	0.504	0.521	0.563	11
8” Top Pipe to Vertical Tank	0.272	0.282	0.300	0.322	16
8” Bottom Pipe to Vertical Tank	0.270	0.283	0.292	0.322	16
Northwest Side Box	0.232	0.232	0.232	0.250	7
Northwest Side Box Bottom	0.219	0.251	0.268	0.250	12
Northeast Side Box	0.239	0.241	0.242	0.250	4
Northeast Side Box Bottom	0.241	0.414	0.522	0.522	46
8” Northeast Pipe Bottom of Tank	0.829	0.829	0.829	0.875	5
2” V330A Pipe	0.410	0.469	0.527	0.552	26
X600X-1 Reducer	0.351	0.368	0.387	0.375	6
12” X600X-1 Pipe	0.242	0.247	0.250	0.250	3
12” X600X-1 Elbow	0.364	0.375	0.386	0.375	3
12” X600X-1 Cap	0.403	0.415	0.424	0.406	1
6” X600X-1 Pipe	0.269	0.278	0.286	0.280	4
6” X600X-2 Pipe	0.250	0.272	0.294	0.280	11

4.3 Recoating Options

In 2020, the top seven shell courses of both cold boxes were prepared with high pressure water blasting and coated with an epoxy and aliphatic polyurethane system. It is unknown why the lower shell course of the cold boxes was not coated however it may be due to the amount of obstructions (piping) attached to the tank that made it difficult to prepare properly.

4.3.1 Surface Preparation

Abrasive blasting with hard media is not feasible if the existing pipe penetrations remain in place due to the damage that it can cause. The area impacted by abrasive blasting material can be as wide as 12 inches and will perforate small tubes or other thin-wall materials. Ultra-high pressure water jetting (UHPWJ) or soft media blasting is capable of removing all of the existing lead-based paint without causing severe damage to the existing piping, instrumentation, and pipe penetrations. This method of surface preparation is recommended if most of the existing piping and instrumentation remains in place on the cold box. However, UHPWJ does not create the surface profile on the steel that is required

by coating manufacturers. The coating contractor would have to rely on the existing surface profile to provide a sufficient anchor profile before applying a new primer.

There are two coating options that will be considered for the lower exterior 8 feet of the tank shell: (1) Remove all existing coatings by use of ultra-high pressure water jetting (UHPWJ) or soft media blasting and reapply the new coating system, and (2) Perform spot repairs by lightly abrading the surface using vacuum-shrouded power tools to remove the lead-based paint and overcoat with a new finish coat.

Hand tool cleaning (SSPC SP 2), power tool cleaning (SSPC SP 3) and power tool cleaning to bare metal (SSPC SP 11) are all possible surface preparation options also. Photo 4-21 shows an example of a power tool being used to abrade a tank surface. However, the production rate will be less than UHPWJ (Photo 4-22) and will not remove the existing coating in areas that inaccessible by the hand and power tools.



Photo 4-21. Power tool cleaning only removes loose coating.(Photo courtesy of Line 10 Tools).



Photo 4-22. Ultra high pressure water jetting on a concrete structure.

4.3.2 Coating Application

The coating application on the lower 8 feet of the cold boxes will be straight forward with a containment system. Small areas around pipe penetrations and flanges will have to be coated with small brushes and rollers similar to Photo 4-23. The removal of the existing lead-based paint will require full containment as shown in Photo 4-24. The containment system would help contain paint chips and would help control the ambient environment when the new coating is applied. It allows more flexibility to the contractor. The full containment will also help alleviate concerns of dust and coating overspray on surrounding equipment.



Photo 4-23. Application with rollers and brushes.



Photo 4-24. Full containment is required for abrasive blasting.

As specified in EBMUD project SD-411 Coating System 2, a three-coat system consisting of one coat of a zinc primer, one coat of a two-component epoxy, and a finish coat of a two-component aliphatic polyurethane was required on atmospherically exposed metals. This coating system is best for steel surfaces that can be prepared to SSPC SP 6 commercial blast standards due to the requirements of the zinc primer. The zinc primer may not adhere well if the existing steel surface cannot be prepared sufficiently. If the existing instrumentation, piping, and pipe penetrations will be replaced, Coating System 2 would provide the best service life.

EBMUD project SD-411 Coating System 13 consisting of spot repairs on bare steel with one coat of epoxy, one full coat of an intermediate coat, and one finish coat of aliphatic polyurethane was also included. This system is best used when overcoating an existing coating system.

Table 4-8 compares the two options for the exterior recoating of the cold boxes assuming a surface area of 400 sq. ft. Overcoating lead-based paints presents potential cost savings over the complete removal and recoat method; however, there will be a reduced service life.

Based on the existing condition of the exterior coating, an overcoat is not recommended. V&A recommends Option 1: complete removal and recoating.

Table 4-8. Comparison of Recoating vs. Overcoating the Tank Exterior

	Option 1: Complete Removal and Recoating	Option 2: Spot Repair and Overcoat of Entire Tank
Repair Description	Remove all existing exterior coatings using UHPWJ or soft media blasting and lead abatement measures. Provide a complete recoating to the entire exterior surface.	Conduct spot repairs to the damaged areas along the tank's surface using hand and power tools. Apply a new overcoat over the entire existing coating.
Coating Type and Description	Provide a complete recoating using one coat of a zinc primer, one coat of epoxy, and one finish coat of a polysiloxane or aliphatic polyurethane to all exterior surfaces.	This spot repair and overcoat option would consist of a surface tolerant primer, epoxy intermediate, and finish coat of a polysiloxane or aliphatic polyurethane coating.
Expected Design Life	25-30 Years	10-20 Years
Lead Based Paint (LBP) Abatement	Need LBP abatement for entire tank. Encapsulation of the tank is required for the LBP containment.	LBP abatement of exposed red primer areas using vacuum shrouded tools.
Surface Preparation and Coating Application	$50,000 per tank	$40,000 per tank

5 Conclusions

Based on the results of the visual assessment and field testing, V&A offers the following conclusions:

5.1 North Cold Box and Piping

1. The exterior coating of Shell Course 1 through 7 of the cold box is in overall good condition. Shell Course 8 exhibits several coating failures and one corrosion pit that has penetrated through the tank wall.
2. The piping between the Make and Add valves is leaking. A leak was also observed on the V350X and V330A pipe penetrations. A leak was also observed on the flow control valve FV340N.
3. The exterior average coating thickness on Shell 7 meets the minimum requirements of ISO 12944. The exterior average coating thickness on Shell 8 does not meet the minimum requirements of ISO 12944.
4. The results from the coating sample laboratory analysis indicate elevated levels of lead, which will require that the Contractor implements lead abatement procedures and worker protection measures.
5. Based on the lowest measurement recorded on the cold box, the maximum metal thickness loss was 9%, which is considered minor.
6. Based on the lowest measurement recorded on the steel box on the east side of the cold box, the maximum metal thickness loss was 43%, which is considered severe. A perforation in the shell wall is likely present on the northeast side as shown in Photo 4-11.
7. UHPWJ or soft media blasting are the best methods to remove the existing coating on the lower 8 feet of the tank. The best time to recoat the lower section of the cold box will be during the controls upgrade after the pneumatic transmitters and some of their associated tubing has been removed from the boxes.

5.2 South Cold Box and Piping

1. The exterior coating of the cold box is in overall good condition with isolated areas of minor corrosion and no major defects.
2. The exterior average coating thickness of Shell 7 and 8 meet the minimum requirements of ISO 12944.
3. The results from the coating sample laboratory analysis indicate elevated levels of lead, which will require that the Contractor implements lead abatement procedures and worker protection measures.
4. Based on the lowest measurement recorded on the cold box, the maximum metal thickness loss was 11%, which is considered minor.
5. Based on the lowest measurement recorded on the piping, the maximum metal thickness loss was 26%, which is considered moderate.
6. UHPWJ or soft media blasting are the best methods to remove the existing coating on the lower 8 feet of the tank. The best time to recoat the lower section of the cold box will be during the controls upgrade after the pneumatic transmitters and some of their associated tubing has been removed from the boxes.

6 Recommendations

Based on the conclusions, V&A offers the following recommendations for Woodard & Curran and EBMUD to consider:

6.1 North Cold Box and Piping

1. Due to the difficulty of trying to scan the entire lower exterior surface of the cold box to determine the remaining thickness, it is recommended that an interior assessment of the cold box be conducted to determine extent of corrosion. If this is not possible, install a weld repair plate above the box shown in Photo 4 11 on the northeast side of the tank.
2. Repair the leaks on the piping between the Make and Add valves, V350X pipe, and V330A pipe penetrations.
3. Repair the leak on the flow control valve FV340N.
4. Require all coatings work to be done in accordance with Title 29 CFR 1926.62 lead paint exposure protections of the OSHA standards and any state and local regulations.
5. Remove all existing exterior coatings using UHPWJ or soft media blasting and lead abatement measures. The coating specification should require a protection plan for all of the piping and tubing that exists on the exterior of the piping. The protection plan may include temporary shrouds or PVC pipe wrapped around the pipes. Provide a complete recoating to the entire exterior surface using one coat of a zinc primer, one coat of epoxy, and one finish coat of a polysiloxane or aliphatic polyurethane (Option 1 per Table 4-4).

6.2 South Cold Box and Piping

1. Require all coatings work to be done in accordance with Title 29 CFR 1926.62 lead paint exposure protections of the OSHA standards and any state and local regulations.
2. Remove all existing exterior coatings using UHPWJ or soft media blasting and lead abatement measures. The coating specification should require a protection plan for all of the piping and tubing that exists on the exterior of the piping. The protection plan may include temporary shrouds or PVC pipe wrapped around the pipes. Provide a complete recoating to the entire exterior surface using one coat of a zinc primer, one coat of epoxy, and one finish coat of a polysiloxane or aliphatic polyurethane (Option 1 per Table 4-4).

V&A Project No. 20-0273







V&A consulting engineers
1000 Broadway, Suite 320
Oakland, CA 94607
510.903.6600
510.903.6601 Fax



woodardcurran.com

COMMITMENT & INTEGRITY DRIVE RESULTS

APPENDIX B
ENVIRONMENTAL ASSESSMENT
INFORMATION

B3. SW Hi-Solids Polyurethane 250 Literature

Protective & Marine Coatings

HI-SOLIDS POLYURETHANE 250

PART S	B65J-300 SERIES	GLOSS
PART S	B65J-350 SERIES	SEMI-GLOSS
PART T	B60V30	HARDENER

Revised: March 27, 2019

PRODUCT INFORMATION

5.30

PRODUCT DESCRIPTION

HI-SOLIDS POLYURETHANE 250 is a two-component, aliphatic, acrylic polyurethane resin coating. It is designed for high performance protection with outstanding exterior gloss and color retention.

- Good/excellent resistance to corrosion and weathering
- Outstanding color and gloss retention
- Chemical resistant
- Suitable for use in USDA inspected facilities
- Formerly named Hi-Solids Polyurethane CA
- Resists film attack by mildew (MR White Tint Base only, B65WWJ305)
- Applications down to 20°F (-7°C)

PRODUCT CHARACTERISTICS

Finish:	Gloss and Semi-Gloss
Color:	Wide range of colors possible
Volume Solids: Ultra White	63% ± 4%, may vary by color or sheen
Weight Solids: Ultra White	74% ± 2%, may vary by color or sheen
VOC (EPA Method 24):	<250 g/L; 2.08 lb/gal Mixed
Mix Ratio:	4:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**4.5** (112.5)	**8.0** (200)
Dry mils (microns)	**3.0** (75)	**5.0** (125)
~Coverage sq ft/gal (m^2/L)	**208** (5.2)	**347** (8.5)

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 4.5 mils (112.5 microns) wet:

	@ 40°F/4.5°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C	@ 120°F/49°C
To touch:	4 hours	2 hours	1 hour	.5 hours
To handle:	16 hours	8 hours	4 hours	2 hours
To recoat:				
minimum:	24 hours	18 hours	14 hours	10 hours
maximum:	30 days	30 days	30 days	30 days
To cure:	14 days	10 days	8 days	7 days

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	8 hours	4 hours	2 hours
Sweat-in-Time:	None required		

Shelf Life:	Part S: 36 months Part T: 24 months Store indoors at 40°F (4.5°C) to 100°F (38°C).
Flash Point:	55°F
Reducer/Clean Up:	Oxsol 100, Reducer #58, or R7K111

RECOMMENDED USES

For use over prepared substrates in industrial environments

- Heavy duty interior and exterior structural coating
- A chemical and abrasion resistant equipment and machinery finish
- A gloss and color retentive heavy duty maintenance coating for use in "high visibility" areas
- Exterior surfaces of steel tanks
- Refineries
- Clean rooms
- Chemical processing equipment
- Conveyors
- Handrails
- Exterior metal siding and trim
- Rolling stock
- Paper mills
- Precipitator surfaces
- Power plants
- Oil Field Machinery
- Offshore structures
- Marine Applications

Conforms to AWWA D102 Outside Coating Systems #5 & #6. (Gloss only)
Approved finish coat for FIRETEX M90 and M93 series systems (Gloss only)

PERFORMANCE CHARACTERISTICS

Substrate*: Steel

Surface Preparation*: SSPC-SP6

System Tested*:

1 ct. Zinc CLad 4100 @ 4.0 mils (100 microns) dft
1 ct. Macropoxy 646 @ 7.5 mils (188 microns) dft
1 ct. Hi-Solids polyurethane 250 @ 4.0 mils (100 microns) dft

*unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	119 mg loss
Adhesion	ASTM D4541	2253 psi
Corrosion Weathering	ASTM D5894, 15 cycles	Rating 10 per ASTM D714 for blistering; Rating 10 per ASTM D610 for rusting
Direct Impact Resistance	ASTM D2794	40 in. lbs.
Dry Heat Resistance	ASTM D2485	200°F (93°C)
Flexibility	ASTM D522, 180° bend, 1/8" mandrel	Passes
Moisture Condensation Resistance	ASTM D4585, 100°F (38°C), 1000 hours	No rusting, blistering, or delamination
Pencil Hardness	ASTM D3363	F
Salt Fog Resistance*	ASTM B117, 5,000 hours	Rating 10 per ASTM D714 for blistering; Rating 9 per ASTM D610 for rusting

Meets the requirements of SSPC Paint No. 36, Level 3 for white and light colors. Dark colors may require a clear coat.

continued on back

Protective & Marine Coatings

HI-SOLIDS POLYURETHANE 250
ALIPHATIC POLYURETHANE

PART S	B65J-300 SERIES	GLOSS
PART S	B65J-350 SERIES	SEMI-GLOSS
PART T	B60V30	HARDENER

Revised: March 27, 2019

PRODUCT INFORMATION

5.30

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	Microns
Steel: Epoxy Primer			
1 ct.	Macropoxy 240	3.0-5.0	(75-125)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Steel: Epoxy Primer			
1 ct.	Macropoxy 646	4.0-6.0	(100-150)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Steel: Zinc Rich Primer			
1 ct.	Zinc Clad 4100	4.0-7.0	(100-175)
1 ct.	Macropoxy 646	5.0-10.0	(125-250)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Steel: Epoxy Mastic Primer			
1 ct.	Macropoxy 646	5.0-10.0	(125-250)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Aluminum:			
1 ct.	DTM Wash Primer	0.7-1.3	(17.5-32.5)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Concrete:			
1 ct.	Kem Cati-Coat Epoxy HS Filler/Sealer	10.0-15.0	(250-375)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Galvanized Metal:			
1 ct.	Epoxy Mastic Aluminum II	4.0-6.0	(100-150)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Galvanized Metal:			
1 ct.	ProCryl Universal Primer	2.0-4.0	(50-100)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
Galvanized Metal:			
1 ct.	Macropoxy 646	4.0-6.0	(100-150)
1-2 cts.	Hi-Solids Polyurethane 250	3.0-5.0	(75-125)
NTPEP System			
1 ct.	Zinc Clad 4100	4.0-7.0	(100-175)
1 ct.	Macropoxy 646	5.0-10.0	(125-250)
1-2 cts.	Hi-Solids Polyurethane 250 SG	3.0-5.0	(75-125)

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

* Iron & Steel:	SSPC-SP6/NACE 3, 2 mil (50 micron) profile
* Aluminum:	SSPC-SP1
* Galvanizing:	SSPC-SP1
* Concrete & Masonry:	SSPC-SP13/NACE 6

* Primer Required

Surface Preparation Standards

Condition of Surface		ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal		Sa 3	SP 5	1
Near White Metal		Sa 2.5	SP 10	2
Commercial Blast		Sa 2	SP 6	3
Brush-Off Blast		Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	SP 2	-
	Pitted & Rusted	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	SP 3	-
	Pitted & Rusted	D St 3	SP 3	-

TINTING

Tint with MAXITONER Colorants only into Part S. Extra White tints at 200% tint strength. Ultradeep tints at 150% tint strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

APPLICATION CONDITIONS

Temperature:	20°F (-7°C) minimum, 120°F (49°C) maximum (air, surface, and material) Do not apply over surface ice At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:	
Part S:	1 gallon (3.78L) and 4 gallon (15.12L) kits
Part T:	quarts and gallons
Weight:	10.7 ± 0.2 lb/gal ; 1.3 Kg/L mixed, may vary with color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.
Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

HI-SOLIDS POLYURETHANE 250
ALIPHATIC POLYURETHANE

PART S	B65J-300 SERIES	GLOSS
PART S	B65J-350 SERIES	SEMI-GLOSS
PART T	B60V30	HARDENER

Revised: March 27, 2019

APPLICATION BULLETIN

5.30

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel
Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils / 50-75 microns). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Aluminum
Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1. Primer required.

Galvanized Steel
Allow to weather a minimum of six months prior to coating. Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1. When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

Concrete and Masonry
For surface preparation, refer to SSPC-SP13/NACE 6. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with ArmorSeal Crack Filler. Weathered masonry and soft or porous cement board must be brush blasted or power tool cleaned to remove loosely adhering contamination and to get to a hard, firm surface. Laitance must be removed by etching with a 10% muriatic acid solution and thoroughly neutralized with water. Primer required. Brick must be allowed to weather for one year prior to surface preparation and painting.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal		Sa 3	SP 5	1
Near White Metal		Sa 2.5	SP 10	2
Commercial Blast		Sa 2	SP 6	3
Brush-Off Blast		Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	SP 2	-
	Pitted & Rusted	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	SP 3	-
	Pitted & Rusted	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	20°F (-7°C) minimum, 120°F (49°C) maximum (air, surface, and material) Do not apply over surface ice At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up .....Oxsol 100, Reducer #58, or R7K111

Airless Spray
Pressure.....2500 - 2800 psi
Hose.....3/8" ID
Tip .....013" - .017"
Filter.....none
Reduction.....As needed up to 10% by volume

Conventional Spray
Gun .....Binks 95
Fluid Nozzle .....63 B
Air Nozzle.....69 PB
Atomization Pressure ....50 - 70 psi
Fluid Pressure.....20 - 25 psi
Reduction.....As needed up to 15% by volume

Brush
Brush.....Natural bristle
Reduction.....As needed up to 15% by volume

Roller
Cover .....3/8" woven with phenolic core
Reduction.....As needed up to 15% by volume

If specific application equipment is not listed above, equivalent equipment may be substituted.

continued on back

Protective & Marine Coatings

HI-SOLIDS POLYURETHANE 250
ALIPHATIC POLYURETHANE

PART S	B65J-300 SERIES	GLOSS
PART S	B65J-350 SERIES	SEMI-GLOSS
PART T	B60V30	HARDENER

Revised: March 27, 2019

APPLICATION BULLETIN

5.30

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Mix contents of each component thoroughly with power agitation. Make certain no pigment remains on the bottom of the can. Then combine 4 parts by volume of Part S with 1 part by volume of Part T. Thoroughly agitate the mixture with power agitation.

If reducer solvent is used, add only after both components have been thoroughly mixed.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**4.5** (112.5)	**8.0** (200)
Dry mils (microns)	**3.0** (75)	**5.0** (125)
~Coverage sq ft/gal (m^2/L)	**208** (5.2)	**347** (8.5)

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 4.5 mils (112.5 microns) wet:

	@ 40°F/4.5°C	@ 77°F/25°C *50% RH*	@ 100°F/38°C	@ 120°F/49°C
To touch:	4 hours	2 hours	1 hour	.5 hours
To handle:	16 hours	8 hours	4 hours	2 hours
To recoat:				
minimum:	24 hours	18 hours	14 hours	10 hours
maximum:	14 days	14 days	14 days	14 days
To cure:	14 days	10 days	8 days	7 days

If maximum recoat time is exceeded, abrade surface before recoating.

Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	8 hours	4 hours	2 hours
Sweat-in-Time:	None required		

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Oxsol 100, Reducer #58, or R7K111. Clean tools immediately after use with Oxsol 100, Reducer #58, or R7K111. Follow manufacturer's safety recommendations when using any solvent.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not apply the material beyond recommended pot life.

Do not mix previously catalyzed material with new.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Oxsol 100, Reducer #58, or R7K111.

Mixed coating is sensitive to water. Use water traps in all air lines. Moisture contact can reduce pot life and affect gloss and color.

Quik-Thane Urethane Accelerator is acceptable for use. See Quik-Thane Urethane Accelerator product data sheet for details.

E-Z Roll Urethane Defoamer is acceptable for use. See E-Z Roll Urethane Defoamer product data sheet for details.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

SAFETY DATA SHEET

B65TWJ304

Section 1. Identification

Product name : Hi-Solids Polyurethane 250 (Part S)
Ultradeep Base

Product code : B65TWJ304

Other means of identification : Not available.

Product type : Liquid.

Relevant identified uses of the substance or mixture and uses advised against

Paint or paint related material.

Manufacturer : THE SHERWIN-WILLIAMS COMPANY
101 W. Prospect Avenue
Cleveland, OH 44115

Emergency telephone number of the company : US / Canada: (216) 566-2917
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Product Information Telephone Number : US / Canada: (800) 524-5979
Mexico: Not Available

Regulatory Information Telephone Number : US / Canada: (216) 566-2902
Mexico: Not Available

Transportation Emergency Telephone Number : US / Canada: (800) 424-9300
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
SKIN SENSITIZATION - Category 1
CARCINOGENICITY - Category 1A
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (central nervous system (CNS)) - Category 1

Percentage of the mixture consisting of ingredient(s) of unknown acute oral toxicity: 14.6%
Percentage of the mixture consisting of ingredient(s) of unknown acute dermal toxicity: 26.5%
Percentage of the mixture consisting of ingredient(s) of unknown acute inhalation toxicity: 26.5%

GHS label elements

Section 2. Hazards identification

Hazard pictograms :



Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
Causes serious eye irritation.
May cause an allergic skin reaction.
May cause cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure. (central nervous system (CNS))

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. FOR INDUSTRIAL USE ONLY. This product must be mixed with other components before use. Before opening the packages, READ AND FOLLOW WARNING LABELS ON ALL COMPONENTS. Adequate ventilation required when sanding or abrading the dried film. If Adequate ventilation cannot be provided wear an approved particulate respirator (NIOSH approved). Follow respirator manufacturer's directions for respirator use. DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Abrading or sanding of the dry film may release Crystalline Silica which has been shown to cause lung damage and cancer under long term exposure.

Please refer to the SDS for additional information. Keep out of reach of children. Do not transfer contents to other containers for storage.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Methyl n-Amyl Ketone	≥10 - ≤25	110-43-0
Crystalline Silica, respirable powder	≥10 - ≤25	14808-60-7
p-Chlorobenzotrifluoride	<10	98-56-6
Acetone	≤5	67-64-1
Heavy Aliphatic Solvent	≤3	64742-82-1
Zeolites	≤3	1318-02-1
Bis(pentamethyl-4-piperidyl)sebacate	≤0.3	41556-26-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Section 4. First aid measures

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.

Skin contact : May cause an allergic skin reaction.

Ingestion : Can cause central nervous system (CNS) depression.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
halogenated compounds
carbonyl halides
metal oxide/oxides

Section 5. Fire-fighting measures

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Section 7. Handling and storage

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	CAS #	Exposure limits
Methyl n-Amyl Ketone	110-43-0	**ACGIH TLV (United States, 3/2018).** TWA: 50 ppm 8 hours. TWA: 233 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 100 ppm 10 hours. TWA: 465 mg/m³ 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 100 ppm 8 hours. TWA: 465 mg/m³ 8 hours.
Crystalline Silica, respirable powder	14808-60-7	**OSHA PEL Z3 (United States, 6/2016).** TWA: 250 mppcf / (%SiO2+5) 8 hours. Form: Respirable TWA: 10 mg/m³ / (%SiO2+2) 8 hours. Form: Respirable **OSHA PEL (United States, 5/2018).** TWA: 50 µg/m³ 8 hours. Form: Respirable dust **ACGIH TLV (United States, 3/2018).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction **NIOSH REL (United States, 10/2016).** TWA: 0.05 mg/m³ 10 hours. Form: respirable dust
p-Chlorobenzotrifluoride	98-56-6	None.
Acetone	67-64-1	**ACGIH TLV (United States, 3/2018).** TWA: 250 ppm 8 hours. STEL: 500 ppm 15 minutes. **NIOSH REL (United States, 10/2016).** TWA: 250 ppm 10 hours. TWA: 590 mg/m³ 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 1000 ppm 8 hours. TWA: 2400 mg/m³ 8 hours.
Heavy Aliphatic Solvent	64742-82-1	None.
Zeolites	1318-02-1	**ACGIH TLV (United States, 3/2018).** TWA: 1 mg/m³ 8 hours. Form: Respirable

Section 8. Exposure controls/personal protection

Bis(pentamethyl-4-piperidyl)sebacate	41556-26-7	fraction None.

Occupational exposure limits (Canada)

Ingredient name	CAS #	Exposure limits
Methyl n-amyl ketone	110-43-0	**CA Alberta Provincial (Canada, 6/2018).** 8 hrs OEL: 233 mg/m³ 8 hours. 8 hrs OEL: 50 ppm 8 hours. **CA British Columbia Provincial (Canada, 7/2018).** TWA: 50 ppm 8 hours. **CA Ontario Provincial (Canada, 1/2018).** TWA: 25 ppm 8 hours. TWA: 115 mg/m³ 8 hours. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 50 ppm 8 hours. TWAEV: 233 mg/m³ 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 60 ppm 15 minutes. TWA: 50 ppm 8 hours.
Quartz	14808-60-7	**CA British Columbia Provincial (Canada, 7/2018).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 0.1 mg/m³ 8 hours. Form: Respirable dust. **CA Ontario Provincial (Canada, 1/2018).** TWA: 0.1 mg/m³ 8 hours. Form: Respirable fraction. **CA Alberta Provincial (Canada, 6/2018).** 8 hrs OEL: 0.025 mg/m³ 8 hours. Form: Respirable particulate **CA Saskatchewan Provincial (Canada, 7/2013).** TWA: 0.05 mg/m³ 8 hours. Form: respirable fraction
Acetone	67-64-1	**CA Alberta Provincial (Canada, 6/2018).** 8 hrs OEL: 1200 mg/m³ 8 hours. 15 min OEL: 1800 mg/m³ 15 minutes. 8 hrs OEL: 500 ppm 8 hours. 15 min OEL: 750 ppm 15 minutes. **CA British Columbia Provincial (Canada, 7/2018).** TWA: 250 ppm 8 hours. STEL: 500 ppm 15 minutes. **CA Ontario Provincial (Canada, 1/2018).** TWA: 250 ppm 8 hours. STEL: 500 ppm 15 minutes. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 500 ppm 8 hours. TWAEV: 1190 mg/m³ 8 hours. STEV: 1000 ppm 15 minutes. STEV: 2380 mg/m³ 15 minutes. **CA Saskatchewan Provincial (Canada, 7/2013).**

Section 8. Exposure controls/personal protection

		STEL: 750 ppm 15 minutes. TWA: 500 ppm 8 hours.

Occupational exposure limits (Mexico)

	CAS #	Exposure limits
Methyl n-Amyl Ketone	110-43-0	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 50 ppm 8 hours.
Crystalline Silica, respirable powder	14808-60-7	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction
Acetone	67-64-1	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 500 ppm 8 hours. STEL: 750 ppm 15 minutes.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Not available.

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Melting point/freezing point : Not available.

Boiling point/boiling range : 55°C (131°F)

Flash point : Closed cup: 13°C (55.4°F) [Pensky-Martens Closed Cup]

Evaporation rate : 5.6 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 0.9%
Upper: 12.8%

Vapor pressure : 24 kPa (180 mm Hg) [at 20°C]

Vapor density : 2 [Air = 1]

Relative density : 1.15

Solubility : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Kinematic (40°C (104°F)): >0.205 cm^2/s (>20.5 cSt)

Molecular weight : Not applicable.

Aerosol product

Heat of combustion : 13.758 kJ/g

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials:
oxidizing materials

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Methyl n-Amyl Ketone	LD50 Oral	Rat	1600 mg/kg	-
p-Chlorobenzotrifluoride	LD50 Oral	Rat	13 g/kg	-
Acetone	LD50 Oral	Rat	5800 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Methyl n-Amyl Ketone	Skin - Mild irritant	Rabbit	-	24 hours 14 milligrams	-
Acetone	Eyes - Mild irritant	Human	-	186300 parts per million	-
	Eyes - Mild irritant	Rabbit	-	10 microliters	-
	Eyes - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Eyes - Severe irritant	Rabbit	-	20 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	395 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Crystalline Silica, respirable powder	-	1	Known to be a human carcinogen.
Zeolites	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Methyl n-Amyl Ketone	Category 3	Not applicable.	Narcotic effects
	Category 3	Not applicable.	Respiratory tract irritation
p-Chlorobenzotrifluoride	Category 3	Not applicable.	Respiratory tract irritation
Acetone	Category 3	Not applicable.	Narcotic effects
	Category 3	Not applicable.	Respiratory tract irritation
Heavy Aliphatic Solvent	Category 3	Not applicable.	Narcotic effects
	Category 3	Not applicable.	Respiratory tract

Section 11. Toxicological information

			irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Methyl n-Amyl Ketone	Category 2	Not determined	Not determined
Crystalline Silica, respirable powder	Category 1	Inhalation	Not determined
Acetone	Category 2	Not determined	Not determined
Heavy Aliphatic Solvent	Category 1	Not determined	central nervous system (CNS)

Aspiration hazard

Name	Result
Heavy Aliphatic Solvent	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.

Skin contact : May cause an allergic skin reaction.

Ingestion : Can cause central nervous system (CNS) depression.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Section 11. Toxicological information

Potential chronic health effects

Not available.

General : Causes damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	8300.61 mg/kg
Inhalation (vapors)	49.15 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Methyl n-Amyl Ketone	Acute LC50 131000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Acetone	Acute EC50 7200000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute LC50 6000000 µg/l Fresh water	Crustaceans - Gammarus pulex	48 hours
	Acute LC50 6900 mg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 5600 ppm Fresh water	Fish - Poecilia reticulata	96 hours
	Chronic NOEC 4.95 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Chronic NOEC 0.016 ml/L Fresh water	Crustaceans - Daphniidae	21 days
	Chronic NOEC 0.1 ml/L Fresh water	Daphnia - Daphnia magna - Neonate	21 days
	Chronic NOEC 0.1 mg/l Fresh water	Fish - Fundulus heteroclitus	4 weeks
Zeolites	Chronic NOEC 200000 µg/l Fresh water	Daphnia - Daphnia magna	21 days

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Methyl n-Amyl Ketone	-	-	Readily
Acetone	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Heavy Aliphatic Solvent	-	10 to 2500	high
Zeolites	-	0.59 to 0.95	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Section 12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	UN1263	UN1263	UN1263	UN1263	UN1263
UN proper shipping name	PAINT	PAINT	PAINT	PAINT	PAINT
Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	II	II	II	II	II
Environmental hazards	No.	No.	No.	No.	No.
Additional information	- **ERG No.** 128	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.18-2.19 (Class 3). **ERG No.** 128	- **ERG No.** 128	-	**Emergency schedules** F-E, S-E

Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Section 14. Transport information

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.

Ship type : Not available.

Pollution category : Not available.

Section 15. Regulatory information

SARA 313

SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

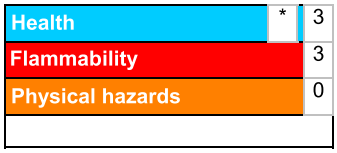
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

International regulations

International lists : **Australia inventory (AICS)**: Not determined.
China inventory (IECSC): Not determined.
Japan inventory (ENCS): Not determined.
Japan inventory (ISHL): Not determined.
Korea inventory (KECI): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan Chemical Substances Inventory (TCSI): Not determined.
Thailand inventory: Not determined.
Turkey inventory: Not determined.
Vietnam inventory: Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE LIQUIDS - Category 2	On basis of test data
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A	Calculation method
SKIN SENSITIZATION - Category 1	Calculation method
CARCINOGENICITY - Category 1A	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (central nervous	Calculation method

Section 16. Other information

system (CNS)) - Category 1	

History

Date of printing : 7/16/2019

Date of issue/Date of revision : 7/16/2019

Date of previous issue : 5/7/2019

Version : 9

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
SGG = Segregation Group
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by the manufacturer, including but not limited to the incorporation of products not specified by the manufacturer, or the use or addition of products in proportions not specified by the manufacturer. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.

SAFETY DATA SHEET

B60V30

Section 1. Identification

Product name : Hi-Solids Polyurethane Activator (Part T)

Product code : B60V30

Other means of identification : Not available.

Product type : Liquid.

Relevant identified uses of the substance or mixture and uses advised against

Paint or paint related material.

Manufacturer : THE SHERWIN-WILLIAMS COMPANY
101 W. Prospect Avenue
Cleveland, OH 44115

Emergency telephone number of the company : US / Canada: (216) 566-2917
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Product Information Telephone Number : US / Canada: (800) 524-5979
Mexico: Not Available

Regulatory Information Telephone Number : US / Canada: (216) 566-2902
Mexico: Not Available

Transportation Emergency Telephone Number : US / Canada: (800) 424-9300
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (inhalation) - Category 4
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
RESPIRATORY SENSITIZATION - Category 1
SKIN SENSITIZATION - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 70.3%
Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 99.7%

GHS label elements

Hazard pictograms :



Signal word : Danger

Section 2. Hazards identification

Hazard statements : Flammable liquid and vapor.
Harmful if swallowed or if inhaled.
Causes serious eye irritation.
Causes skin irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause an allergic skin reaction.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear respiratory protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Contaminated work clothing must not be allowed out of the workplace.

Response : Get medical attention if you feel unwell. IF INHALED: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. If experiencing respiratory symptoms: Call a POISON CENTER or physician. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements

DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. FOR INDUSTRIAL USE ONLY. This product must be mixed with other components before use. Before opening the packages, READ AND FOLLOW WARNING LABELS ON ALL COMPONENTS. VAPOR AND SPRAY MIST HARMFUL. Gives off harmful vapor of solvents and isocyanates. DO NOT USE IF YOU HAVE CHRONIC (LONG-TERM) LUNG OR BREATHING PROBLEMS, OR IF YOU HAVE EVER HAD A REACTION TO ISOCYANATES. USE ONLY WITH ADEQUATE VENTILATION. WHERE OVERSPRAY IS PRESENT, A POSITIVE PRESSURE AIR SUPPLIED RESPIRATOR (NIOSH approved) SHOULD BE WORN TO PREVENT EXPOSURE. IF UNAVAILABLE, AN APPROPRIATE PROPERLY FITTED APPROVED NIOSH VAPOR/PARTICULATE RESPIRATOR MAY BE EFFECTIVE. Follow directions for respirator use. Wear the respirator for the whole time of spraying and until all vapors and mists are gone. If you have any breathing problems during use, LEAVE THE AREA and get fresh air. If problems remain or happen later, IMMEDIATELY call a doctor - If not available get emergency medical treatment. Have this label with you. Reacts with water in closed container to produce pressure which may cause container to burst.

Please refer to the SDS for additional information. Keep out of reach of children. Do not transfer contents to other containers for storage.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Hexamethylene Diisocyanate Polymer	≥50 - ≤75	28182-81-2
Methyl n-Amyl Ketone	≥25 - ≤32	110-43-0
Hexamethylene Diisocyanate (max.)	≤0.3	822-06-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. In the event of any complaints or symptoms, avoid further exposure.

Skin contact : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin contact : Causes skin irritation. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. Can cause central nervous system (CNS) depression.

Over-exposure signs/symptoms

Section 4. First aid measures

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Flammable liquid and vapor. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Hexamethylene Diisocyanate Polymer Methyl n-Amyl Ketone	None. **ACGIH TLV (United States, 3/2017).** TWA: 50 ppm 8 hours. TWA: 233 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 100 ppm 10 hours. TWA: 465 mg/m³ 10 hours. **OSHA PEL (United States, 6/2016).** TWA: 100 ppm 8 hours. TWA: 465 mg/m³ 8 hours.
Hexamethylene Diisocyanate (max.)	**ACGIH TLV (United States, 3/2017).** TWA: 0.005 ppm 8 hours. TWA: 0.03 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 0.005 ppm 10 hours. TWA: 0.035 mg/m³ 10 hours. CEIL: 0.02 ppm 10 minutes. CEIL: 0.14 mg/m³ 10 minutes. **OSHA PEL (United States, 6/2016).** **Absorbed through skin.** TWA: 5 mg/m³, (as CN) 8 hours.

Occupational exposure limits (Canada)

Ingredient name	Exposure limits
Methyl n-Amyl Ketone	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 233 mg/m³ 8 hours. 8 hrs OEL: 50 ppm 8 hours. **CA British Columbia Provincial (Canada, 6/2017).** TWA: 50 ppm 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 25 ppm 8 hours. TWA: 115 mg/m³ 8 hours. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 50 ppm 8 hours. TWAEV: 233 mg/m³ 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 60 ppm 15 minutes. TWA: 50 ppm 8 hours.
Hexamethylene Diisocyanate (max.)	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 0.005 ppm 8 hours. 8 hrs OEL: 0.03 mg/m³ 8 hours. **CA British Columbia Provincial (Canada, 6/2017). Inhalation sensitizer.** TWA: 0.005 ppm 8 hours. C: 0.01 ppm **CA Quebec Provincial (Canada, 1/2014). Skin sensitizer.** TWAEV: 0.005 ppm 8 hours. TWAEV: 0.034 mg/m³ 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 0.03 mg/m³ 8 hours. TWA: 0.01 ppm 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).**

Section 8. Exposure controls/personal protection

	STEL: 0.015 ppm 15 minutes. TWA: 0.005 ppm 8 hours.

Occupational exposure limits (Mexico)

Ingredient name	Exposure limits
Methyl n-Amyl Ketone	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 50 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Not available.

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Melting point/freezing point : Not available.

Boiling point/boiling range : 147°C (296.6°F)

Flash point : Closed cup: 39°C (102.2°F) [Pensky-Martens Closed Cup]

Evaporation rate : 0.33 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.1%
Upper: 7.9%

Vapor pressure : 0.51 kPa (3.855 mm Hg) [at 20°C]

Vapor density : 3.94 [Air = 1]

Relative density : 1.01

Solubility : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Kinematic (40°C (104°F)): >0.205 cm^2/s (>20.5 cSt)

Molecular weight : Not applicable.

Aerosol product

Heat of combustion : 10.421 kJ/g

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials:
oxidizing materials

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Hexamethylene Diisocyanate Polymer	LC50 Inhalation Vapor	Rat	18500 mg/m³	1 hours
Methyl n-Amyl Ketone	LD50 Oral	Rat	1600 mg/kg	-
Hexamethylene Diisocyanate (max.)	LC50 Inhalation Dusts and mists	Rat	124 mg/m³	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Hexamethylene Diisocyanate Polymer	Eyes - Moderate irritant	Rabbit	-	100 milligrams	-
	Skin - Moderate irritant	Rabbit	-	500 milligrams	-
Methyl n-Amyl Ketone	Skin - Mild irritant	Rabbit	-	24 hours 14 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Hexamethylene Diisocyanate Polymer	Category 3	Not applicable.	Respiratory tract irritation
Methyl n-Amyl Ketone	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Hexamethylene Diisocyanate (max.)	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Methyl n-Amyl Ketone	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin contact : Causes skin irritation. May cause an allergic skin reaction.

Ingestion : Harmful if swallowed. Can cause central nervous system (CNS) depression.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral Inhalation (vapors)	1615.4 mg/kg 11.03 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Methyl n-Amyl Ketone	Acute LC50 131000 µg/l Fresh water	Fish - Pimephales promelas	96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Methyl n-Amyl Ketone	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Hexamethylene Diisocyanate (max.)	-	57.63	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	UN1263	UN1263	UN1263	UN1263	UN1263
UN proper shipping name	PAINT RELATED MATERIAL	PAINT RELATED MATERIAL	PAINT RELATED MATERIAL	PAINT RELATED MATERIAL	PAINT RELATED MATERIAL

Section 14. Transport information

Transport hazard class(es)	3 	3 	3 	3 	3 
Packing group	III	III	III	III	III
Environmental hazards	No.	No.	No.	No.	No.
Additional information	This product may be re-classified as "Combustible Liquid," unless transported by vessel or aircraft. Non-bulk packages (less than or equal to 119 gal) of combustible liquids are not regulated as hazardous materials in package sizes less than the product reportable quantity. **ERG No.** 128	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 18-2.19 (Class 3). **ERG No.** 128	- **ERG No.** 128	-	**Emergency schedules** F-E, S-E

Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.

Ship type : Not available.

Pollution category : Not available.

Section 15. Regulatory information

SARA 313

SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

Not applicable.

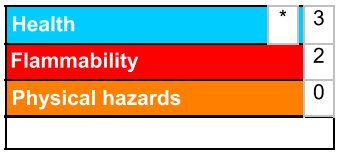
International regulations

Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: Not determined.
China inventory (IECSC): Not determined.
Japan inventory (ENCS): Not determined.
Japan inventory (ISHL): Not determined.
Korea inventory (KECI): Not determined.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): Not determined.
Taiwan Chemical Substances Inventory (TCSI): Not determined.
Thailand inventory: Not determined.
Turkey inventory: Not determined.
Vietnam inventory: Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE LIQUIDS - Category 3	On basis of test data
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (inhalation) - Category 4	Calculation method
SKIN CORROSION/IRRITATION - Category 2	Calculation method
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A	Calculation method
RESPIRATORY SENSITIZATION - Category 1	Calculation method
SKIN SENSITIZATION - Category 1	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method

History

Date of printing : 10/31/2018

Date of issue/Date of revision : 10/31/2018

Date of previous issue : 10/10/2018

Version : 7.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Section 16. Other information

Notice to reader

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by the manufacturer, including but not limited to the incorporation of products not specified by the manufacturer, or the use or addition of products in proportions not specified by the manufacturer. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.

SECTION 22 05 00

AIR COMPRESSOR MOTOR REPLACEMENT

PART 1 – GENERAL

1.1 SUMMARY

A. BACKGROUND: The District's Wastewater Oxygen Production Facility includes four (4) Main Air Compressors (MAC) originally manufactured by Joy Manufacturing in the 1970's. The compressor manufacturer is now owned by Ingersoll Rand. Three of the four MAC's have recently been modified to increase their capacity from 5850 ICFM (Inlet Cubic Feet per Minute) to 7020 ICFM, and one MAC will be modified over the duration of the Contract by others. This increase led to operation of the existing MAC 1250 HP motors well into their service factor. The existing 1250 HP motors will be replaced with new 1500 HP motors for improved reliability as well as increased compressor capacity.

B. The Contractor shall replace the existing 1250 HP motors with 1500 HP motors for all four MACs. The work includes field verification, testing, and start-up/commissioning.

C. The 1500 HP motors are purchased by and are furnished by the District. The Installation Contractor is to install these motors per the manufacturer's recommendations and per the requirements of the Drawings and Specifications.

D. NOT USED.

E. The Installation Contractor is required to install the new motors in the existing location. The location of the new motors will require coordination with the District to avoid disruption to plant operations. Use of the District's existing overhead hoist and cranes should be verified before replacement of the motors.

1. The source for the overhead crane is MCC P16.

F. The existing reduced voltage autotransformer type motor starters shall be used with the new motors. The tap settings shall be adjusted as required by the Contractor to allow the appropriate inrush current for starting purposes.

G. New separately mounted termination boxes as shown on the Drawings shall be provided. The termination boxes shall house the new arrestors, surge capacitors and neutral CTs. The location of the new termination box shall be aligned with the existing conduits and motor cable entry.

H. The Installation Contractor shall furnish the necessary labor, materials, instruments, transportation, and devices required to store, handle, test, adjust and balance the air compressor systems. Each system as specified and detailed, shall perform in

accordance with the intent of the Drawings and this Section. Systems to be tested, adjusted, and balanced include the existing air compressor.

I. Testing, balancing and operation of the air compressor systems shall be performed by qualified and experienced personnel, having formerly done similar Work and whose qualifications and performance shall be subject to the approval of the Engineer. Test and balance system and submit testing and vibration reports to the Engineer for review and provide labor, tools, equipment, and materials necessary to furnish and install electrical work as specified and in accordance with the Drawings and applicable reference standards listed in Article 1.3.

J. The Installation Contractor shall coordinate with the District testing of the furnished motors. The motor manufacturer will be required to test the motors per API 541 standards. The Installation Contractor shall be available and provide the necessary labor and materials for these tests done by the motor manufacturer.

K. The Installation Contractor is required to attend a preconstruction meeting for the MAC work.

1.2 SUBMITTALS

A. Submit welders' certificates specified in Quality Assurance below.

B. Submit MAC motor surge protector product literature and O&M manual. Provide product literature for surge arrestors.

C. Submit sample "blank" alignment report for review by the Engineer prior to motor installation. Alignment report shall include pre-startup inspection procedures, testing procedures, shim specifications, half shaft coupling data sheets and alignment check procedure, and other details of the motor installation.

D. Submit completed alignment report after all the shimming and motor adjustments have been completed. Alignment reports shall be submitted prior to startup of motors.

E. Submit motor vibration test results.

F. Submit method of handling motor installation and provide sketch to confirm clearance requirements for motor installation. Sketch shall confirm that installation of new motors will not damage existing conduits that are to remain during the course of this work.

G. Submit surge test results.

1.3 QUALITY ASSURANCE

A. Welder's Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications http://www.asme.org/.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook http://www.ansi.org/.

C. Soldering and brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration http://www.ansi.org/.

D. Sustainable Design Requirements

1. Local/Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

2. Low-Emitting Materials, Adhesives and Sealants: Furnish materials that comply with the requirements of South Coast Air Quality Management District (SCAQMD), Ruling #168, July 1, 2005.

E. Submit Manufacturer's certificate of proper installation and certificate of functional testing assistance for each MAC motor in accordance with 01 75 17, Field Testing and Startup.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, hub-and-spigot, clay pipe. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

D. Store in a clean, dry, well-ventilated place, free from vibration and rapid or wide variations in temperature. Rotate the shaft a minimum of 10 complete turns by hand each month to coat the bearings with lubricant which will prevent oxidation or corrosion. If drain plugs are provided in enclosed motors, they must be removed periodically to drain any water accumulation from the motor.

E. The Installation Contractor is required to avoid existing conduits and piping during the motor installation and provide equipment necessary to clear existing equipment.

1.5 SITE VISIT REQUIREMENT

A. The District furnished motor will be coupled to an existing skid mounted air compressor. The Installation Contractor is required to coordinate a site visit with the District to fully investigate each air compressor system how the motor will be handled during installation, how the motor will be shimmed and retrieve information on the existing stub shaft to determine the required flange half coupling piece for connecting new motor to existing air compressor shaft. ~~The Contractor is~~

~~required to measure the shaft diameter of each main air compressor motor as indicated in Paragraph 1.1~~.

B. For main air compressors that need to be shutdown for safe investigation purposes the Contractor shall provide at least two weeks notice to the District and submit a System Outage Request (SOR) in accordance with Section 01 35 13, Special Project Procedures.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL

A. All mechanical equipment and materials proposed for this project shall be new and purchased specifically for this project.

B. Damaged, dented, bent, scarred, or scratched equipment or materials shall be not installed.

C. When damage has occurred the contractor shall notify the District's authorized representative, within 24 hours of the damage, for review and resolution of the damage problem.

2.2 VIBRATION REQUIREMENTS

A. Mounting feet or surfaces of rotating equipment shall be machined.

B. Base Structure: Cast iron or welded steel construction with ribs or bracing to prevent distortion and machine surfaces where equipment is to be mounted. Tolerance shall be +/-0.002 inches between mounting pads. Base structure shall have mounting holes around perimeter. Center distance between these holes shall not be more than 30 inches.

C. Hollow Bases: Holes sufficiently large in top of base for filling and venting grout, throughout the entire base. If cross-members are provided in the base, provide grout vent holes for each base segment.

D. Dynamic balancing and unbalance vibration of the rotating element (or rotor) shall be as follows:

1. Pump impellers shall be balanced in accordance with ISO 1940/1 - 1986 balance quality grade G2.5. If the manufacturer’s tolerance is more stringent, then that balance quality shall apply.

2. Motor rotors shall be balanced in accordance with NEMA MG-1 standards to a Special Balance tolerance to give an amplitude of vibration of no more than 0.8 mils on the bearing housings. If the motor manufacturers tolerances are more stringent, then they shall apply.

E. Shaft Alignment Requirements: On coupled rotating equipment installation where driver and driven units are supplied as a factory mounted unit, shafts shall be

aligned in angular and offset positions and within tolerances as specified in this section with all hold-down bolts/nuts tight.

2.3 MOTOR SURGE PROTECTION EQUIPMENT

A. Provide a medium voltage, three phase motor surge protector that is designed to protect medium voltage motors from voltage surges due to lightning and switching events. The motor surge protector will be installed on a 4160V system (line-line voltage) which is ungrounded. The surge protector shall be NEPSI (Northeast Power Systems, Inc.) part number MSP6A0416 or Equal.

B. Enclosure

1. The surge protector shall be housed in a NEMA 12, 11 gauge, all-welded, steel enclosure. The enclosure shall be equipped with a hinged door which shall bolt closed with two 3/8" x 16 stainless steel bolts. The hinges shall be stainless steel and the door shall be removable when in the open position.

2. High voltage warning signs and a nameplate showing rating information shall be located on the front of the enclosure.

C. Capacitors

1. A low inductance, three phase, all-film surge capacitor shall be provided for decreasing the slope of impending voltage surges. The capacitor shall be rated 0.5 micro-farads.

2. The surge capacitor shall be equipped with discharge resistors that reduce the capacitor voltage to 50V in 5 minutes when disconnected from the source.

3. The surge capacitor shall be capable of operating between -40 degrees F and 115 degrees F.

D. Surge Arrester

1. The surge protector shall be equipped with three heavy duty distribution class surge arresters for limiting the crest of impending voltage surges to safe values.

2. The surge arresters shall be silicone rubber housed and shall utilize MOV blocks. The arresters shall comply with ANSI C62.11 standards.

2.4 NEUTRAL CURRENT TRANSFORMER ENCLOSURE

A. Enclosure

1. Current transformer enclosure shall be NEMA 12, ANSI 61 gray.

2. Material shall be minimum 14 gauge mild steel.

3. Enclosure shall measure 36” high, 36” wide, 24” deep.

4. Enclosure shall be equipped with a single hinged door which is either lockable or is bolted closed.

5. A backpanel compatible with enclosure shall be provided for mounting components.

B. Neutral Current Transformers

1. Provide three bar-type current transformers and install in the CT enclosure in accordance with drawing number SD428-W4400-E901.

2. CTs shall be GE Grid Solutions model JKM-3C or Equal.

3. CTs shall be single ratio, 300:5.

4. CTs shall be rated 5KV, 60KV BIL.

C. Neutral Bus Bar

1. Provide copper neutral bus bar measuring 24” long, 1” wide, ¼” thick and install in the CT enclosure in accordance with drawing number SD428-W400-E901 or Approved Equal.

D. Insulators

1. Provide two neutral bus bar insulators and install according to drawing number SD428-W4400-E901.

2. Insulators shall be NVENT ERIFLEX, ERICO part number 559694 or Approved Equal.

3. Insulators shall be 3” high, 2.5” wide.

2.5 DESIGN VIBRATION REQUIREMENTS

A. The machine base of the rotating equipment shall be mounted on the sub-base in a manner that is level in both directions according to the machined surfaces on the base. If sub-base is cast-in-place concrete, coordinate drawings to show details of steel reinforcement. The base is to be supported firmly by hold-down bolts all the way around the base and grouted when necessary.

2.6 JOINING MATERIALS

A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded http://www.asme.org/.

B. Brazing Materials: Comply with SFA-5.8, Section II, ASME Boiler and Pressure Vessel Code for brazing filler metal materials appropriate for the materials being joined http://www.asme.org/.

C. Soldering Materials: Refer to individual piping system specifications for solder appropriate for each respective system. Lead bearing solders shall not be used.

D. Gaskets for Flanged Joints: Gasket material shall be full-faced for cast-iron flanges and raised-face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A21.11, B16.20, or B16.21) http://www.ansi.org/. Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

PART 3 - EXECUTION

3.1 PREPARATION

A. Select a location for the motor and driven unit that will:

1. Be clean, dry, well ventilated, properly drained, and provide accessibility for inspection, lubrication, and maintenance.

2. Provide adequate space for future motor removal without shifting the driven unit.

3. Permit the motor to safely deliver adequate power. Temperature rise of a standard motor is based on operation at an altitude not higher than 3,300 feet above sea level.

4. Avoid condensation of moisture in bearings and on windings. Motors should not be stored in areas subject to rapid temperature changes unless motors are energized or protected with space heaters.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the systems.

3.2 INSTALLATION

A. Handling

1. The Installation Contractor shall receive, uncrate, set in place, level, and install the equipment according to the installation drawings and as per the EBMUD Site Manager's direction.

2. Lifting devices are provided for handling only. An experienced rigger should be used to install motors.

3. To avoid damage, the use of spreader bars is recommended on other than single point lifts. Lifting devices are typically provided to facilitate handling with shackles and cables.

4. Avoid pounding or bumping shaft, coupling, or bearing parts, as shocks may damage bearings.

5. Note weight of motor before lifting. Apply tension gradually to cables. Do not jerk or attempt to move the unit suddenly.

B. Mounting

1. Mount the motor base on existing flange foundation.

a. Sub-base that supports the equipment base and made of concrete shall be reinforced with steel reinforcements of the proper design as indicated.

b. The sub-base shall be level in both directions. Particular care shall be taken at hold-down bolt locations so that these areas are flat and level.

c. Machine bases of rotation equipment shall be mounted on sub-bases in a manner that they are level in both directions according to machined surfaces on base.

d. Leveling of machine bases on sub-bases and alignment of shafts between driver and driven unit shall be accomplished by use of stainless steel blocks and stainless steel precision cut and shims.

e. Blocks and shims shall be generously sized to provide solid support at each anchor bolt location.

f. Provide blocks and shims at each anchor bolt. Blocks and shims shall be square shape with "U" cut out to allow blocks and shims to be centered on anchor bolts.

1) Verify bolt hole location and depth for new motors. Perform any modifications of the foundation to mount the motors with manufacturer’s approval in writing.

2. Shim as required to level. Use laser or spirit level (check two directions at 90°) to ensure motor feet will be in one plane (base not warped) when base bolts are tightened.

3. Set motor on the base, install nuts, and tighten. Do not tighten until after alignment.

C. Coupling of Sleeve Bearing Motors

1. Sleeve bearings cannot withstand externally generated axial thrust. Antifriction bearings are normally designed to handle a minimum thrust. As the motor and driven equipment get hot they may expand towards each other and with the wrong coupling. If properly installed, the following types of couplings are considered to be free from the development of axial thrust and may be used.

a. Laminated Metal Disk Type

b. Rubber Biscuit Type

c. Pin and Bushing Type

d. Gear Type

D. External Wiring

1. Starting and overload control devices must be matched to the motor rating. For safety or convenience the may need to be installed some distance from the motor. Follow the motor manufactures instructions to make proper installations and connections.

2. Connect electrical power supply to conform with National Electric Code and any local regulations. Line voltage and wire capacity must match motor rating stamped on the nameplate.

3. With the driven equipment disconnected, momentarily energize the motor to check rotation.

E. Alignment

1. Accurate shaft alignment between motor and driven equipment is essential. Improper alignment may result in vibration, bearing overloads and excessive shaft stresses. Flexible couplings will not compensate for excessive misalignment.

2. Machinery Shaft Alignment: All rotating motor-driven equipment shafts with couplings shall be aligned as installed on-site using a computer-aided optical laser. The transducer system (where applicable), which houses the Class 1 laser diode and a position detector, and the prism shall be installed on the respective shafts, then adjusted such that the laser beam is reflected back into the position detector. As the shafts are rotated through 180 degrees, any parallel offset or angularity shall deflect the reflected beam from its original point of incidence in the position detector. The position detector measurements shall automatically enter the computer, which shall calculate misalignment from the beam deflection, and then display shaft misalignment at the coupling and corrective measures to the nearest 0.0005 inches at the machine feet.

a. Preliminary and final alignments shall be performed. Preliminary alignment shall occur before grouting of the base, connection the piping and cabling connections are performed. During preliminary alignment, soft foot function shall measure machine feet sitting unevenly on the foundation and determine the necessary corrections. Measurement of the amounts and directions of misalignment, calculations of corrective moves, and initial alignment shall be performed.

b. Following the completion of all connections and grouting, the final alignment shall be performed.

c. The computer shall automatically calculate alignment specifications into the corrections such that when thermal growth is present, the machines will be positioned to grow into optimum alignment at operating temperatures. All data collected will be permanently recorded in a report and included in the final O&M manual for the equipment.

d. Shims used to adjust alignment shall be factory precut stainless steel sized for the appropriate motor horsepower.

e. Accuracy of the optical laser alignment system shall be traceable to the National Institute of Standards and Technology. Allowable equipment tolerances are as set forth elsewhere in this Section.

f. Coupling manufacturer alignment tolerances shall not be used for shaft alignment tolerances. The tolerances specified herein shall apply to both vertical and horizontal alignments measured at or calculated to the coupling centerline. In cases where the equipment manufacturer requires more stringent shaft alignment standards, the manufacturer's standards shall apply.

~~g.~~ If the equipment comes as a factory mounted/aligned unit the shaft alignment shall be rechecked as installed on site and any misalignment corrected in accordance with these specifications and tolerance herein.

3. Brief Explanation Of Terms

a. Machine To Be Shimmed ("M.T.B.S."): When two machines must be aligned to each other, any necessary adjustments will usually be done on only one of the machines. Usually, the driver will be the machine that must be adjusted. The term “Machine to be shimmed” shall be used to describe the machine that is to be shimmed.

b. Stationary Machine: The term “Stationary Machine” shall be used to describe the machine that is usually not adjusted (the pump, fan, gear reducer, air compressor, etc. in most cases).

c. Vertical Misalignment: When the "M.T.B.S." must be adjusted vertically with shims to bring it into its correct position. This term applies to horizontally mounted machines.

d. Horizontal Misalignment: When the "M.T.B.S." must be adjusted horizontally to bring it into its correct position. (Shims are not used to correct horizontal misalignment.) This term applies to horizontally mounted machines.

e. Angularity: The angle that one shaft centerline makes in relation to the other shaft centerline. For clarity, this is expressed as a "slope" of so many thousandths of an inch PER inch, rather than as an angle of so many degrees. This must be determined in both the vertical and horizontal planes (vertical angularity and horizontal angularity) on horizontally mounted machines and east-west and north-south planes on vertically coupled shafts.

f. Offset: The distance (in thousandths of an inch) between two shaft centerlines. For purposes of standardization, this distance will always be calculated to (or measured at) the centerline of the coupling. This must be determined in both the vertical and horizontal planes (vertical offset and horizontal offset) on horizontally mounted machines and east-west and north- south planes on vertical coupled shafts.

g. Soft Foot: A condition that exists when the bottom of all four feet of the moveable machines are not machined on the same plane or resting on the same plane (can be compared to a chair that has one short leg).

h. Jacking Bolts: Horizontally positioned bolts on the machine base that are located at each foot of the machine and are used to adjust the horizontal position of the machine. Jacking bolts are not used to hold the machine in place.

4. Prior to final shaft alignment, the following criteria must be met:

5. Machinery foundation must be installed as designed with the base parallel with respect to the machine's shaft on horizontally mounted machines.

6. Machinery must be free of piping strain. To check for piping strain, piping flanges should be loosened up separately with flange movement observed continuously. Should movement exceed 1/8- inch, piping strain is considered excessive and shall be corrected by adding or adjusting pipe supports, hangers, expansion joints, etc. Refer to .03 A. 3. of this Section.

7. Machinery must be resting firmly on the mounting bases with equal loading on each support.

8. Horizontally mounted machinery (coupled) over 125 horsepower shall be provided with fine-thread jackbolts for horizontal alignment adjustments. Machine foothold down bolts shall be loosened before horizontal position adjustments are made with the jackbolts.

9. Machinery supports and baseplate pads shall be free of burrs, rust, scale, and other obstructions.

10. Stainless steel pre-cut shims shall be used to provide a firm, solid, adjustable link between machine and baseplate.

11. Machinery must be free of soft foot. To check for soft foot, the machinery must be firmly bolted to the baseplate. Each support foot is checked with the dial indicator and/or feeler gauges, loosening hold-down bolts one at a time. If movement exceeds 0.002 inches, soft foot is indicated. Shim and torque uniformly to minimize soft foot. (see Drawing 4 in Appendix A.)

12. All jackbolts shall be backed-off (1) turn after the alignment procedure is complete.

13. All final alignment data for each machine assembly shall be recorded by the contractor on the Machinery Alignment Report, one electronic PDF copy and three (3) copies of which will be submitted to the project manager for distribution.

F. Parallel Alignment

1. After positioning unit for correct end float, separate the coupling halves and mount a dial indicator rigidly on one coupling half with the button on the cylindrical surface of the other half.

2. Rotate the shafts together, and take readings at top, bottom, and side positions.

3. Align shaft so that the difference between top and bottom readings and the side readings is a maximum of 0.002 inches for a flexible coupling.

G. Angular Alignment

1. Hold each shaft at maximum end float. Rotate both shafts together, and measure between matching points at the outside diameter of the coupling faces for the top, bottom, and both sides.

2. Use two indicators because of the possible axial shaft movement. Read difference of variation between them.

3. Align shafts so that the total indicator variation does not exceed 0.002 inches.

H. A basic rule is to not have more than five shims in a shim pack under any one motor foot. Thick shim packs will cause soft foot, excessive vibration, or twisted frame (motor foot out of plane).

I. After erection, the contractor shall demonstrate that all equipment is operating in a satisfactory manner. All adjustments shall be made to suit anticipated operating conditions. Each piece of machinery shall be tested to show that it operates quietly without excessive vibration, overheating, or signs of distress at specified capacity. The engineer shall be notified in advance of all tests, and all tests shall be conducted to his entire satisfaction. All tests shall be made by the manufacturers' representative and the results recorded and submitted to the County. Vibration testing and acceptance shall be done in accordance with the Performance Testing in Appendix B, E, and F of these design standards.

J. Manufacturer's certificates that the installation of the equipment is in accordance with the manufacturer's recommendations shall be secured by the contractor and submitted to the engineer.

K. Certification that the equipment shafts are aligned to the alignment tolerances specified.

L. Certification that equipment rotors have been dynamically balanced within the tolerances specified.

M. Foot Plane

1. The proper foot plane exists when adequate shims have been installed to assure equal pressure on each foot or corner of motor when the mounting bolts are loose.

2. Mount dial indicator on shaft to be checked so that contact will rest on either the adjacent shaft or a bracket from the foundation or base.

3. With mounting bolts tight and indicator set at zero, release one bolt at the shaft extension end of the unit and check the indicator for a maximum change of 0.001 inches.

4. If no change is indicated, re-tighten the bolt, and repeat the process for each of the remaining bolts.

5. If a change is indicated, add shims under motor foot and re-tighten until indicator movement is reduced or eliminated.

N. Vibration

1. The standard unfiltered housing vibration limits measured at no load, uncoupled, and with rigid mounting are as follows based on the requirements of NEMA MG1-7.8.

Speed	Velocity, inches/sec peak
1200 – 3600 RPM	0.120
1000 RPM	0.105
900 RPM	0.096
750 RPM	0.079
720 RPM	0.075
600 RPM	0.063

2. After alignment is complete and foot mounting bolts are tight, run motor at no load (or minimum possible). Check for vibration.

3. If excessive vibration exists and the alignment is acceptable, check foot plane by loosening one drive end mounting bolt at a time and re-check vibration until within acceptable limit.

O. Doweling

1. After controlling rotor end float and establishing accurate alignment, it is recommended to drill and ream the foundation plate and motor feet together for dowel pins. Doweling the motor (and driven unit) restricts movement, eases realignment if motor is removed from base, and temporarily restrains the motor should mounting bolts loosen.

2. Re-check parallel and angular alignment after the unit has been in operation approximately one week before bolting the coupling together. Motor shaft should be level within 0.03 inches after alignment.

3. Using pre-drilled dowel holes in motor feet as guides, drill into the mounting base.

4. Ream holes in the feet and base to the proper diameter for tapered dowel pins. Clean out the chips.

5. Insert dowel pins.

3.3 INITIAL START UP AND TESTING

A. Motor Checks

1. Conform to requirements of Div 01

2. Check that motor, starting, and control device connections agree with wiring diagrams.

3. Check that voltage, phase, frequency of line circuit (power supply) agree with motor nameplate.

4. Check motor service record and tags accompanying motor. Ensure bearings have been properly lubricated and oil wells are filled. See motor outline drawing to determine proper oil level.

5. Remove external motor load and turn shaft by hand to ensure free rotation.

6. Run motor at no load long enough to be certain that no unusual condition exists. Listen and monitor for excessive noise, vibration, clicking or pounding and that oil rings are turning if so equipped. If present, stop motor immediately. Investigate cause and correct before putting motor in service.

7. When checks are satisfactory, operate motor at lowest load possible and look for any unusual conditions. Increase load slowly to maximum checking unit for satisfactory operation.

B. Alignment Checks

1. After completion of installation of each air compressor motor and verification of motor rotation, the motor and compressor must be aligned, initially in a cold condition to be followed by a hot alignment after the compressor has been run and allowed to reach normal operating temperatures.

2. All alignment procedures must be executed in strict accordance with the compressor and motor manufacturer specifications and must be witnessed by a District representative.

3. All mounting bolts and fixtures must be torqued to their final design values prior to recording final alignment. No further tightening or adjustments will be permitted after final alignment measurements.

4. Alignment reports documenting the As Found and As Left conditions for each alignment must be provided to and accepted by the Engineer.

5. The alignment check shall be done utilizing high-end laser technology. Alignment checks shall be performed by a firm with a minimum of ten (10) years of experience installing and performing maintenance work on industrial air compressor systems with at least three (3) projects involving Ingersoll Rand air compressor systems. The following is a list of such firms:

   a. Cisco Air Systems

   b. Or Equal

C. Performance Testing

1. Testing shall be done at full load.

2. Testing of the air compressor system shall include a surge test to determine the surge limits of the system. The surge test results shall be documented

and provided in a report submitted to the District with recommendations on adjusting components or devices to mitigate reaching the surge limit.

3. Air compressor components and devices such as valves shall be adjusted by the Installation Contractor to avoid reaching the surge limit. The system shall be tested after adjustments have been completed to confirm that the surge limit is avoided.

END OF SECTION

~~THIS PAGE IS LEFT INTENTIONALLY BLANK~~

SECTION 22 05 53.05

PIPE IDENTIFICATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Furnish and install piping identification markers for exposed piping as specified herein.

B. Related work specified elsewhere:

1. Section 09 90 00 – Painting and Coatings

2. NOT USED

1.2 REFERENCES

A. American National Standards Institute (ANSI) Z535.1 – Safety Color Code

1.3 SUBMITTALS

A. Submit the following as specified herein and in accordance with Section 01 33 00, Submittal Procedures:

B. Descriptive literature for markers: The literature and drawings shall contain the manufacturer's name, description, manufacturers' product data, and the full item number or designation.

C. Piping marker table listing each piping service with proposed marker lettering and colors.

PART 2 - PRODUCTS

2.1 PAINTING

A. Paint as specified in Section 09 90 00, Painting and Coatings and per schedule.

B. Pipe System Color shall be as specified in the Schedule.

C. Special Items:

1. In addition, special painting of following items will be required:

ITEM	COLOR
Hoist hooks and blocks	Yellow and black stripes
Steel guard posts	ANSI Safety Yellow

2. Paint minimum legibly numbers on or adjacent to accessible valves, pumps, flow-meters, and other items of equipment which are identified on Drawings or in Specifications by number.

2.2 ADHESIVE MARKERS

A. Self-adhesive vinyl, suitable for outdoor application from –40 degrees to 180 degrees Fahrenheit.

B. Minimum thickness shall be 0.004-inch.

C. Each marker shall include:

1. Multiple axial-mounted text blocks to allow visibility from all likely viewing directions.

2. Pipe banding tape with repeating flow arrows surrounding the entire pipe circumference on both ends of the pipe marker. Arrow colors shall be the same as the lettering color.

D. Marker Colors:

1. Refer to the Standard Drawing (STD-G-005) for the marker lettering and background colors for label use.

E. Lettering:

Pipe Outer Diameter	Lettering Size
Less than 0.75 inches	Permanently legible tag
0.75 inches to 1.25 inches	1/2 inch
1.5 inches to 2 inches	3/4 inch
2.5 inches to 6 inches	1-1/4 inches
8 inches to 10 inches	2-1/2 inches
over 10 inches	3-1/2 inches

F. As manufactured by:

1. Seton, Opti Code Pipe Markers

2. Lab Safety Supply

3. or equal.

PART 3 - EXECUTION

3.1 PAINTING

A. Color Code:

1. Paint piping scheduled to be color coded completely with specified colors.

2. NOT USED.

3.2 ADHESIVE MARKER

A. Prepare surface in accordance with product manufacturer's instructions. Ensure surface is clean, dry, and free of dust or debris.

B. Identify piping with legend markers, directional arrow markers, and number markers; use self-adhesive arrow roll tape to secure ends of piping markers and indicate flow direction.

C. Provide piping marker letters and colors as scheduled.

D. Install adhesive markers at the following locations:

1. adjacent to equipment served and adjacent to valves

2. both sides of walls and floors where pipe passes through

3. adjacent to changes in direction (e.g., upstream and downstream of elbows, bends, tees, etc.)

4. at intervals of not more than 20 feet in straight runs of pipe

E. Place markers on piping so they are visible from operator's position in walkway or working platform near piping. Locate markers along horizontal centerline of pipe, unless better visibility is achieved elsewhere. Install two labels on opposite, or near opposite, sides of the pipe if pipe is visible from two directions (e.g., piping crossing between two work areas or walkways).

3.3 PIPING SYSTEM COLOR SCHEDULE

ID	PIPING SYSTEM	PIPE (SYSTEM) COLOR	COLOR CODE				
			Tnemec	Devoe	Carboline	PPG	S-W
5W	Fire Service	ANSI Safety Red	06SF	DC9000	7573	PC895	4081
1W	Potable Water (1W)	ANSI Safety Blue	11SF	DC9800	9112	PC865	4086
O2	Oxygen (SST)	None	--	--	--	--	--
--	MWWTP Process – All Other Interior (epoxy)	Popcorn	1029 - PA21	Match	0842	2012-1531	CCC0471-15
--	MWWTP Process – All Other Exterior (polyurethane)	Popcorn	Match	Match	Match	2012-1532	CCC0470-15
--	All PE or HDPE piping	Use solid color pipe or co-extrusion stripes based on the piping system color.	Various	Various	Various	Various	Various

Color codes have not been verified. Contractor shall confirm color code with paint manufacturer.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: This section covers the work necessary to provide a complete and operable low voltage cable system as specified herein.

B. Related Sections: Refer to other divisions and sections of these specifications to determine the extent and character of related electrical work specified elsewhere, but which shall be done under this section.

1. Section 01 33 00 – Submittal Procedures

2. Section 26 05 00 – Common Work Results for Electrical

3. Section 26 05 26 – Grounding and Bonding for Electrical Systems

4. Section 26 05 53 – Identification of Electrical Systems

5. Section 26 08 00 – Commissioning of Electrical Systems

6. Section 27 13 23 Communications Optical Fiber Backbone Cabling

7. Section 27 13 23.13 Communications Optical Fiber Splice and Termination

1.2 SUBMITTALS

A. Make submittals in accordance with Section 01 33 00 Submittal Procedures, and Section 26 05 00 Common Work Results for Electrical. In addition to these requirements, submit the following:

1. Perform cable insulation and resistant tests in accordance to the NETA ATS latest version.

2. Pulling calculations for all low voltage cables installed in concrete ductbank showing compliance with all manufacturers' recommended installation requirements and pulling tensions. Submittal shall include the recommended sequence of cable installations specifically detailing the "from" and "to" points for each cable installation segment.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. B-3 - Standard Specification for Soft or Annealed Copper Wire.

2. B-8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

3. B-33 – Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes

B. American National Standards Institute (ANSI):

1. C2 - National Electrical Safety Code

C. Institute of Electronic and Electrical Engineers (IEEE):

1. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

2. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis

D. Insulated Cable Engineers Association (ICEA):

1. S-73-532 – Standard for Control, Thermocouple Extension and Instrumentation Cables. (Join Standard NEMA WC 57)

2. S-95-658 – Standard for Nonshielded Power Cables rated 2000 Volts or less. (Joined Standard NEMA WC 70)

E. National Fire Protection Association (NFPA):

1. NFPA 70 – National Electrical Code

F. National Electrical Manufacturers Association (NEMA):

1. WC 26 – Wire and Cable Packaging

G. InterNational Electrical Testing Association (NETA ATS)

H. Underwriters Laboratory (UL):

1. Standard 44 – Thermoset Insulated Wires and Cables

2. Standard 83 – Thermoplastic Insulated Wires and Cables

3. Standard 486A/486B – Wire Connectors

4. Standard 510 – Polyvinyl Chloride, Polyethylene and Rubber Insulating Tapes

5. Standard 1063 – Machine Tool Wires and Cables

6. Standard 1581 – Reference Standard for Electrical Wires, Cables and Flexible Cords

1.4 SYSTEM DESCRIPTION

A. The application for required cable, wire, and connectors include, but are not limited to:

1. Power distribution circuitry

2. Appliance and equipment circuitry

3. Network and communication systems and circuitry

4. Wiring for motors of mechanical equipment

5. Wiring from the motor(s) of mechanical equipment to disconnect switches or junction boxes, including wiring for pushbuttons, pilot lights, interlocks and similar devices as directed, shown, or specified.

6. Wiring from the motors of mechanical equipment to motor starters, including other auxiliary wiring as may be required, directed, or shown.

7. Line voltage wiring as required by other Disciplines, and interlocking to motor starters

8. Control wiring for motors, mechanical equipment, relays and switches, and similar mechanical-electrical devices.

1.5 CONDUCTOR COLOR CODING

A. Color coding of multiconductor control and instrumentation cable is specified in the individual cable type specification.

B. For power conductors, provide all single conductors and individual conductors of multiconductor power cables with integral insulation pigmentation of the designated colors, except conductors larger than No. 6 AWG may be provided with color coding by wrapping the conductor at each end and at all accessible locations with vinyl tape. Where this method of color coding is used, wrap at least six full overlapping turns of tape around the conductor covering an area 1-1/2 to 2 inches wide at a visible location at all conductor termination and pulling points.

C. Phases A, B, C imply the direction of positive phase rotation.

D. Use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
208Y/120 Volts, 3-Phase, 4-Wire	Grounded Neutral	White
	Phase A	Black
	Phase B	Red
	Phase C	Blue
480Y/277 Volts, 3-Phase, 4-Wire	Grounded Neutral (if used)	White, Black Tracer
	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
Single Conductor, AC		Red
Multiple Conductor Control Cables		ICEA Method 1 Table E-2
Multiple Conductor Power Cables		ICEA Method 1 or 3, Table E-2
12 or 24V DC Positive		Blue
0V DC		Blue with Gray Stripes
Single-Conductor, DC Alarm, Annunciator, Instrumentation, and Telemetering (if not shielded)		Purple

E. All conductors carrying AC foreign voltage over 100 VAC into control panels, switchboards, and other enclosures shall be yellow. Multi-conductor cables carrying such foreign voltage shall be marked with yellow tape at each termination point.

1.6 DELIVERY, STORAGE AND HANDLING

A. Storage of cable after pulling or splicing shall include purging of entire cable with nitrogen or otherwise seal with tape at both ends.

B. Inspect the reels as they are unloaded from the delivery truck. Any visible damage shall be reported by the Contractor and the reel returned to the factory.

C. Provide a crane, special lift truck or forklift to unload the cable reels.

D. Cables shall be packaged on spools or reels. Each package shall contain only one continuous length of cable. Construct the packaging so as to prevent damage to the cable during shipping and handling.

E. All conductor ends shall be sealed at the factory, and these seals shall be intact when the conductors are delivered. When delivered, provide the Engineer with certified test reports.

PART 2 - PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only. Products of other manufacturers will be considered in accordance with the Division 01, General Requirements.

2.2 CONDUCTORS

A. Provide cables as specified under the type number in this section (Type 1, Type 2, etc.). Conduits shown on the drawings have been sized to accommodate the outside diameter for each type.

B. Multi-Conductor Power, Control, and Instrumentation Cable 600 Volts and Less:

1. Provide cable that is UL listed and conforms to the requirements of UL 1277 and CEC Article 340, or UL listed Power Limited Circuit Cable that conforms to the requirements of Article 725 of the National Electrical Code. Provide cables permanently and legibly marked with the manufacturer's name, the nominal voltage, the type of cable, and the UL label (or submit evidence of UL listing).

2. Type 10 (600-Volt, Twisted, Shielded Pair Instrumentation Cable):

a. General: Type TC, single pair instrumentation cable designed for noise rejection for process control, computer, or data log applications. Suitable for installation in conduit, wireway, or other

approved raceways. Minimum cable temperature rating shall be 90 degrees C dry locations, 75 degrees C wet locations.

b. Individual Conductors: No.18 AWG stranded bare annealed copper, Class B, 7-strand concentric per ASTM B8, size as indicated on the drawings; 7-strand tinned copper drain wire.

c. Insulation and Jacket: Each conductor 15-mil nominal PVC and 4-mil nylon insulation. Pair conductors pigmented black and red. Jacket flame-retardant and sunlight- and oil-resistant PVC with 45 mil nominal thickness. Aluminum/polyester shield overlapped to provide 100 percent coverage.

1) Acceptable Manufacturers:

a) Belden No. 9341

b) Dekoron (MC-HL)

c) General Cable, VNTC Spec 2450 (for hazardous locations)

d) Okonite Okoseal-N Type P-OS (for hazardous locations)

e) Or equal.

C. Type 11 (Power and control cables 600 Volts and less):

1. Unless otherwise indicated, provide stranded conductors.

2. Provide the following types of insulation:

a. Type XHHW-2 insulation for conductors No.14 and larger.

3. Single conductor control wiring shall be No.14 AWG and shall have insulation type XHHW-2 and Class B stranded per ASTM B-8. Insulation shall be in accordance to ICEA S-95-658, NEMA WC-70, and UL listed.

4. XHHW-2 power conductors shall have a cross linked polyethylene insulation rated at 90 degrees C in wet and dry locations.

5. Provide copper conductors. Do not provide conductors smaller than those indicated.

6. Acceptable Manufactures:

a. Southwire, SIMpull Type XHHW-2

b. Okonite, X-Olene Type XHHW-2

c. Southwire, Spec 45061 (for hazardous locations)

d. Or equal.

D. Type 13 (Category 6 Unshielded Twisted Pairs):

1. General: industrial grade Category 6 Unshielded Twisted Pairs (UTP) suitable for use in harsh environments as industrial Ethernet cable, 600 MHz Enhanced Category 6, Gigabit Ethernet, 100BaseTX, NTSC/PAL Component or Composite Video, RS-422, RJ-45 compatible, suitable for outdoor use and installation in conduit and other approved raceways.

2. Conductors: 4 pairs of conductors, 8 conductors total, 23 AWG solid bare copper conductors.

3. Insulation and Jacket: polyolefin insulation, individual conductors colored white/green and green, white/orange and orange, white/blue and blue, and white/brown and brown, center strength member, unshielded, industrial grade sunlight and oil resistant PVC jacket, outer jacket ripcord, 0.251 x 0.339 inch overall nominal diameter, 300 volts, -40 degrees C to +75 degrees C operating temperature.

4. Applicable Standards: CEC/UL CMR, UL Style 444, ANSI/TIA/EIA-568-B.2-1 CAT 6, UL Verified to Category 6, UL1666 Riser Flame Test.

5. Acceptable Manufacturers:

a. Belden 7927A

b. AlphaWire, Xtra-Guard industrial Ethernet cable

c. General Cable Cat 6 Riser

d. Or equal.

E. Type 14 (600Volt Multi-twisted Shielded Pairs with a Common Overall Shield Instrumentation Cable):

1. General: Type TC, twisted, shielded pairs of instrument cables, grouped in a single cable, designed for use for instrumentation, process control, and computer applications. Suitable for installation in conduit, wireway, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry and wet locations.

2. Conductors: No. 18 stranded bare annealed copper, Class B, 7-strand, concentric per ASTM B8. Tinned copper drain wires sized as shown on the drawings, one for each pair and one for the overall group.

3. Insulation and Jacket: Each conductor 15-mil PVC and 4-mil nylon insulation. Pair conductors pigmented black and red or black and white, with red or white conductor numerically printed for group identification. Outer jacket flame-retardant and sunlight- and oil-resistant PVC with 45 mil minimum thickness. Individual pair shield aluminum/polyester. Group shield aluminum/polyester, overlapped for 100 percent coverage.

4. Acceptable Manufacturers:

   a. Belden No. 1050A (1 pair), 1048A (2 pairs), 1049A (4 pairs), 1050A (8 pairs)

   b. Dekoron (MC-HL)

   c. General Cable, Spec 2500 (for hazardous locations)

   d. Okonite Okoseal-N Type SP-OS (hazardous locations)

   e. Or equal.

F. Type 15 (6/C RS-485):

1. General: industrial low-capacitance shielded cables for EIA RS-485 applications, including security access card readers, suitable for outdoor use and installation in conduit and other approved raceways.

2. Conductors: 3 pairs of conductors, 6 conductors total, 22 AWG, 7 strand tinned copper conductors.

3. Insulation: foam high density polyethylene insulation, pairs colored white/blue and blue/white, white/orange and orange/white, white/green and green/white.

4. Shield: aluminum foil polyester tape providing 100 percent coverage, tinned copper braid providing 90 percent coverage, 7-strand tinned copper 24 AWG drain wire.

5. Jacket: UV and oil resistant PVC, 0.420 inch overall nominal diameter, 300 volt, -20 degrees C to +60 degrees C operating temperature.

6. Applicable Standards: CEC/UL CM and PLTC OIL RES II, UL 1685 Flame Test, UL 1581 Sunlight Resistance Test.

7. Acceptable Manufacturers:

a. Belden 3108A

b. Or equal.

G. Type 19 (600-Volt Multi-Conductor Control Cable):

1. General: Multi-conductor control circuit interconnection cable with ground. Suitable for installation in conduit, wireway, or other approved raceways. Minimum cable temperature rating 90 degrees C dry and wet locations.

2. Individual Conductors: size as indicated on the drawings. Class B stranded per ASTM B-8.

3. Insulation and Jackets: Provide Cross-linked Polyethylene (XLPE) overall jacket insulation and Type XHHW-2 insulated conductor, and UL listed for cable tray use. Color code the conductor group in accordance with ICEA S-73-532 NEMA WC 57, Method 1, Table E-2. Provide cable with overall outer XLPE jacket which is flame-retardant, sunlight- and oil-resistant in accordance to UL 1581 and UL 1685.

4. No. 14 AWG minimum stranded copper conductors.

5. Acceptable Manufacturers:

a. General Cable Type CVTC spec 4500 (for hazardous and non-hazardous locations)

b. Okonite Okoseal-X-Olene (for hazardous and non-hazardous locations)

c. Or equal.

H. Type 27 (600-Volt, Multi-twisted Shielded Triads with a Common Overall Shield Instrumentation Cable):

1. General: Twisted, shielded triads of instrument cables, grouped in a single cable, designed for use for instrumentation, process control, and computer applications. Suitable for installation in conduit, wireway, or other approved raceways. Minimum cable temperature rating shall be 90 degrees C dry and wet locations.

2. Conductors: No. 18 AWG stranded bare annealed copper, Class B, 7-strand, concentric per ASTM B8, size as indicated on the drawings. Tinned copper drain wires, one for each triad and one for the overall group.

3. Insulation and Jacket: Each conductor 15-mil PVC and 4-mil nylon insulation. Triad conductors pigmented black, red, and blue, or black, white, and red, with red or white conductor numerically printed for group identification. Outer jacket flame-retardant and sunlight- and oil-resistant PVC with 60 mil minimum thickness. Individual triad shield 1.35-mil aluminum/polyester. Group shield 2.35-mil aluminum/polyester, overlapped for 100 percent coverage.

4. Conductors shall be numerically printed for group identification.

5. Acceptable Manufacturers:

   a. Belden

   b. Dekoron

   c. General Cable Spec 2450 (for hazardous locations)

   d. Okonite Okoseal-N Type P-OS (for hazardous locations)

   e. Or equal.

I. Flexible Cord and Cable Sealing Fittings:

1. Provide liquid-tight strain relief connectors for exposed flexible cord and power cable where cables enter electrical panels and enclosures.

2. Acceptable Manufacturers:

   a. OZ Gedney

   b. Hubbell

   c. Appleton

   d. Or equal.

J. Electrical Tape for Color Coding:

1. Electrical tape shall be premium grade, 600V rated, not less than 7 mils thick, rated for 105 degree C minimum, flame-retardant, weather resistant, and available in suitable colors for color coding. The tape shall be resistant to abrasion, ultraviolet rays, moisture, alkalies, solvents, acids, and suitable for indoor and weather-protected outdoor use. The tape shall be suitable for use with PVC and polyethylene jacketed cables, and meet or exceed the requirements of UL 510.

2. Acceptable Manufactures:

a. 3M 35 Scotch Vinyl Electrical Tape for Color Coding

b. Plymouth Rubber Company Premium 37 Color Coding Tape

c. Or equal.

K. Low Voltage Splices, 600 volts and below:

1. General: Provide low voltage splices consisting of 600 volt compression type connectors and connector insulators, suitable for indoor and outdoor field installations.

2. Provide two-way, uninsulated, compression connectors, long barrel type, suitable for use with stranded copper conductors. Provide UL listed connectors rated 600 volts minimum.

a. Acceptable Manufacturers:

1) Burndy

2) Thomas and Betts

3) Panduit

4) Or equal.

3. For 480V and below applications, connector insulators shall be cold shrink type factory expanded and assembled tubular rubber sleeves, suitable for field installation including direct buried, overhead, and outdoor applications. Insulators shall shrink over in-line connections, forming a water-proof seal. Provide insulators rated for 1000 volts, minimum, with -40 to 194 degree F temperature rating and ANSI C119-1 compliance.

a. Acceptable manufacturers:

1) 3M 8420 and 8430 Series for wires size #8 or larger, 3M Scotchcast 72-N Series for wire sizes #22-10.

2) Or equal.

L. Thermocouple cables

1. Provide extension cables for the thermocouple (RTD) sensors from the termination box to the DCS RIO or as indicated on the conduit and cable schedule. These cables shall be ANSI cable type KX and TX.

a. Acceptable Manufacturers:

1) Belden

2) Or Equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii. Where pulling compound is used, use only UL listed compound compatible with the cable outer jacket, voltage rating, and with the raceway involved.

B. Submit a schedule of cable pulls 2 weeks prior to installation and certify in writing that the cable will meet the requirements of the cable manufacturer for maximum pulling tension, allowable sidewall pressure, and installed bending radius limitations.

C. Monitor pulling tensions while pulling on runs between manhouses and handholes and record the maximum tensions used. Advise the Engineer of cases exceeding the manufacturer's recommendations and remove and replace cables subjected to tensions in excess of those recommended.

D. Perform pulling of cable in such a manner that the cable outer jacket does not scrape against the edge of the conduit, at both the inlet and outlet ends of the conduit. Cable shall be free of sandy or gritty material during pulling. If cable is laid on ground during pulling, cable shall be wiped free of sandy or gritty material prior to entry of cable into conduit and prior to application of any pulling compound.

E. Tighten all screws and terminal bolts using torque type wrenches and/or drivers to tighten to the inch-pound requirements of the CEC and UL.

F. Where single conductors and cables in manholes, handholes, vaults, and other indicated locations are not wrapped together by some other means such as arc and fireproofing tapes, bundle throughout their exposed length all conductors entering from each conduit with nylon, self-locking, releasable, cable ties placed at intervals not exceeding 18 inches on centers.

G. Terminate no more than two control conductors per terminal point. Terminate all spare conductors on terminal blocks.

H. Low voltage power and control conductors shall be in separate conduits.

I. Only combine conductors with no more than two wire sizes difference to prevent possible installation damage to the smaller conductors; otherwise use separate conduits.

3.2 CONDUCTOR 600 VOLTS AND BELOW

A. Provide conductor sizes indicated on drawings with no splices except as accepted in writing by the Engineer.

B. Minimum wire size for all 480VAC or higher application shall be #12.

C. Wire nuts may be used on 120-volt lighting and 120-volt receptacle circuits only. Place no more than one conductor in any single-barrel pressure connection. Use crimp connectors with tools by same manufacturer and/or UL listed for connectors of all stranded conductors.

D. Soldered mechanical joints insulated with tape will not be acceptable.

E. Color coding on wire sizes larger than No. 6 AWG shall be by taping the individual conductors with the appropriate colored self-adhesive vinyl electrical tape. Vinyl plastic insulating tape for wire and cable splices and terminations shall be flame retardant, 7-mil thick minimum, rated for 105 degrees C minimum meeting the requirements of UL 510.

F. Provide terminals and connectors acceptable for the type of material used.

G. Arrange wiring inside control panels, motor starters, switchgear, etc., neatly cut to proper length, remove surplus wire, and bridle and secure in an acceptable manner. Identify all circuits entering switchgear, motor starters, control panels, etc., in accordance with the cable schedules on the drawings. Terminate cable conductors on the same side of the terminal blocks as shown on the drawings.

H. Terminate control and instrumentation wiring with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions. Where terminals provided will accept such lugs, terminate all control and instrumentation wiring (except solid thermocouple leads) with insulated, locking-fork compression lugs, Thomas & Betts Sta-Kon, or equal. Control panel incoming field wireway sizes indicated on the drawings are considered minimum. Contractor shall adjust wireway sizes to meet CEC percentage fill requirements.

I. For terminals designed to accept only bare wire compression terminations use only stranded wire, and terminate only one wire per terminal. Tighten all terminal screws with torque screwdriver to the recommended torque values.

J. Attach compression lugs with a tool specifically designed for that purpose which provides a complete, controlled crimp where the tool will not release until the crimp is complete. Use of plier type crimpers is not acceptable.

K. Cap spare conductors and conductors not terminated with UL listed end caps. Label spare conductors with “From A – B, Spare – X” where A and B indicate the

source and destination locations respectively and X shall be the unique spare sequence number.

L. Where conductors pass through holes or over edges in sheet metal, remove all burrs, chamfer all edges, and install bushings and protective strips of insulating material to protect the conductors.

M. For conductors that will be connected by others, provide at least 6 feet spare conductor in freestanding panels and at least 2 feet spare in other assemblies. Provide additional spare conductor length in any particular assembly where it is obvious that more conductor length will be needed to reach the termination point.

N. Train cables passing through all manholes and handholes along the walls on cable racks. Allow minimum 5 feet of slack in each run in a "drip loop" at least once along a wall. Loops and cables shall be organized, trained, and neatly installed.

O. Do not strip cables more than eight inches from the nearest termination point of that cable.

P. Bundle and label all spare pairs with the cable designation. Tag all individual pairs to enable identification of spare pairs when making future terminations.

Q. Splices will not be permitted except as accepted in writing by the Engineer.

R. Ends of cable shall not be exposed to environment more than 24 hours after pulling or splicing. After 24 hours purge the cable with nitrogen or sealed with tape.

S. All hardware used shall be minimum rated for grade #5.

T. Used only rated compression lugs for all conductor terminations.

3.3 MULTI-CONDUCTOR POWER, CONTROL, AND INSTRUMENTATION CABLES 600 VOLTS AND LESS

A. Splices will not be permitted except as accepted in writing by the Engineer.

B. Where connections of cables installed under this section are to be made under Div. 40, Process Integration, leave pigtails of adequate length for neat bundled type connections.

C. Maintaining the integrity of shielding of instrumentation cables is essential to the operation of the control systems. Take special care in cable installation to ensure that grounds do not occur because of damage to the jacket over the shield. Shields shall be grounded at one location only as shown on the drawings.

3.4 LACING OF WIRES AND CABLES

A. Lace all wires and cables in pull or junction boxes, manholes, handholes, wireways, and at each termination. Lace wires and cables so that the wires of the individual circuits are laced together by circuit and the laced-together circuit or cable shall be tagged with the cable number. Bundle all wiring entering and exiting the control panels into groups. Bundle and lace power, lighting, control, alarm, annunciator, and instrumentation wiring as specified herein.

3.5 FIELD QUALITY CONTROL

A. Provide acceptance testing of all of the low voltage cables per Section 26 08 00.

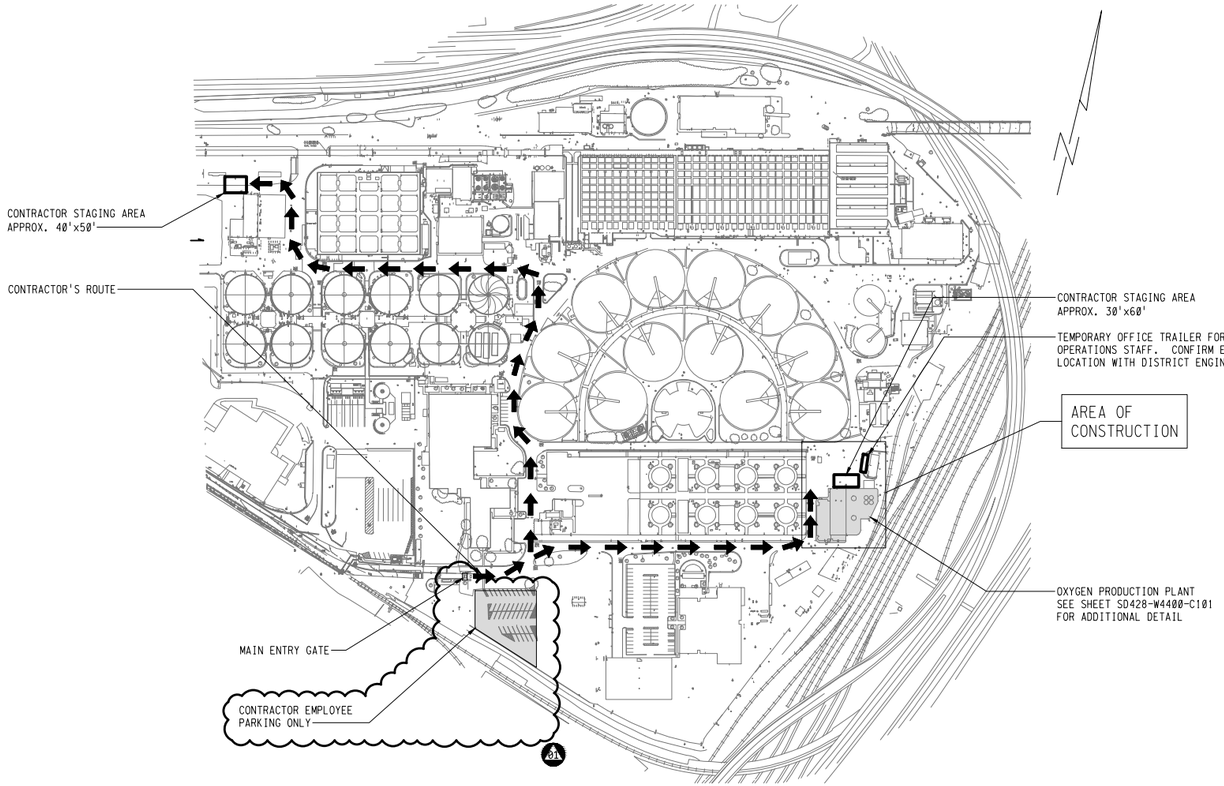
END OF SECTION

THIS PAGE IS LEFT INTENTIONALLY BLANK.

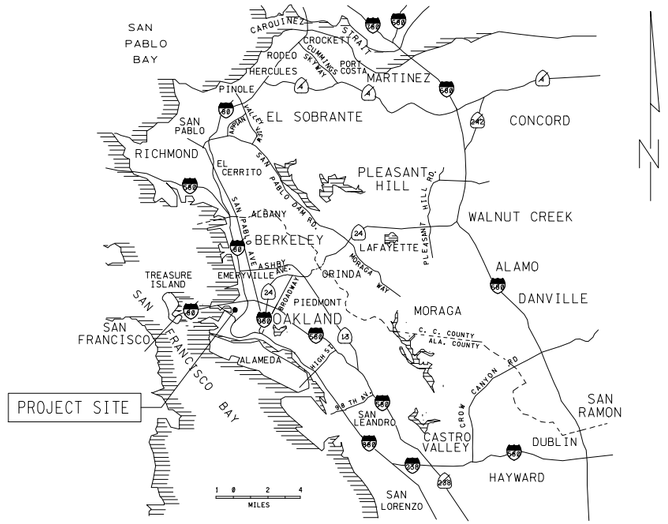
SD-428 Addendum No. 1

VOLUME III - DRAWINGS

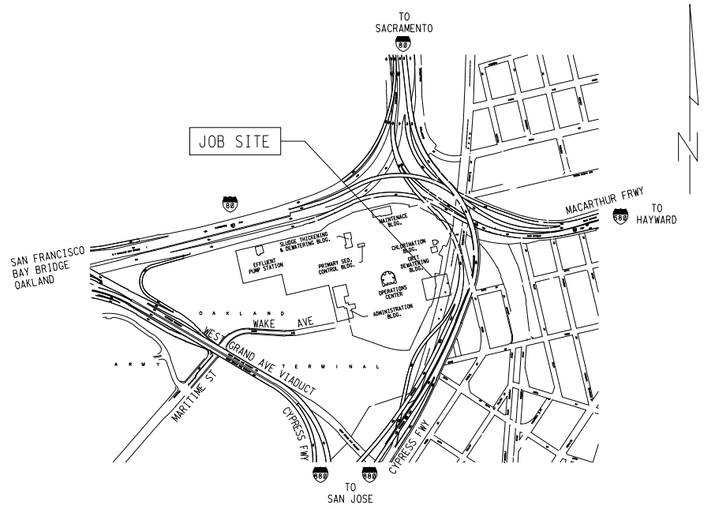
REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME
REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME
USER: #USER#
DATE: #DATE#
FILE: #FILENAME#
PLOT SCALE: PLOTSCALE



SITE PLAN
NOT TO SCALE



LOCATION MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

David L. Richardson
Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:19:07-04'00'

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran
SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	J. JANCAITIS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
GENERAL
LOCATION MAP, VACINITY MAP AND SITE PLAN

SCALE NONE
DATE 28JUN24

SD428-W4400-G001
DRAWING NUMBER

01
REV.

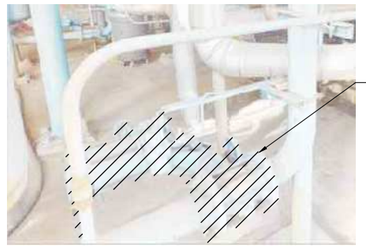
REF 7: REF4#TLEWWE
REF 6: REF5#TLEWWE
REF 5: REF6#TLEWWE
REF 4: REF7#TLEWWE
REF 3: REF8#TLEWWE
REF 2: REF9#TLEWWE
REF 1: REF10#TLEWWE
PLOT SCALE: PLOTSCALE
FILE: ##########
USER: ##USER####
DATE: ##DATE####
FILE: ##########



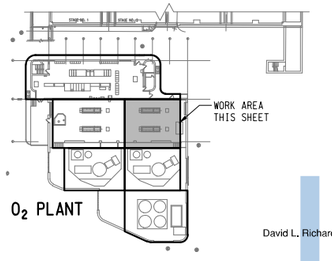
(NOTE 6)
PHOTO DETAIL P1
NO SCALE



(NOTE 6)
PHOTO DETAIL P2
NO SCALE



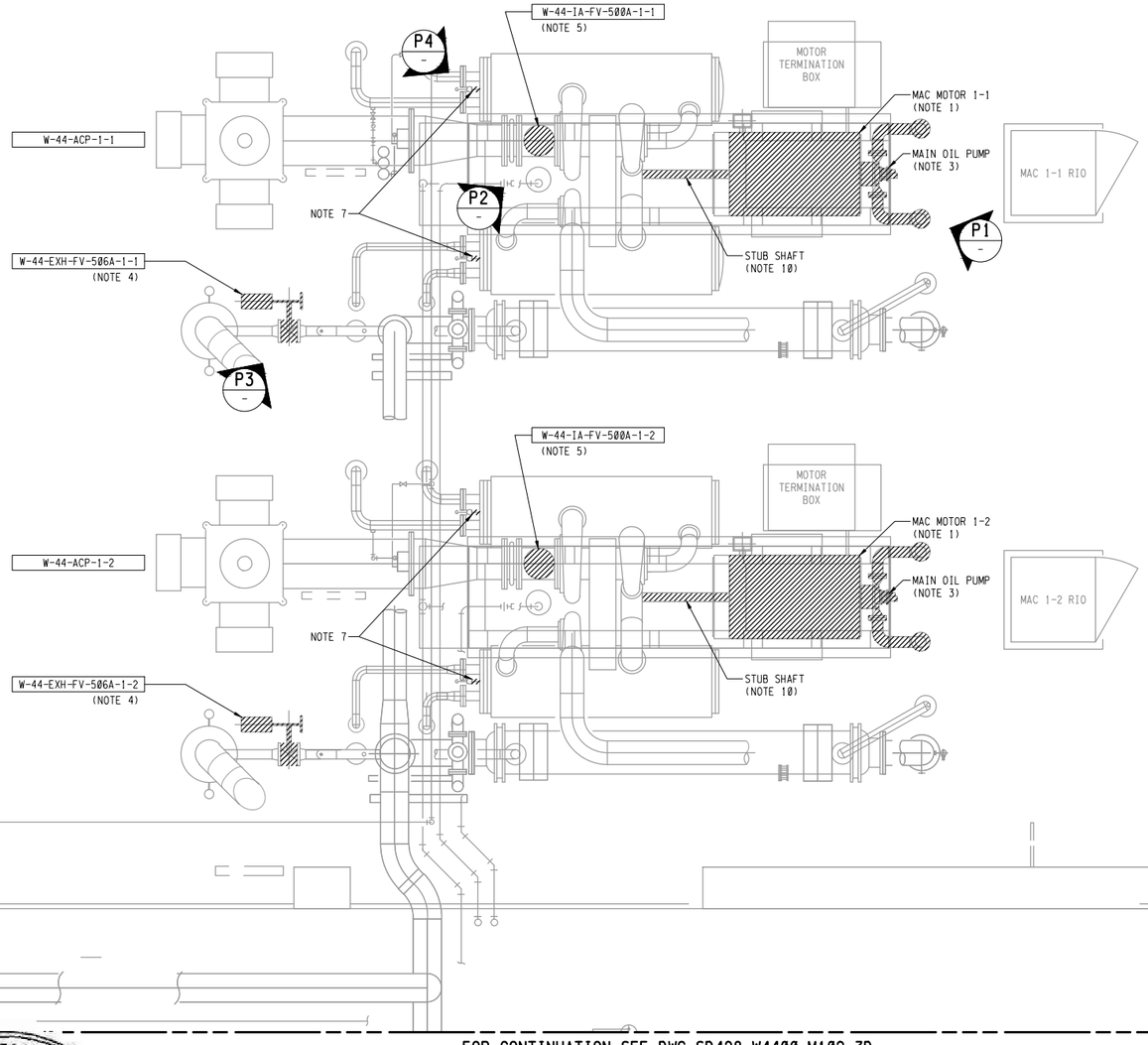
(NOTE 6)
PHOTO DETAIL P3
NO SCALE



KEY PLAN

FOR CONTINUATION SEE DWG SD428-W4400-M102.2D

FOR CONTINUATION SEE DWG SD428-W4400-M102.6D



FOR CONTINUATION SEE DWG SD428-W4400-M102.3D

PLAN

NOTES:

1. DISCONNECT LEADS AND DEMOLISH MAC MOTOR.
2. CLEAN MOTOR BASE PRIOR TO INSTALLATION OF NEW MAC MOTOR.
3. REMOVE MAIN OIL PUMP AND ANY NECESSARY ASSOCIATED PIPING AND STORE FOR RE-INSTALLATION. DRAIN OIL RESERVOIR AND SAVE OIL PRIOR TO THE REMOVAL OF MAC MOTOR.
4. DEMOLISH AND REPLACE VALVE ASSEMBLY.
5. DEMOLISH AND REPLACE ACTUATOR AND POSITIONER.
6. PHOTOS TYPICAL FOR MAC 1-1, MAC 1-2, MAC 2-1 AND MAC 2-2.
7. DEMOLISH PIPE SECTION BEFORE BALL VALVE FOR INSTALLATION OF TEE AND RELIEF VALVE.
8. DEMOLISH AND REPLACE PNEUMATIC TUBING. REFER TO PNEUMATIC TUBING SCHEDULE ON DWG. SD428-W4400-M301.
9. TEMPORARILY COVER OR BLIND FLANGE OPEN PIPING UNTIL NEW WORK IS COMPLETE TO PREVENT DUST AND DEBRIS FROM ENTERING MAC PIPING.
10. REMOVE STUB SHAFT AND COVER AND STORE FOR RE-INSTALLATION.



(NOTE 6)
PHOTO DETAIL P4
NO SCALE

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:19:24-04'00'
David L. Richardson

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	B. WESLEY/D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

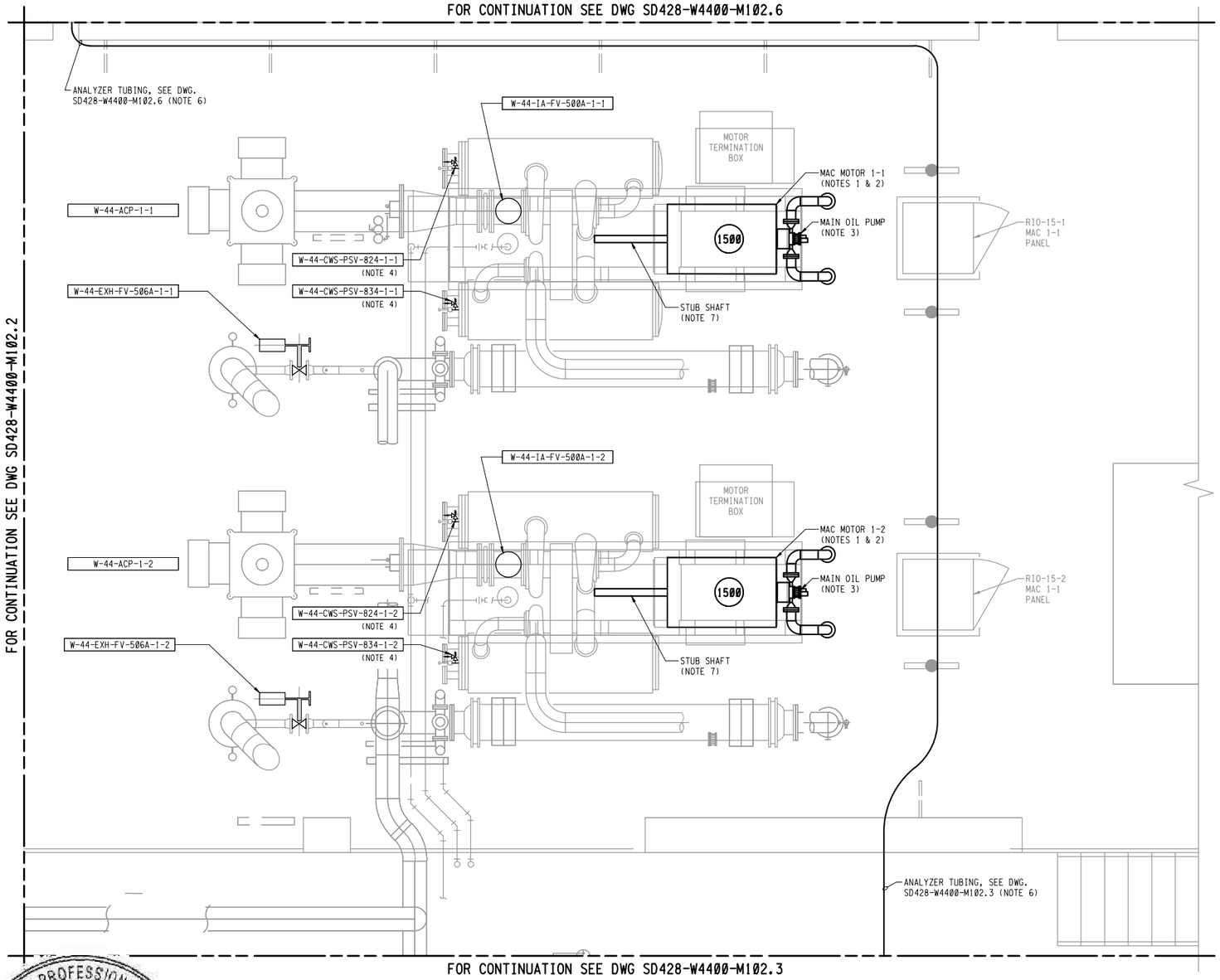
PROJECT MANAGER R.P.E. NO. 95846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
MECHANICAL
PARTIAL DEMOLITION PLAN 1

SCALE 3/8"=1'-0"
DATE 28JUN24
SD428-W4400-M102.1D
DRAWING NUMBER
01
REV.

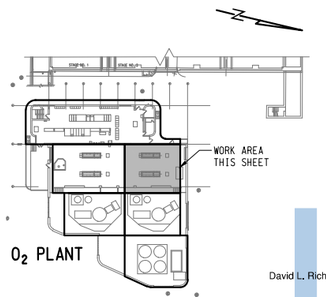
REF 7: REF-W-FILENAME
REF 8: REF-W-FILENAME
REF 9: REF-W-FILENAME
REF 4: REF-W-FILENAME
REF 5: REF-W-FILENAME
REF 6: REF-W-FILENAME
REF 1: REF-W-FILENAME
REF 2: REF-W-FILENAME
REF 3: REF-W-FILENAME
PLOT SCALE: PLOTSCALE
USER: USERNAME
DATE: MONTH DAY, YEAR
FILE: FILENAME



PLAN

NOTES:

1. MAC MOTOR SPECIFIED AND PROVIDED BY EBMUD. VERIFY EXISTING COMPRESSOR MOTOR SHAFT COMPATIBILITY WITH NEW MOTOR PRIOR TO INSTALLATION.
2. REFER TO MAC MOTOR SPECIFICATION DOCUMENT FOR DETAILS REGARDING STORAGE, INSTALLATION, SEQUENCING OF WORK, LEVELING AND ALIGNMENT OF MOTOR.
3. RE-INSTALL MAIN OIL PUMP FITTINGS AND PIPING. (01A)
4. INSTALL TEE AND RELIEF VALVE BEFORE EXISTING 90° BALL VALVE
5. FIELD ROUTE PNEUMATIC TUBING AS INDICATED ON PNEUMATIC AIR TUBING SCHEDULE SHOWN ON DWG. SD428-W4400-M301
6. ROUTE ANALYZER TUBING FROM COLD BOX 1 TO MAIN CONTROL PANEL PLANT 1 UTILIZING EXISTING CABLE TRAY SUPPORTS FOLLOWING SIMILAR ROUTING AS ELECTRICAL CONDUIT. SEE DWG. SD428-W4400-E102.1 FOR GENERAL PATH LOCATION. FOR PNEUMATIC TUBING SCHEDULE SEE DWG.'S SD428-W4400-M301 THRU SD428-W4400-M303.
7. RE-INSTALL STUB SHAFT TO NEW MOTOR HALF COUPLING AND EXISTING COMPRESSOR. REINSTALL STUB SHAFT COVER PIECE. (01A)



KEY PLAN

David L. Richardson
Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:19:34-04'00'

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	B. WESLEY/D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EBMUD

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
MECHANICAL
PARTIAL PLAN 1

SCALE 3/8"=1'-0"
DATE 28JUN24

SD428-W4400-M102.1
DRAWING NUMBER

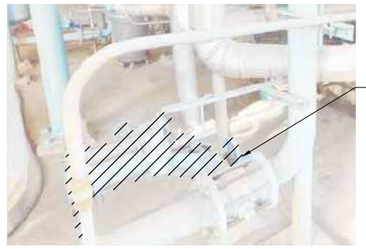
01
REV.



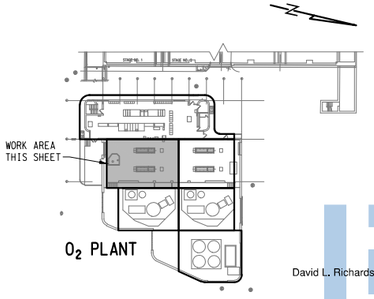
(NOTE 6)
PHOTO DETAIL P1
NO SCALE



(NOTE 6)
PHOTO DETAIL P2
NO SCALE

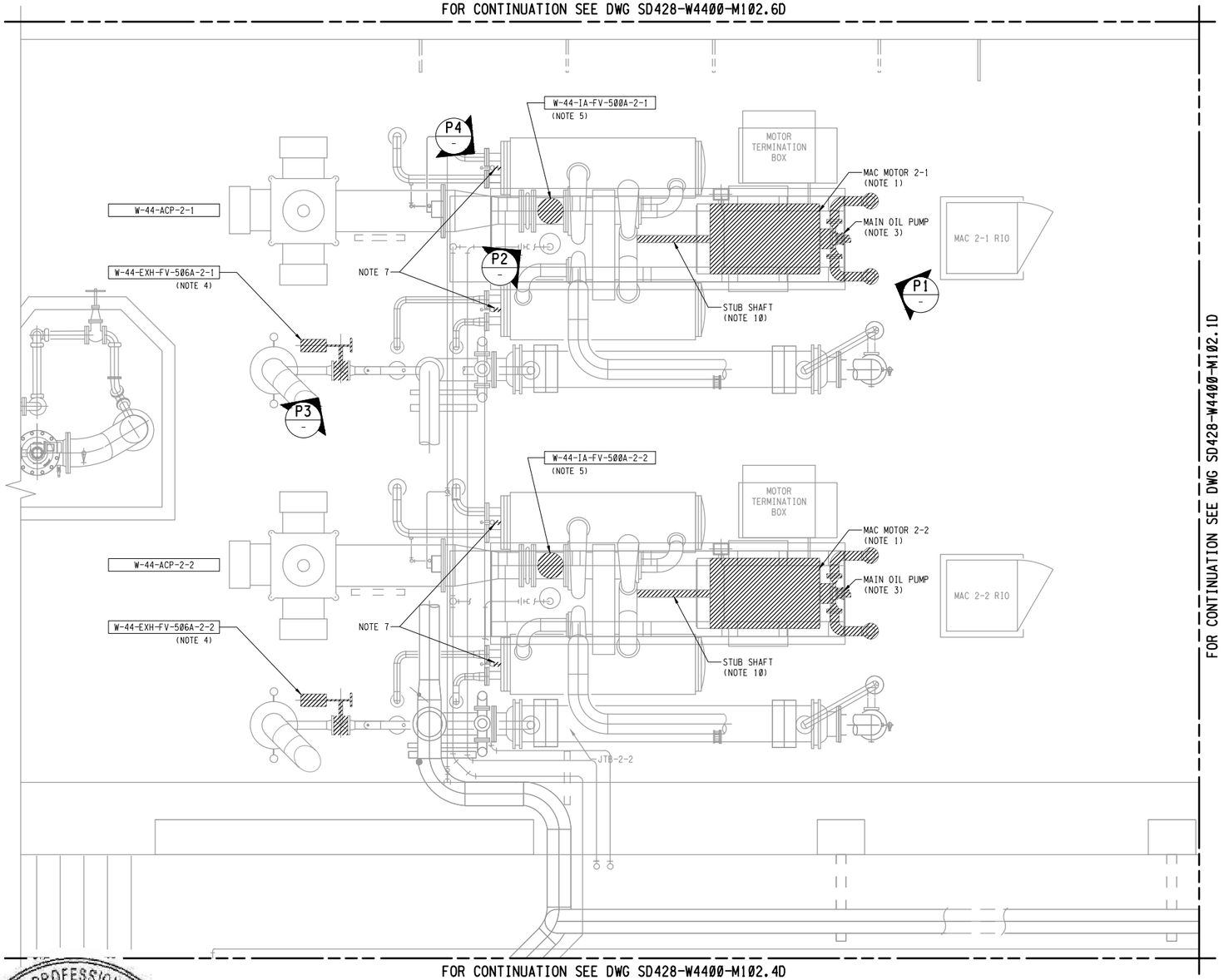


(NOTE 6)
PHOTO DETAIL P3
NO SCALE



KEY PLAN

FOR CONTINUATION SEE DWG SD428-W4400-M102.6D



FOR CONTINUATION SEE DWG SD428-W4400-M102.4D

PLAN

FOR CONTINUATION SEE DWG SD428-W4400-M102.1D

NOTES:

1. DISCONNECT LEADS AND DEMOLISH MAC MOTOR.
2. CLEAN MOTOR BASE PRIOR TO INSTALLATION OF NEW MAC MOTOR.
3. REMOVE MAIN OIL PUMP AND ANY NECESSARY ASSOCIATED PIPING AND STORE FOR RE-INSTALLATION. DRAIN OIL RESERVOIR AND SAVE OIL PRIOR TO THE REMOVAL OF MAC MOTOR.
4. DEMOLISH AND REPLACE VALVE ASSEMBLY.
5. DEMOLISH AND REPLACE ACTUATOR AND POSITIONER.
6. PHOTOS TYPICAL FOR MAC 1-1, MAC 1-2, MAC 2-1 AND MAC 2-2.
7. DEMOLISH PIPE SECTION BEFORE BALL VALVE FOR INSTALLATION OF TEE AND RELIEF VALVE.
8. DEMOLISH AND REPLACE PNEUMATIC TUBING. REFER TO PNEUMATIC TUBING SCHEDULE ON DWG. SD428-W4400-M301.
9. TEMPORARILY COVER OR BLIND FLANGE OPEN PIPING UNTIL NEW WORK IS COMPLETE TO PREVENT DUST AND DEBRIS FROM ENTERING MAC PIPING.
10. REMOVE STUB SHAFT AND COVER AND STORE FOR RE-INSTALLATION.



(NOTE 6)
PHOTO DETAIL P4
NO SCALE

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:19:50-04'00'
David L. Richardson

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	B. WESLEY/D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO. 95846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
MECHANICAL
PARTIAL DEMOLITION PLAN 2

SCALE 3/8"=1'-0"
DATE 28JUN24

SD428-W4400-M102.2D
DRAWING NUMBER

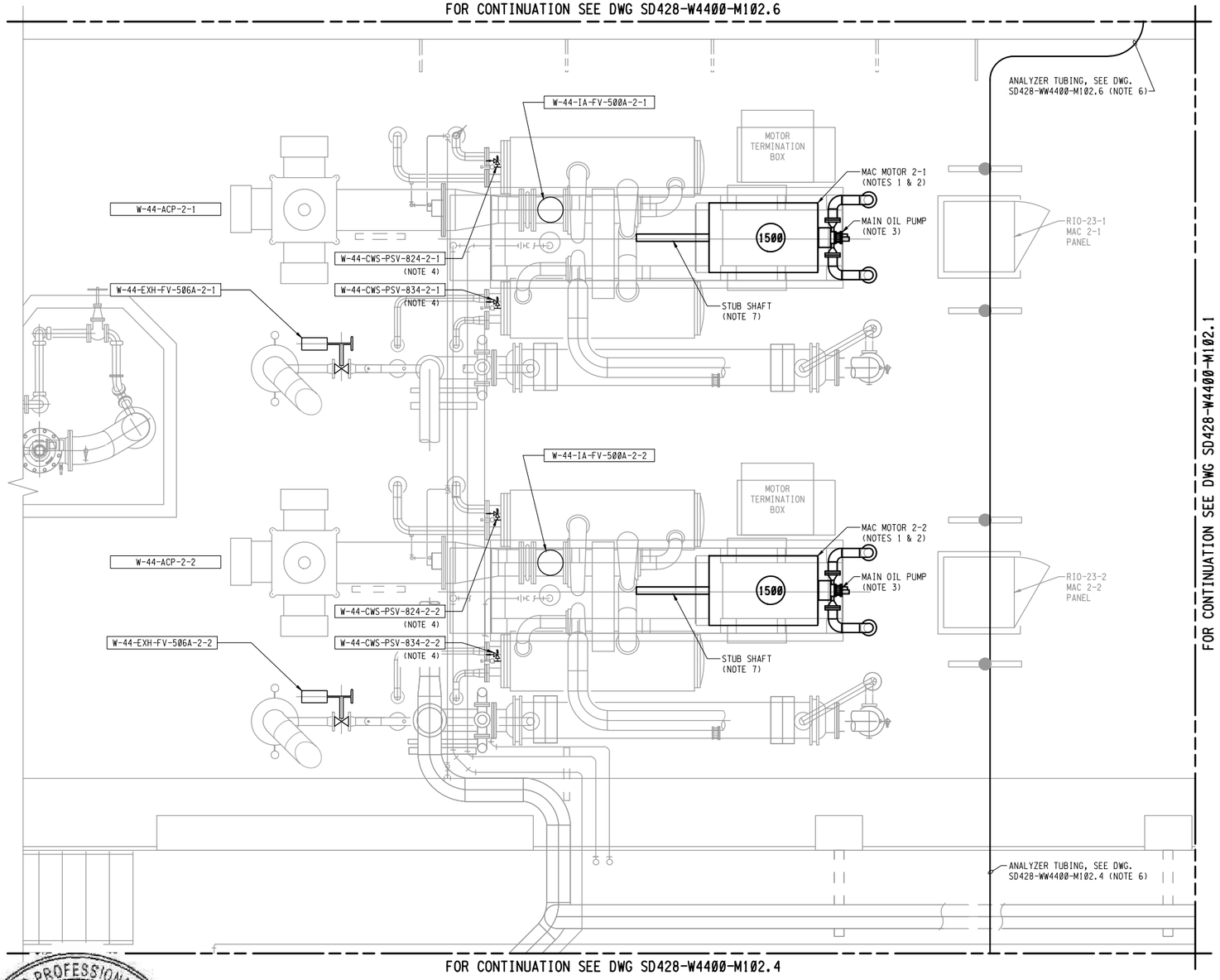
01
REV.

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME
REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME

PLOT SCALE: PLOTSCALE
FILE: ##########FILENAME##########
USER: ##USER##
DATE: ##DATE##
FILE: ##########FILENAME##########

REF 7: REF4#FILENAME
REF 8: REF4#FILENAME
REF 9: REF4#FILENAME
REF 4: REF4#FILENAME
REF 5: REF4#FILENAME
REF 6: REF4#FILENAME
REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
PLOT SCALE: PLOTSCALE
USER: #USERNAME#
DATE: #DATE#
FILE: #FILENAME#

FOR CONTINUATION SEE DWG SD428-W4400-M102.6



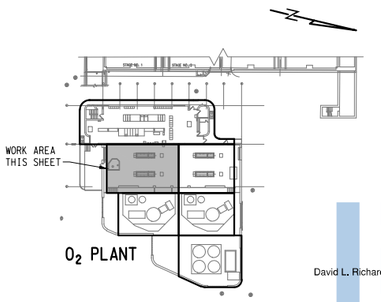
FOR CONTINUATION SEE DWG SD428-W4400-M102.1

FOR CONTINUATION SEE DWG SD428-W4400-M102.4

PLAN

NOTES:

1. MAC MOTOR SPECIFIED AND PROVIDED BY EBMUD. VERIFY EXISTING COMPRESSOR MOTOR SHAFT COMPATIBILITY WITH NEW MOTOR PRIOR TO INSTALLATION.
2. REFER TO MAC MOTOR SPECIFICATION DOCUMENT FOR DETAILS REGARDING STORAGE, INSTALLATION, SEQUENCING OF WORK, LEVELING AND ALIGNMENT OF MOTOR.
3. RE-INSTALL MAIN OIL PUMP FITTINGS AND PIPING 01A
4. INSTALL TEE AND RELIEF VALVE BEFORE EXISTING 90° BALL VALVE
5. FIELD ROUTE PNEUMATIC TUBING AS INDICATED ON PNEUMATIC AIR TUBING SCHEDULE SHOWN ON DWG. SD428-W4400-M301
6. ROUTE ANALYZER TUBING FROM COLD BOX 1 TO MAIN CONTROL PANEL PLANT 1 UTILIZING EXISTING CABLE TRAY SUPPORTS FOLLOWING SIMILAR ROUTING AS ELECTRICAL CONDUIT. SEE DWG. SD428-W4400-E102.1 FOR GENERAL PATH LOCATION. FOR PNEUMATIC TUBING SCHEDULE SEE DWG.'S SD428-W4400-M301 THRU SD428-W4400-M303.
7. RE-INSTALL STUB SHAFT TO NEW MOTOR HALF COUPLING AND EXISTING COMPRESSOR. REINSTALL STUB SHAFT COVER PIECE. 01A



KEY PLAN

David L. Richardson
Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:20:00-04'00'

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	B. WESLEY/D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

MECHANICAL

PARTIAL PLAN 2

SCALE 3/8"=1'-0"
DATE 28JUN24

SD428-W4400-M102.2
DRAWING NUMBER

01
REV.

REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME

REF 4: REF#FILENAME
REF 5: REF#FILENAME
REF 6: REF#FILENAME

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME

USER: #USER#####
DATE: #####DATE#####
FILE: ##########################FILE##########################
PLOT SCALE: PLOT#SCALE

PNEUMATIC TUBING SCHEDULE

LOCATION	FROM	TO	ESTIMATED LENGTH (IN)	ESTIMATED LENGTH (FT)	TUBING DIAM.	MATERIAL	COMMENTS
			MAC-1-1				
MAC-1-1	ORIFICE PLATE	FIT-502-1-1 HIGH	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	ORIFICE PLATE	FIT-502-1-1 LOW	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	P50?A-1-1	PIT-506-1-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	P53L-1-1	PIT-53-1-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	P54L-1-1	PSL-53-1-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	3RD STAGE DISCHARGE	PSH-503-1-1	24	2	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-1	IA SUPPLY LINE	PCV-500A-1-1	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-1	IA SUPPLY LINE	PCV-506A-1-1	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-1	PCV-500A-1-1	FY-500-1-1	12	1	3/8"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
			MAC-1-2				
MAC-1-2	ORIFICE PLATE	FIT-502-1-2 HIGH	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-2	ORIFICE PLATE	FIT-502-1-2 LOW	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-2	P50?A-1-2	PIT-506-1-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-2	P53L-1-2	PIT-53-1-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-2	P54L-1-2	PSL-53-1-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-2	3RD STAGE DISCHARGE	PSH-503-1-2	24	2	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-2	IA SUPPLY LINE	PCV-500A-1-2	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-2	IA SUPPLY LINE	PCV-506A-1-2	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-1-2	PCV-500A-1-2	FY-500-1-2	12	1	3/8"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
			MAC-2-1				
MAC-2-1	ORIFICE PLATE	FIT-502-2-1 HIGH	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-1	ORIFICE PLATE	FIT-502-2-1 LOW	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-1	P50?A-2-1	PIT-506-2-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-1	P53L-2-1	PIT-53-2-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-1-1	P54L-2-1	PSL-53-2-1	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-1	3RD STAGE DISCHARGE	PSH-503-2-1	24	2	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-1	IA SUPPLY LINE	PCV-500A-2-1	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-1	IA SUPPLY LINE	PCV-506A-2-1	60	5	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-1	PCV-500A-2-1	FY-500-2-1	12	1	3/8"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
			MAC-2-2				
MAC-2-2	ORIFICE PLATE	FIT-502-2-2 HIGH	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-2	ORIFICE PLATE	FIT-502-2-2 LOW	96	8	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-2	P50?A-2-2	PIT-506-2-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-2	P53L-2-2	PIT-53-2-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-2	P54L-2-2	PSL-53-2-2	60	5	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
MAC-2-2	3RD STAGE DISCHARGE	PSH-503-2-2	24	2	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-2	PCV-506A-2-2	FY-506A-2-2	12	1	3/8"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
MAC-2-2	IA SUPPLY LINE	PCV-500A-2-2	120	10	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-2	IA SUPPLY LINE	PCV-506A-2-2	120	10	3/8"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
MAC-2-2	PCV-500A-2-2	FY-500-2-2	12	1	3/8"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR

David L. Richardson

Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:20:08-04'00'

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

EBMUD

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
MECHANICAL
PNEUMATIC TUBING SCHEDULE 1

SCALE NONE
DATE 28JUN24

SD428-W4400-M301
DRAWING NUMBER

01
REV.

PNEUMATIC TUBING SCHEDULE

LOCATION	FROM	TO	ESTIMATED LENGTH (IN)	ESTIMATED LENGTH (FT)	TUBING DIAM.	MATERIAL	COMMENTS
CRYO PLANT #1							
CRYO PLANT #1	S350N-1	AIT-312-1	1200	100	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	S500X-1	AIT-352-1	1200	100	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	S355X-1	AIT-355-1	1200	100	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P800A-1	PSL-800-1	12	1	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #1	X111A-1	FCV-111-1	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #1	X112A-1	FCV-112-1	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #1	X113A-1	FCV-113-1	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #1	X114A-1	FCV-114-1	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #1	H115A-1	FIT-115-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L115A-1	FIT-115-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	H120A-1	FIT-120-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L120A-1	FIT-120-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	H340N-1	FIT-340-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L340N-1	FIT-340-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	H600X-1	FIT-600-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L600X-1	FIT-600-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	H330A-1	LIT-330-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L330A-1	LIT-330-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	H352X-1	LIT-352-1 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	L352X-1	LIT-352-1 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	IA SUPPLY LINE	PCV-340-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #1	IA SUPPLY LINE	PCV-600-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #1	IA SUPPLY LINE	PCV-601-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #1	P200A-1	PIT-200-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P300N-1	PIT-300-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P349N-1	PIT-349-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P352X-1	PIT-352-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P590A-1	PIT-590-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	P600A-1	PIT-600-1	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #1	IA SUPPLY LINE	PCV-X600X-1-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NEW CONNECTION NEEDS TEE FITTING WHERE FCV-120 WOULD BE CONNECTED
CRYO PLANT #1	IA SUPPLY LINE	PCV-X600X-1-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NEW CONNECTION NEEDS TEE FITTING WHERE FCV-120 WOULD BE CONNECTED
CRYO PLANT #1	IA SUPPLY LINE	PCV-330-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #1	IA SUPPLY LINE	PCV-350X-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
CRYO PLANT #1	IA SUPPLY LINE	PCV-351X-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #2							
CRYO PLANT #2	S350N-2	AIT-312-2	1680	140	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	S500X-2	AIT-352-2	1680	140	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	S355X-2	AIT-355-2	1500	125	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	X111A-2	FCV-111-2	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #2	X112A-2	FCV-112-2	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #2	X113A-2	FCV-113-2	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #2	X114A-2	FCV-114-2	120	10	1/2"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/2" TUBING
CRYO PLANT #2	H115A-2	FIT-115-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L115A-2	FIT-115-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	H120A-2	FIT-120-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L120A-2	FIT-120-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	H340N-2	FIT-340-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L340N-2	FIT-340-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	H600X-2	FIT-600-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L600X-2	FIT-600-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	H330A-2	LIT-330-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L330A-2	LIT-330-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	H352X-2	LIT-352-2 HIGH	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	L352X-2	LIT-352-2 LOW	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	IA SUPPLY LINE	PCV-340-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #2	IA SUPPLY LINE	PCV-600-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #2	IA SUPPLY LINE	PCV-601-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #2	P200A-2	PIT-200-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	P300N-2	PIT-300-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	P349N-2	PIT-349-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	P352X-2	PIT-352-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	P590A-2	PIT-590-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	P600A-2	PIT-600-2	240	20	1/4"	316 STAINLESS STL .035 IN THICK	REPLACE FITTING WITH SST 1/2" NPT TO 1/4" COMPRESSION
CRYO PLANT #2	IA SUPPLY LINE	PCV-X600X-2-1	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NEW CONNECTION NEEDS TEE FITTING WHERE FCV-120 WOULD BE CONNECTED
CRYO PLANT #2	IA SUPPLY LINE	PCV-X600X-2-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NEW CONNECTION NEEDS TEE FITTING WHERE FCV-120 WOULD BE CONNECTED
CRYO PLANT #2	IA SUPPLY LINE	PCV-330-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING
CRYO PLANT #2	IA SUPPLY LINE	PCV-350X-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	NPT TO TUBING CONNECTION FROM SUPPLY REGULATOR
CRYO PLANT #2	IA SUPPLY LINE	PCV-351X-2	36	3	1/4"	316 STAINLESS STL .035 IN THICK	FITTING FROM 1/2" NPT TO 1/4" TUBING

REGISTERED PROFESSIONAL ENGINEER
DAVID LLYOD RICHARDSON
No. 37097
Exp. 06-30-26
CIVIL
STATE OF CALIFORNIA

David L. Richardson
Digitally signed by David L. Richardson
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:20:17-04'00'

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	D. BOGGS
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	D. RUSSELL

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
MECHANICAL
PNEUMATIC TUBING SCHEDULE 2

SCALE NONE
DATE 28JUN24

SD428-W4400-M302
DRAWING NUMBER

01
REV.

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME
REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME

PLOT SCALE: PLOTSCALE
USER: #USER#
DATE: #DATE#
FILE: #FILE#

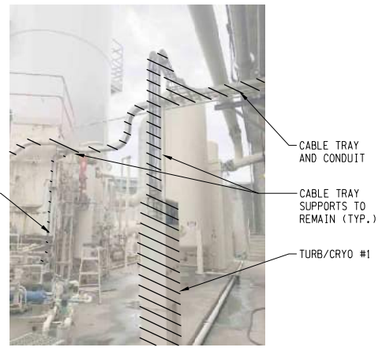


PHOTO DETAIL P1
NO SCALE

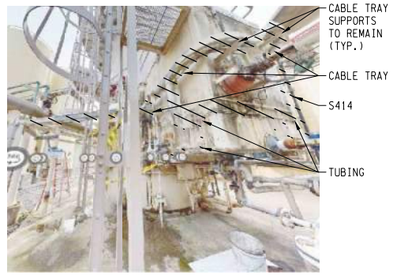
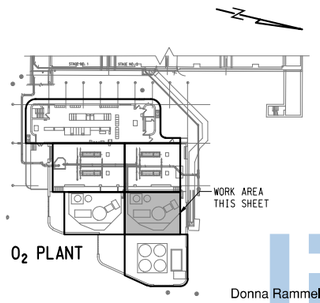


PHOTO DETAIL P2
NO SCALE



PHOTO DETAIL P3
NO SCALE



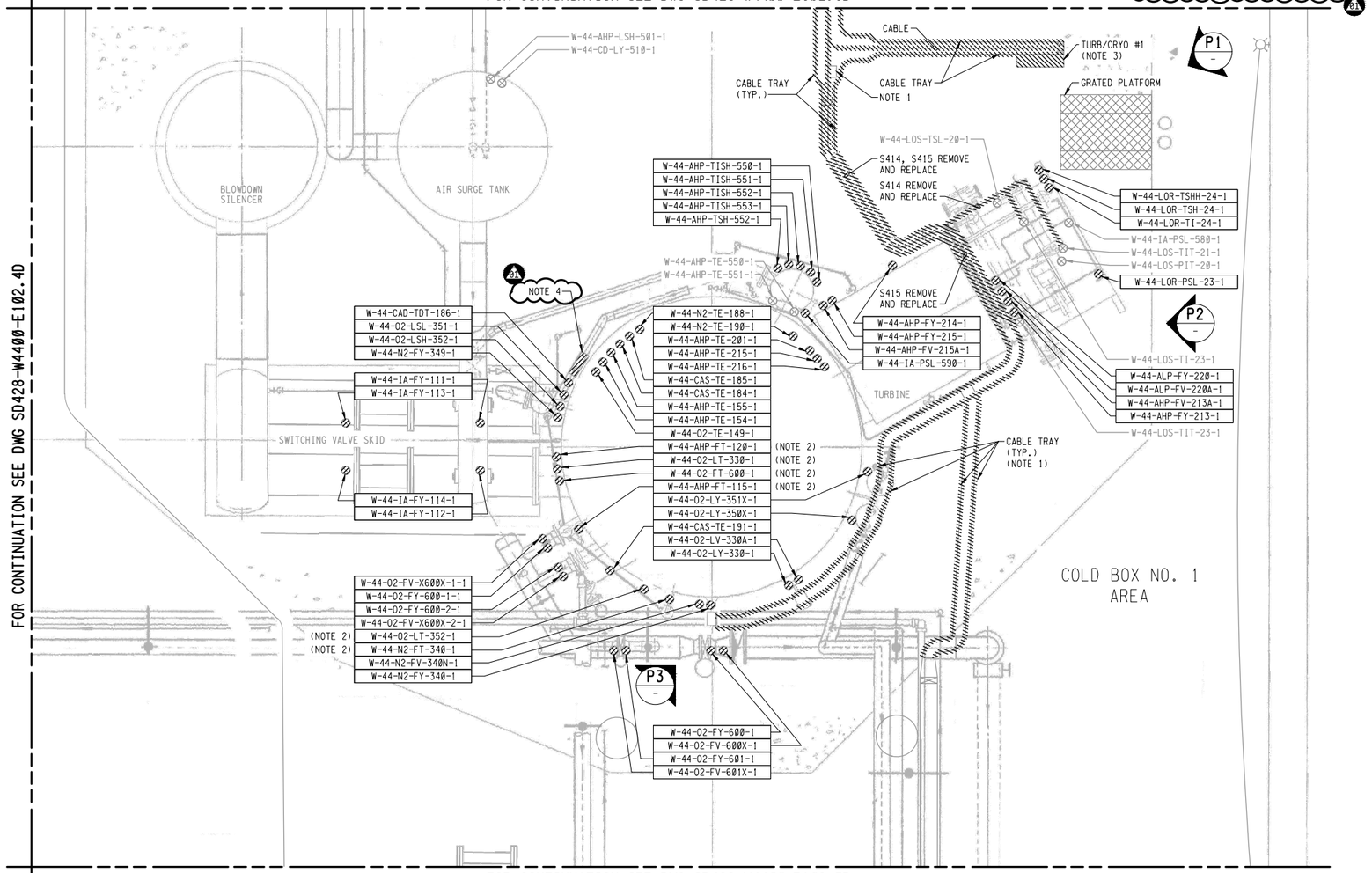
KEY PLAN

NOTES:

1. CABLE TRAY SUPPORTS TO REMAIN.
2. INSTRUMENTS TO BE RELOCATED
3. UNDERGROUND CONDUIT SHALL BE ABANDONED. CUT AND CAP IN PLACE.
4. REMOVE AND REPLACE TERMINATION BOX

FOR CONTINUATION SEE DWG SD428-W4400-E102.1D

FOR CONTINUATION SEE DWG SD428-W4400-E102.4D



PLAN

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by this placement of my signature on this document
Date: 2024.08.30 14:47:43-07'00'
Donna Rammell

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	L. MAXWELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 99846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

PARTIAL POWER AND SIGNAL DEMOLITION PLAN 3

SCALE	NONE	SD428-W4400-E102.3D	01
DATE	28JUN24	DRAWING NUMBER	REV.

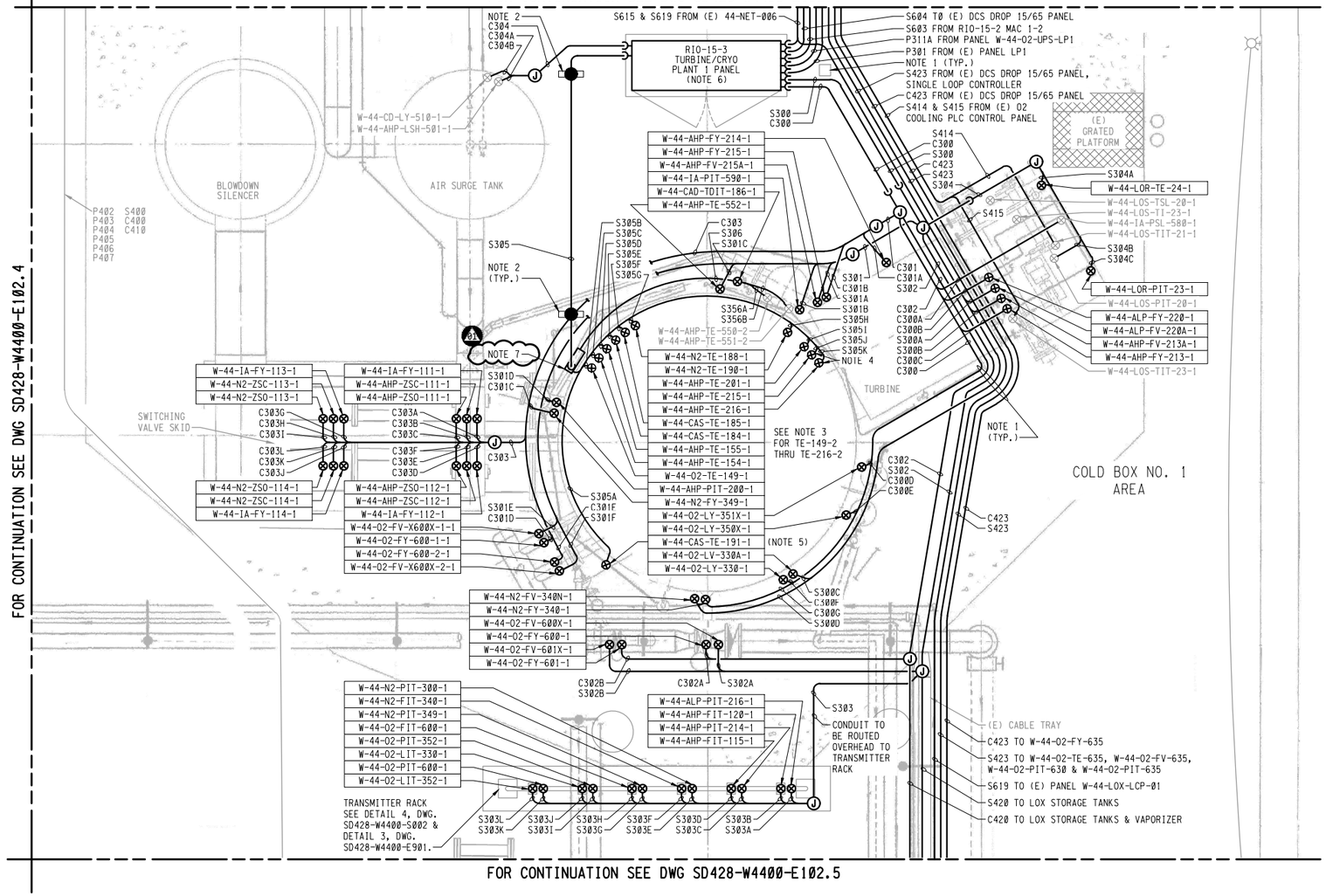
REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME
REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME

USER: USERNAME
DATE: $$DATE
FILE: FILENAME
PLOT SCALE: PLOTSCALE

REF 7: REF-W-TLDWWE
REF 6: REF-W-TLDWWE
REF 5: REF-W-TLDWWE
REF 4: REF-W-TLDWWE
REF 3: REF-W-TLDWWE
REF 2: REF-W-TLDWWE
REF 1: REF-W-TLDWWE
USER: ##USER####
DATE: ##########
FILE: ##########
PLOT SCALE: PLOT@SCALE
FILE##########

FOR CONTINUATION SEE DWG SD428-W4400-E102.4

FOR CONTINUATION SEE DWG SD428-W4400-E102.1

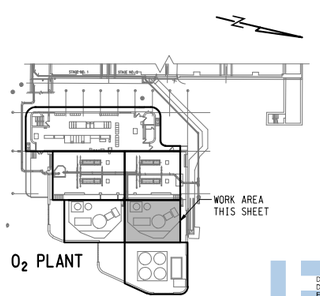


FOR CONTINUATION SEE DWG SD428-W4400-E102.5

PLAN

NOTES:

1. UTILIZE EXISTING CONDUIT AND CABLE TRAY SUPPORTS FOR CONDUIT WHEN POSSIBLE.
2. PROVIDE CONDUIT RACK SUPPORTS FOR SIGNAL AND CONTROL CONDUITS
3. FIELD VERIFY LOCATIONS OF TE-149-1 THRU TE-190-1 AND TE-201-1 THRU TE-216-1 LOCATED WITHIN THE COLD BOX.
4. TE-215-1 AND TE-216-1 LOCATED INSIDE TURBINE BOX
5. TE-191-1 SERVES COOL DOWN HEADER
6. ALL CONDUITS CONNECTING TO PANELS LOCATED OUTDOORS SHALL BE SIDE ENTRY.
7. PROVIDE THERMOCOUPLE TERMINATION BOX (CB T/C T-BOX). ENCLOSURE SHALL BE NEMA 4X, 316 SS. MOUNT TO SIDE OF COLD BOX.



KEY PLAN

Donna Rammell
Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:48:07-07'00'

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	L. MAXWELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

PARTIAL POWER AND SIGNAL PLAN 3

SCALE 3/8"=1'-0"
DATE 28JUN24

SD428-W4400-E102.3
DRAWING NUMBER

01
REV.



PHOTO DETAIL P1
NO SCALE

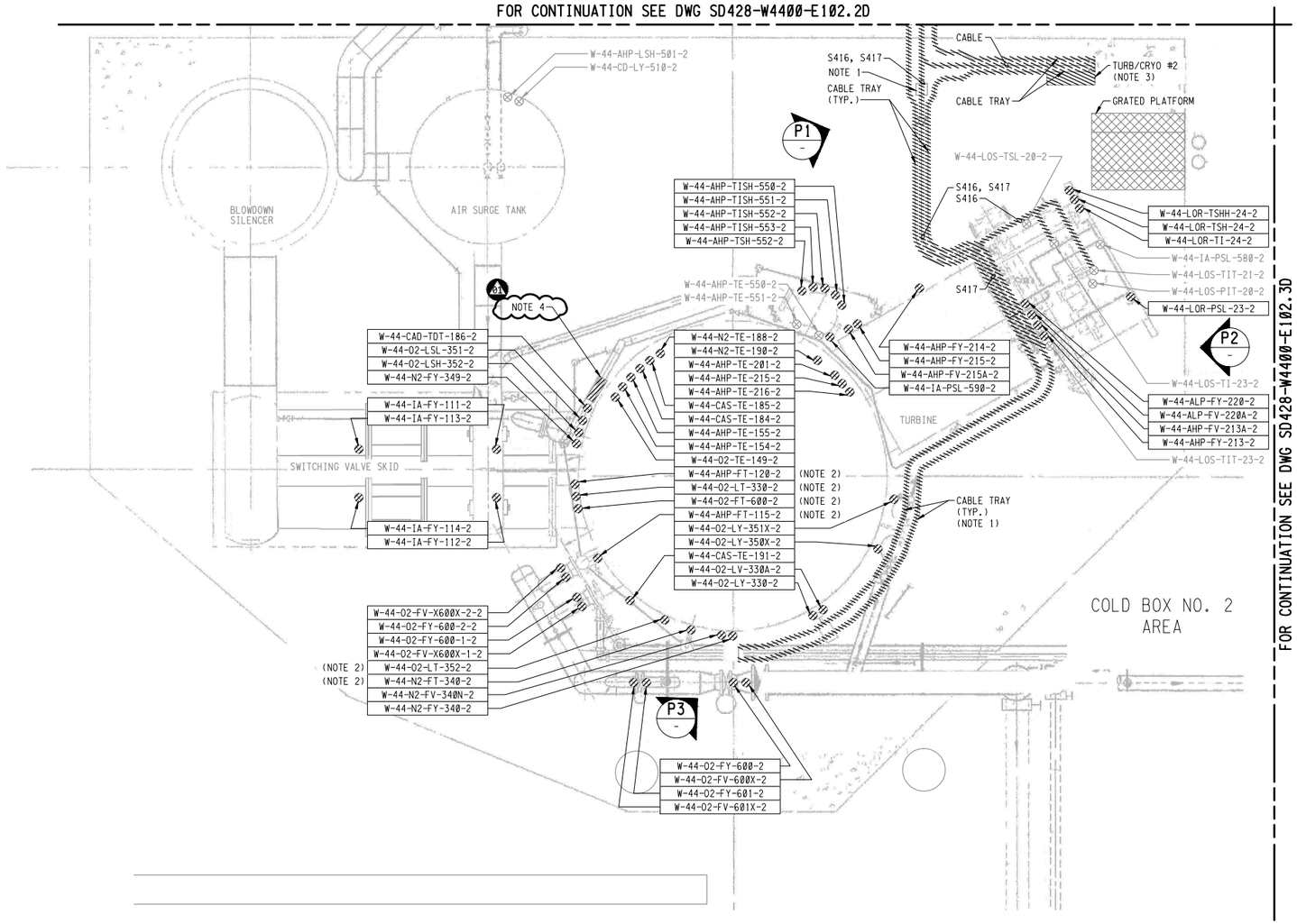


PHOTO DETAIL P2
NO SCALE



PHOTO DETAIL P3
NO SCALE

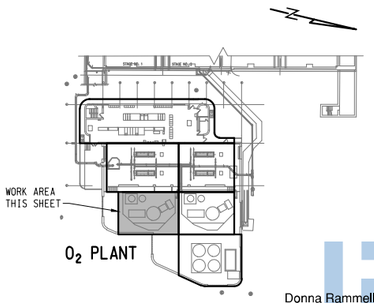
FOR CONTINUATION SEE DWG SD428-W4400-E102.2D



PLAN

NOTES:

1. CABLE TRAY SUPPORTS TO REMAIN.
2. INSTRUMENTS TO BE RELOCATED.
3. UNDERGROUND CONDUIT SHALL BE ABANDONED. CUT AND CAP IN PLACE.
4. REMOVE AND REPLACE TERMINATION BOX.



KEY PLAN

Donna Rammell
Digitally signed by Donna Rammell
DN: C=US, E=donnam@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:48:24-07'00'

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	L. MAXWELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 59846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

PARTIAL POWER AND SIGNAL DEMOLITION PLAN 4

SCALE NONE
DATE 28JUN24

SD428-W4400-E102.4D
DRAWING NUMBER

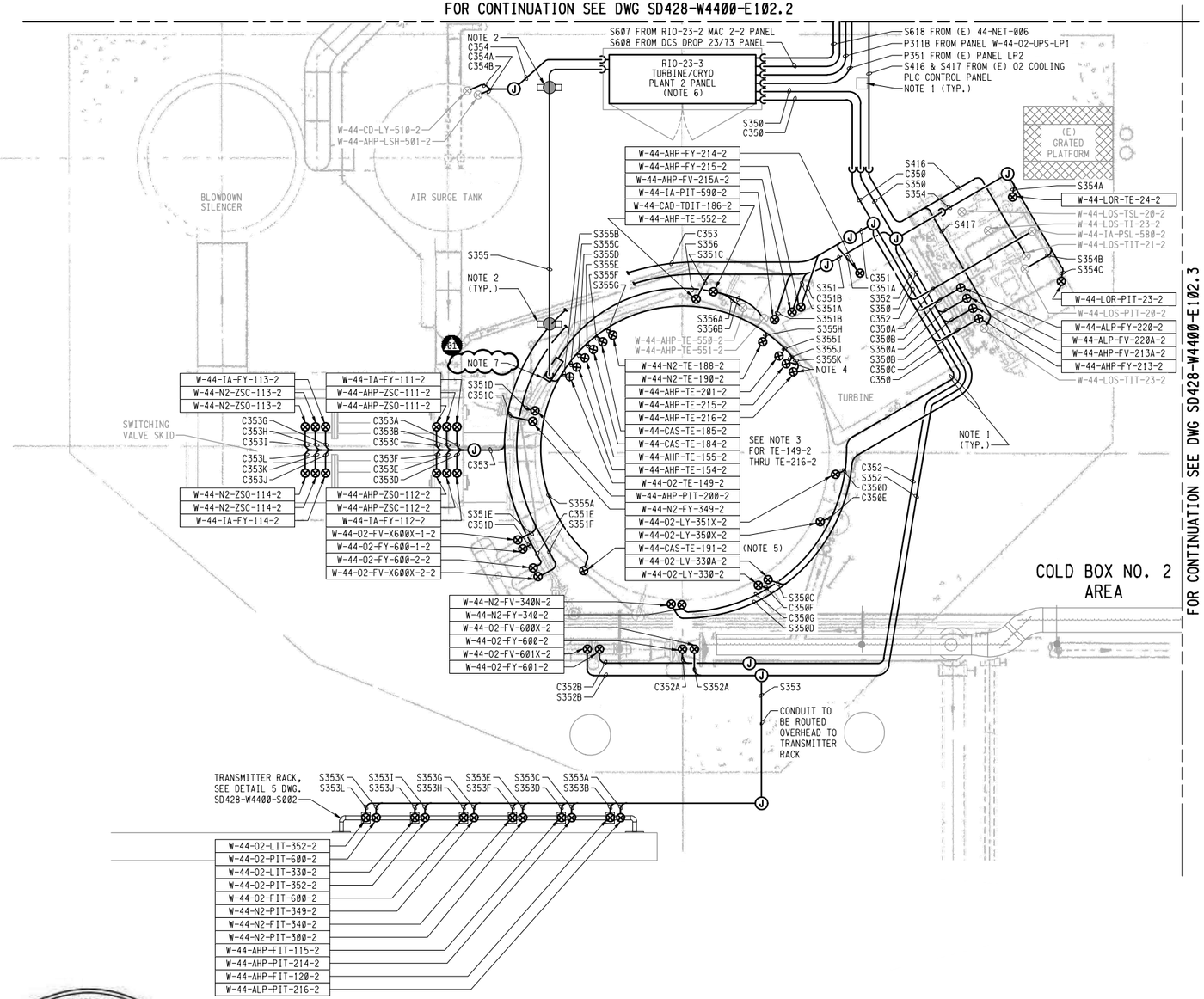
01
REV.

REF 1: REF1#TLEWWE
REF 2: REF2#TLEWWE
REF 3: REF3#TLEWWE
REF 4: REF4#TLEWWE
REF 5: REF5#TLEWWE
REF 6: REF6#TLEWWE
REF 7: REF7#TLEWWE
REF 8: REF8#TLEWWE
REF 9: REF9#TLEWWE

PLOT SCALE: PLOT@SCALE
USER: #USER#
DATE: #DATE#
FILE: #FILE#

REF 7: REF-W-TLEWWE
REF 8: REF-W-TLEWWE
REF 9: REF-W-TLEWWE
REF 4: REF-W-TLEWWE
REF 5: REF-W-TLEWWE
REF 6: REF-W-TLEWWE
REF 1: REF-W-TLEWWE
REF 2: REF-W-TLEWWE
REF 3: REF-W-TLEWWE
PLOT SCALE: PLOTSCALE
USER: ##USER####
DATE: ##DATE####
FILE: ##########FILE##########

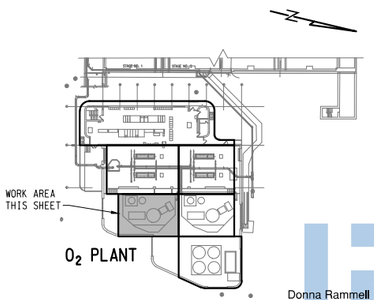
FOR CONTINUATION SEE DWG SD428-W4400-E102.2



PLAN

NOTES:

1. UTILIZE EXISTING CONDUIT AND CABLE TRAY SUPPORTS FOR CONDUIT WHEN POSSIBLE.
2. PROVIDE CONDUIT RACK SUPPORTS FOR SIGNAL AND CONTROL CONDUITS
3. FIELD VERIFY LOCATIONS OF TE-149-2 THRU TE-190-2 AND TE-201-2 THRU TE-216-2 LOCATED WITHIN THE COLD BOX.
4. TE-215-2 AND TE-216-2 LOCATED INSIDE TURBINE BOX
5. TE-191-2 SERVES COOL DOWN HEADER
6. ALL CONDUITS CONNECTING TO PANELS LOCATED OUTDOORS SHALL BE SIDE ENTRY.
7. PROVIDE THERMOCOUPLE TERMINATION BOX (CB T/C T-BOX). ENCLOSURE SHALL BE NEMA 4X, 316 SS. MOUNT TO SIDE OF COLD BOX.



KEY PLAN

Donna Rammell
Digitally signed by Donna Rammell
DN: cn=DR, o=WoodardCurran, ou=Engineering, email=DR@woodardcurran.com, c=US
Date: 2024.08.30 14:48:39-07'00'
Reason: I agree to the terms defined by the placement of my signature on this document

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	L. MAXWELL	
DRAWN BY:	L. MAXWELL	
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL	
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS	
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON	

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW	
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC	

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

PARTIAL POWER AND SIGNAL PLAN 4

SCALE 3/8"=1'0"
DATE 28JUN24

SD428-W4400-E102.4
DRAWING NUMBER

01
REV.

REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME

REF 4: REF#FILENAME
REF 5: REF#FILENAME
REF 6: REF#FILENAME

REF 1: REF#FILENAME
REF 2: REF#FILENAME
REF 3: REF#FILENAME

USER: #USERNAME#
DATE: ##MONTH##DAY##
FILE: ##########FILENAME##########
PLOT SCALE: PLOTSCALE

CONDUIT SCHEDULE - SIGNAL

CONDUIT NUMBER	CONDUIT SIZE	CONDUCTOR QTY AND SIZE	FROM	TO	COMMENTS
S001	1"	SEE SECTION 26 09 16	(E) MAC 1-1 MOTOR CONTROL CENTER	RIO-15-1 MAC 1-1 PANEL	SEL 2600 MODULE
S002	1"	SEE SECTION 26 09 16	(E) MAC 1-2 MOTOR CONTROL CENTER	RIO-15-2 MAC 1-2 PANEL	SEL 2600 MODULE
S003	1"	SEE SECTION 26 09 16	(E) MAC 2-1 MOTOR CONTROL CENTER	RIO-23-1 MAC 2-1 PANEL	SEL 2600 MODULE
S004	1"	SEE SECTION 26 09 16	(E) MAC 2-2 MOTOR CONTROL CENTER	RIO-23-2 MAC 2-2 PANEL	SEL 2600 MODULE
S100	1 1/2"	7#18TSP, 7#14GND	RIO-15-1 MAC 1-1 PANEL	J-BOX	MAIN AIR COMPRESSOR 1-1
S100A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-502-1-1	MAIN AIR COMPRESSOR 1-1, 3RD STAGE DP FOR ANTI-SURGE CONTROL
S100B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TIT-505-1-1	AIR FROM MAIN AIR COMPRESSOR 1-1, AFTERCOOLER TEMPERATURE
S100C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-FV-500A-1-1	MAIN AIR COMPRESSOR 1-1, INLET VALVE'S I/P
S100D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-506-1-1	MAIN AIR COMPRESSOR 1-1, DISCHARGE PRESSURE FOR ANTI-SURGE CONTROL
S100E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-TIT-53-1-1	MAIN AIR COMPRESSOR 1-1, LUBE OIL SUPPLY TEMPERATURE
S100F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-53-1-1	MAIN AIR COMPRESSOR 1-1, LUBE OIL RETURN PRESSURE
S100G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-EXH-FV-506A-1-1	MAIN AIR COMPRESSOR 1-1, F.O. DISCHARGE (ANTI-SURGE) VENT VALVE'S IP
S101	1 1/2"	BY VENDOR	RIO-15-1 MAC 1-1 PANEL	JBOX	MAIN AIR COMPRESSOR 1-1
S101A	1"	BY VENDOR	J-BOX	W-44-LOS-VE-502-1-1	MAIN AIR COMPRESSOR 1-1, 2ND STAGE VIBRATION
S101B	1"	BY VENDOR	J-BOX	W-44-LOS-VE-501-1-1	MAIN AIR COMPRESSOR 1-1, 1ST STAGE VIBRATION
S101C	1"	BY VENDOR	J-BOX	W-44-LOS-VE-503-1-1	MAIN AIR COMPRESSOR 1-1, 3RD STAGE VIBRATION
S102	1"	BY VENDOR	MAC 1-1 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-15-1 MAC 1-1 PANEL	MAIN AIR COMPRESSOR 1-1, MOTOR VIBRATION SIGNAL CABLE
S103	1 1/2"	SHIELDED, 3/C #24AWG	MAC 1-1 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-15-1 MAC 1-1 PANEL	MAIN AIR COMPRESSOR 1-1, FOR CABLE TYPE REFER TO 26 09 16
S150	1 1/2"	7#18TSP, 7#14GND	RIO-15-2 MAC 1-2 PANEL	J-BOX	MAIN AIR COMPRESSOR 1-2
S150A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-502-1-2	MAIN AIR COMPRESSOR 1-2, 3RD STAGE DP FOR ANTI-SURGE CONTROL
S150B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TIT-505-1-2	AIR FROM MAIN AIR COMPRESSOR 1-2, AFTERCOOLER TEMPERATURE
S150C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-FV-500A-1-2	MAIN AIR COMPRESSOR 1-2, INLET VALVE'S I/P
S150D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-506-1-2	MAIN AIR COMPRESSOR 1-2, DISCHARGE PRESSURE FOR ANTI-SURGE CONTROL
S150E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-TIT-53-1-2	MAIN AIR COMPRESSOR 1-2, LUBE OIL SUPPLY TEMPERATURE
S150F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-53-1-2	MAIN AIR COMPRESSOR 1-2, LUBE OIL RETURN PRESSURE
S150G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-EXH-FV-506A-1-2	MAIN AIR COMPRESSOR 1-2, F.O. DISCHARGE (ANTI-SURGE) VENT VALVE'S IP
S151	1 1/2"	BY VENDOR	RIO-15-2 MAC 1-2 PANEL	JBOX	MAIN AIR COMPRESSOR 1-2
S151A	1"	BY VENDOR	J-BOX	W-44-LOS-VE-502-1-2	MAIN AIR COMPRESSOR 1-2, 2ND STAGE VIBRATION
S151B	1"	BY VENDOR	J-BOX	W-44-LOS-VE-501-1-2	MAIN AIR COMPRESSOR 1-2, 1ST STAGE VIBRATION
S151C	1"	BY VENDOR	J-BOX	W-44-LOS-VE-503-1-2	MAIN AIR COMPRESSOR 1-2, 3RD STAGE VIBRATION
S152	1"	BY VENDOR	MAC 1-2 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-15-2 MAC 1-2 PANEL	MAIN AIR COMPRESSOR 1-2, MOTOR VIBRATION SIGNAL
S153	1 1/2"	SHIELDED, 3/C #24AWG	MAC 1-2 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-15-2 MAC 1-2 PANEL	MAIN AIR COMPRESSOR 1-2, FOR CABLE TYPE REFER TO 26 09 16
S200	1 1/2"	7#18TSP, 7#14GND	RIO-23-1 MAC 2-1 PANEL	J-BOX	MAIN AIR COMPRESSOR 2-1
S200A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-502-2-1	MAIN AIR COMPRESSOR 2-1, 3RD STAGE DP FOR ANTI-SURGE CONTROL
S200B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TIT-505-2-1	AIR FROM MAIN AIR COMPRESSOR 2-1, AFTERCOOLER TEMPERATURE
S200C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-FV-500A-2-1	MAIN AIR COMPRESSOR 2-1, INLET VALVE'S I/P
S200D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-506-2-1	MAIN AIR COMPRESSOR 2-1, DISCHARGE PRESSURE FOR ANTI-SURGE CONTROL
S200E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-TIT-53-2-1	MAIN AIR COMPRESSOR 2-1, LUBE OIL SUPPLY TEMPERATURE
S200F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-53-2-1	MAIN AIR COMPRESSOR 2-1, LUBE OIL RETURN PRESSURE
S200G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-EXH-FV-506A-2-1	MAIN AIR COMPRESSOR 2-1, F.O. DISCHARGE (ANTI-SURGE) VENT VALVE'S IP
S201	1 1/2"	BY VENDOR	RIO-23-1 MAC 2-1 PANEL	JBOX	MAIN AIR COMPRESSOR 2-1
S201A	1"	BY VENDOR	J-BOX	W-44-LOS-VE-502-2-1	MAIN AIR COMPRESSOR 2-1, 2ND STAGE VIBRATION
S201B	1"	BY VENDOR	J-BOX	W-44-LOS-VE-501-2-1	MAIN AIR COMPRESSOR 2-1, 1ST STAGE VIBRATION
S201C	1"	BY VENDOR	J-BOX	W-44-LOS-VE-503-2-1	MAIN AIR COMPRESSOR 2-1, 3RD STAGE VIBRATION
S202	1"	BY VENDOR	MAC 2-1 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-23-1 MAC 2-1 PANEL	MAIN AIR COMPRESSOR 2-1, MOTOR VIBRATION SIGNAL
S203	1 1/2"	SHIELDED, 3/C #24AWG	MAC 2-1 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-23-1 MAC 2-1 PANEL	MAIN AIR COMPRESSOR 2-1, FOR CABLE TYPE REFER TO 26 09 16
S250	1 1/2"	7#18TSP, 7#14GND	RIO-23-2 MAC 2-2 PANEL	J-BOX	MAIN AIR COMPRESSOR 2-2
S250A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-502-2-2	MAIN AIR COMPRESSOR 2-2, 3RD STAGE DP FOR ANTI-SURGE CONTROL
S250B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TIT-505-2-2	AIR FROM MAIN AIR COMPRESSOR 2-2, AFTERCOOLER TEMPERATURE
S250C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-FV-500A-2-2	MAIN AIR COMPRESSOR 2-2, INLET VALVE'S I/P
S250D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-506-2-2	MAIN AIR COMPRESSOR 2-2, DISCHARGE PRESSURE FOR ANTI-SURGE CONTROL
S250E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-TIT-53-2-2	MAIN AIR COMPRESSOR 2-2, LUBE OIL SUPPLY TEMPERATURE
S250F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-53-2-2	MAIN AIR COMPRESSOR 2-2, LUBE OIL RETURN PRESSURE
S250G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-EXH-FV-506A-2-2	MAIN AIR COMPRESSOR 2-2, F.O. DISCHARGE (ANTI-SURGE) VENT VALVE'S IP
S251	1 1/2"	BY VENDOR	RIO-23-2 MAC 2-2 PANEL	JBOX	MAIN AIR COMPRESSOR 2-2
S251A	1"	BY VENDOR	J-BOX	W-44-LOS-VE-502-2-2	MAIN AIR COMPRESSOR 2-2, 2ND STAGE VIBRATION
S251B	1"	BY VENDOR	J-BOX	W-44-LOS-VE-501-2-2	MAIN AIR COMPRESSOR 2-2, 1ST STAGE VIBRATION
S251C	1"	BY VENDOR	J-BOX	W-44-LOS-VE-503-2-2	MAIN AIR COMPRESSOR 2-2, 3RD STAGE VIBRATION
S252	1"	BY VENDOR	MAC 2-2 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-23-2 MAC 2-2 PANEL	MAIN AIR COMPRESSOR 2-2, MOTOR VIBRATION SIGNAL
S253	1 1/2"	SHIELDED, 3/C #24AWG	MAC 2-2 MOTOR INSTRUMENTATION TERMINATION BOX	RIO-23-2 MAC 2-2 PANEL	MAIN AIR COMPRESSOR 2-2, FOR CABLE TYPE REFER TO 26 09 16

CONDUIT SCHEDULE - SIGNAL CON'T

CONDUIT NUMBER	CONDUIT SIZE	CONDUCTOR QTY AND SIZE	FROM	TO	COMMENTS
S300	3"	39#18TSP, 39#14GND	RIO-15-3 TURBINE/CRYO PLANT 1 PANEL	J-BOX	COLD BOX NO. 1
S300A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-ALP-FV-220A-1	COLD BOX NO. 1
S300B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FV-213A-1	COLD BOX NO. 1
S300C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-FV-340N-1	COLD BOX NO. 1
S300D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LV-330A-1	COLD BOX NO. 1
S301	1 1/2"	7#18TSP, 7#14GND	J-BOX	J-BOX	COLD BOX NO. 1
S301A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FV-215A-1	COLD BOX NO. 1
S301B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-PIT-590-1	COLD BOX NO. 1
S301C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TE-552-1	COLD BOX NO. 1
S301D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-200-1	COLD BOX NO. 1
S301E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-X600X-1-1	COLD BOX NO. 1
S301F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-X600X-2-1	COLD BOX NO. 1
S302	2 1/2"	23#18TSP,23#14GND	J-BOX	J-BOX	COLD BOX NO. 1
S302A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-600X-1	COLD BOX NO. 1
S302B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-601X-1	COLD BOX NO. 1
S303	2"	12#18TSP, 12#14GND	J-BOX	J-BOX	COLD BOX NO. 1
S303A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-ALP-PIT-216-1	COLD BOX NO. 1
S303B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-120-1	COLD BOX NO. 1
S303C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-214-1	COLD BOX NO. 1
S303D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-115-1	COLD BOX NO. 1
S303E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-PIT-300-1	COLD BOX NO. 1
S303F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-FIT-340-1	COLD BOX NO. 1
S303G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-PIT-349-1	COLD BOX NO. 1
S303H	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FIT-600-1	COLD BOX NO. 1
S303I	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-352-1	COLD BOX NO. 1
S303J	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LIT-330-1	COLD BOX NO. 1
S303K	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-600-1	COLD BOX NO. 1
S303L	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LIT-352-1	COLD BOX NO. 1
S304	3/4"	3#18TSP, 3#14GND	J-BOX	J-BOX	COLD BOX NO. 1
S304A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-TE-24-1	COLD BOX NO. 1
S304B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-PIT-20-1	COLD BOX NO. 1
S304C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-23-1	COLD BOX NO. 1
S305	1 1/2"	11 TYPE TX, 2 TYPE KX	RIO-15-3 TURBINE/CRYO PLANT 1 PANEL	J-BOX	COLD BOX NO. 1
S305A	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-191-1	COLD BOX NO. 1
S305B	3/4"	BY VENDOR	J-BOX	W-44-O2-TE-149-1	COLD BOX NO. 1
S305C	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-154-1	COLD BOX NO. 1
S305D	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-155-1	COLD BOX NO. 1
S305E	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-184-1	COLD BOX NO. 1
S305F	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-185-1	COLD BOX NO. 1
S305G	3/4"	BY VENDOR	J-BOX	W-44-N2-TE-188-1	COLD BOX NO. 1
S305H	3/4"	BY VENDOR	J-BOX	W-44-N2-TE-190-1	COLD BOX NO. 1
S305I	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-201-1	COLD BOX NO. 1
S305J	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-215-1	COLD BOX NO. 1
S305K	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-216-1	COLD BOX NO. 1
S306	3/4"	2 TYPE KX	J-BOX	W-44-CAD-TDIT-186-1	COLD BOX NO. 1
S306A	3/4"	BY VENDOR	W-44-CAD-TDIT-186-1	W-44-AHP-TE-550-1	COLD BOX NO. 1
S306B	3/4"	BY VENDOR	W-44-CAD-TDIT-186-1	W-44-AHP-TE-551-1	COLD BOX NO. 1

Donna Rammell
Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:48:56-07'00'

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	D. RAMMELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
CONDUIT SCHEDULE 2
SIGNAL

SCALE NONE
DATE 28JUN24
SD428-W4400-E122
DRAWING NUMBER
01
REV.

REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME

REF 4: REF#FILENAME
REF 5: REF#FILENAME
REF 6: REF#FILENAME

REF 1: REF#FILENAME
REF 2: REF#FILENAME
REF 3: REF#FILENAME

PLOT SCALE: PLOTSCALE
FILE: ##########FILENAME##########
DATE: ##########DATE##########
USER: ##########USERNAME##########

CONDUIT SCHEDULE - SIGNAL

CONDUIT NUMBER	CONDUIT SIZE	CONDUCTOR QTY AND SIZE	FROM	TO	COMMENTS
S350	3"	39#18TSP, 39#14GND	RIO-23-3 TURBINE/CRYO PLANT 2 PANEL	J-BOX	COLD BOX NO. 2
S350A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-ALP-FV-220A-2	COLD BOX NO. 2
S350B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FV-213A-2	COLD BOX NO. 2
S350C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-FV-340X-2	COLD BOX NO. 2
S350D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LV-330A-2	COLD BOX NO. 2
S351	1 1/2"	7#18TSP, 7#14GND	J-BOX	J-BOX	COLD BOX NO. 2
S351A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FV-215A-2	COLD BOX NO. 2
S351B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-IA-PIT-590-2	COLD BOX NO. 2
S351C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-TE-552-2	COLD BOX NO. 2
S351D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-200-2	COLD BOX NO. 2
S351E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-X600X-1-2	COLD BOX NO. 2
S351F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-X600X-2-2	COLD BOX NO. 2
S352	3/4"	2#18TSP,2#14GND	J-BOX	J-BOX	COLD BOX NO. 2
S352A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-600X-2	COLD BOX NO. 2
S352B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-601X-2	COLD BOX NO. 2
S353	2"	12#18TSP, 12#14GND	J-BOX	J-BOX	COLD BOX NO. 2
S353A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-ALP-PIT-216-2	COLD BOX NO. 2
S353B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-120-2	COLD BOX NO. 2
S353C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-PIT-214-2	COLD BOX NO. 2
S353D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-AHP-FIT-115-2	COLD BOX NO. 2
S353E	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-PIT-300-2	COLD BOX NO. 2
S353F	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-FIT-340-2	COLD BOX NO. 2
S353G	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-N2-PIT-349-2	COLD BOX NO. 2
S353H	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FIT-600-2	COLD BOX NO. 2
S353I	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-352-2	COLD BOX NO. 2
S353J	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LIT-330-2	COLD BOX NO. 2
S353K	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-600-2	COLD BOX NO. 2
S353L	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-LIT-352-2	COLD BOX NO. 2
S354	3/4"	3#18TSP, 3#14GND	J-BOX	J-BOX	COLD BOX NO. 2
S354A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-TE-24-2	COLD BOX NO. 2
S354B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOS-PIT-28-2	COLD BOX NO. 2
S354C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-LOR-PIT-23-2	COLD BOX NO. 2
S355	1 1/2"	11 TYPE TX, 2 TYPE KX	RIO-23-3 TURBINE/CRYO PLANT 2 PANEL	J-BOX	COLD BOX NO. 2
S355A	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-191-2	COLD BOX NO. 2
S355B	3/4"	BY VENDOR	J-BOX	W-44-O2-TE-149-2	COLD BOX NO. 2
S355C	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-154-2	COLD BOX NO. 2
S355D	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-155-2	COLD BOX NO. 2
S355E	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-184-2	COLD BOX NO. 2
S355F	3/4"	BY VENDOR	J-BOX	W-44-CAS-TE-185-2	COLD BOX NO. 2
S355G	3/4"	BY VENDOR	J-BOX	W-44-N2-TE-188-2	COLD BOX NO. 2
S355H	3/4"	BY VENDOR	J-BOX	W-44-N2-TE-190-2	COLD BOX NO. 2
S355I	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-201-2	COLD BOX NO. 2
S355J	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-215-2	COLD BOX NO. 2
S355K	3/4"	BY VENDOR	J-BOX	W-44-AHP-TE-216-2	COLD BOX NO. 2
S356	3/4"	2 TYPE KX	J-BOX	W-44-CAD-TDIT-186-2	COLD BOX NO. 2
S356A	3/4"	BY VENDOR	W-44-CAD-TDIT-186-2	W-44-AHP-TE-550-2	COLD BOX NO. 2
S356B	3/4"	BY VENDOR	W-44-CAD-TDIT-186-2	W-44-AHP-TE-551-2	COLD BOX NO. 2
S360	3/4"	3#18TSP, 3#14GND	(E) DCS DROP 15/65 PANEL	J-BOX	CONTROL PANEL PLANT NO. 1
S360A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-352-1	CONTROL PANEL PLANT NO. 1
S360B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-312-1	CONTROL PANEL PLANT NO. 1
S360C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-355-1	CONTROL PANEL PLANT NO. 1
S361	3/4"	4#18TSP, 4#14GND	(E) DCS DROP 15/65 PANEL	J-BOX	CONTROL PANEL PLANT NO. 1
S361A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-ZC-635	CONTROL PANEL PLANT NO. 1
S361B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-TIC-635	CONTROL PANEL PLANT NO. 1
S361C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIC-630	CONTROL PANEL PLANT NO. 1
S361D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIC-635	CONTROL PANEL PLANT NO. 1
S370	3/4"	3#18TSP, 3#14GND	DCS DROP 23/73 PANEL	J-BOX	CONTROL PANEL PLANT NO. 1
S370A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-352-2	CONTROL PANEL PLANT NO. 2
S370B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-312-2	CONTROL PANEL PLANT NO. 2
S370C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-AIT-355-2	CONTROL PANEL PLANT NO. 2
S410	3/4"	(E) MULTI-CONDUCTOR CABLE	(E) O2 COOLING PLC CONTROL PANEL	(E) JTB-1-1	MAIN AIR COMPRESSOR 1-1
S411	3/4"	(E) MULTI-CONDUCTOR CABLE	(E) O2 COOLING PLC CONTROL PANEL	(E) JTB-1-2	MAIN AIR COMPRESSOR 1-2
S412	3/4"	(E) MULTI-CONDUCTOR CABLE	(E) O2 COOLING PLC CONTROL PANEL	(E) JTB-2-1	MAIN AIR COMPRESSOR 2-1 NOTE 1
S413	3/4"	(E) MULTI-CONDUCTOR CABLE	(E) O2 COOLING PLC CONTROL PANEL	(E) JTB-2-2	MAIN AIR COMPRESSOR 2-2 NOTE 1
S414	3/4"	1#18TSP, 1#14GND	(E) O2 COOLING PLC CONTROL PANEL	W-44-LOS-TIT-21-1	COLD BOX NO. 1 NOTE 1
S415	3/4"	1#18TSP, 1#14GND	(E) O2 COOLING PLC CONTROL PANEL	W-44-LOS-TIT-23-1	COLD BOX NO. 1 NOTE 1
S416	3/4"	1#18TSP, 1#14GND	(E) O2 COOLING PLC CONTROL PANEL	W-44-LOS-TIT-21-2	COLD BOX NO. 2
S417	3/4"	1#18TSP, 1#14GND	(E) O2 COOLING PLC CONTROL PANEL	W-44-LOS-TIT-23-2	COLD BOX NO. 2
S420	1 1/2"	8#18TSP, 8#14GND	RIO-15-3 TURBINE/CRYO PLANT 1 PANEL	J-BOX	LOX
S420A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-615X-1	LOX TANK 1-1
S420B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-616X-1	LOX TANK 1-1
S420C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-626X-1	LOX TANK 1-2
S420D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-625X-1	LOX TANK 1-2
S421	3/4"	4#18TSP, 4#14GND	J-BOX	J-BOX	LOX
S421A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-615X-2	LOX TANK 2-1

CONDUIT SCHEDULE - SIGNAL CON'T

CONDUIT NUMBER	CONDUIT SIZE	CONDUCTOR QTY AND SIZE	FROM	TO	COMMENTS
S421B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-616X-2	LOX TANK 2-1
S421C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-626X-2	LOX TANK 2-2
S421D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PV-625X-2	LOX TANK 2-2
S423	3/4"	4#18TSP, 4#14GND	(E) DCS DROP 15/65 PANEL	J-BOX	LOX
S423A	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-635	LOX
S423B	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-PIT-630	LOX
S423C	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-FV-635	LOX
S423D	3/4"	1#18TSP, 1#14GND	J-BOX	W-44-O2-TE-635	LOX
S424	3/4"	4#24, 3 TWISTED, SH	MAC 1-1 MOTOR TERMINATION BOX	(E) MAC 1-1 MOTOR CONTROL CENTER	BEARING RTD
S425	3/4"	4#24, 3 TWISTED, SH	MAC 1-2 MOTOR TERMINATION BOX	(E) MAC 1-2 MOTOR CONTROL CENTER	BEARING RTD
S426	3/4"	4#24, 3 TWISTED, SH	MAC 2-1 MOTOR TERMINATION BOX	(E) MAC 2-1 MOTOR CONTROL CENTER	BEARING RTD
S427	3/4"	4#24, 3 TWISTED, SH	MAC 2-2 MOTOR TERMINATION BOX	(E) MAC 2-2 MOTOR CONTROL CENTER	BEARING RTD

CONDUIT SCHEDULE - NETWORK COMMUNICATIONS

CONDUIT NUMBER	CONDUIT SIZE	CONDUCTOR QTY AND SIZE	FROM	TO	COMMENTS
S601	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	(E) DROP 15/65 PATCH PANEL	RIO-15-1 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT (E) DROP 15/65 AND FIBER PP PORTS 7-12 AT RIO-15-1
S602	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-15-1 PATCH PANEL	RIO-15-2 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-15-1 AND FIBER PP PORTS 7-12 AT RIO-15-2
S603	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-15-2 PATCH PANEL	RIO-15-3 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-15-2 AND FIBER PP PORTS 7-12 AT RIO-15-3
S604	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-15-3 PATCH PANEL	(E) DROP 15/65 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-15-3 AND FIBER PP PORTS 7-12 AT (E) DROP 15/65
S605	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	DROP 23/73 PATCH PANEL	RIO-23-1 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT DROP 23/73 AND FIBER PP PORTS 7-12 AT RIO-23-1
S606	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-23-1 PATCH PANEL	RIO-23-2 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-23-1 AND FIBER PP PORTS 7-12 AT RIO-23-2
S607	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-23-2 PATCH PANEL	RIO-23-3 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-23-2 AND FIBER PP PORTS 7-12 AT RIO-23-3
S608	1"	OM4 MULTIMODE FIBER 12 FIBER STRANDS	RIO-23-3 PATCH PANEL	DROP 23/73 PATCH PANEL	UTILIZE FIBER PP PORTS 1-6 AT RIO-23-3 AND FIBER PP PORTS 7-12 AT DROP 23/73
S611	2"	12-CAT 5E ETHERNET CABLE	(E) DROP 15/65 PATCH PANEL	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	UTILIZE PP PORTS 1-6 AT DROP 15/65 AND PP PORTS 1-6 AT (E) 44-NET-006 NEW PPA UTILIZE PP PORTS 7-12 AT DROP 15/65 AND PP PORTS 1-6 AT (E) 44-NET-006 NEW PPB
S612	2"	12-CAT 5E ETHERNET CABLE	DROP 23/73 PATCH PANEL	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	UTILIZE PP PORTS 1-6 AT DROP 23/73 PP AND PP PORTS 7-12 AT (E) 44-NET-006 NEW PPA UTILIZE PP PORTS 7-12 AT DROP 23/73 PP AND PP PORTS 7-12 AT (E) 44-NET-006 NEW PPB
S613	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-15-1 PATCH PANEL	UTILIZE PP PORTS 13-14 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-15-1 UTILIZE PP PORTS 13-14 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-15-1
S614	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-15-2 PATCH PANEL	UTILIZE PP PORTS 15-16 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-15-2 UTILIZE PP PORTS 15-16 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-15-2
S615	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-15-3 PATCH PANEL	UTILIZE PP PORTS 17-18 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-15-3 UTILIZE PP PORTS 17-18 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-15-3
S616	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-23-1 PATCH PANEL	UTILIZE PP PORTS 19-20 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-23-1 UTILIZE PP PORTS 19-20 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-23-1
S617	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-23-2 PATCH PANEL	UTILIZE PP PORTS 21-22 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-23-2 UTILIZE PP PORTS 21-22 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-23-2
S618	3/4"	4-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPA (E) 44-NET-006-PPB	RIO-23-3 PATCH PANEL	UTILIZE PP PORTS 23-24 AT (E) 44-NET-006 NEW PPA AND PP PORTS 1-2 AT RIO-23-3 UTILIZE PP PORTS 23-24 AT (E) 44-NET-006 NEW PPB AND PP PORTS 3-4 AT RIO-23-3
S619	3/4"	2-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPC	(E) W-(E) 44-LOX-LCP-01	UTILIZE FIBER PP PORTS 1-2 AT (E) 44-NET-006 NEW PPC AND PP PORTS 3-4 AT LOX PANEL
S620	3/4"	2-CAT 5E ETHERNET CABLE	(E) 44-NET-006-PPC	(E) O2 COOLING PLC CONTROL PANEL	UTILIZE FIBER PP PORTS 3-4 AT (E) 44-NET-006 NEW PPC AND PP PORTS 1-2 AT (E) O2 COOLING PLC CONTROL PANEL

NOTE:

1. EXISTING CONDUIT TO BE REUSED FOR NEW WORK.

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

Donna Rammell

Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:49:10-07'00'

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	D. RAMMELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

CONDUIT SCHEDULE 3
SIGNAL

SCALE NONE
DATE 28JUN24

SD428-W4400-E123
DRAWING NUMBER

01
REV.

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
#1 AIR COMPRESSOR START	45	3	1						2	3	45	#2 AIR COMPRESSOR START
#1 AIR COMPRESSOR RUN	75	3	3						4	3	45	#2 AIR COMPRESSOR RUN
(1) THAW HTR CNTRL NO. 1, FY-690 DRAIN VAPORIZER	15	1	5						6	1	15	THAW HTR CNTRL NO. 2
AIR DRYER CONTROL	15	1	7						8	1	15	ANALYZER POWER
#1 AIR COMPRESSOR 75 HP	75	3	9						10	1	15	CNTRL PNL PLANT NO. 1 UTILITY CIRCS.
TURBINE OIL HEATER	20	1	11						12	3	45	#2 AIR COMPRESSOR START
#1 AIR COMPRESSOR 75 HP	75	3	13						14	3	45	#2 AIR COMPRESSOR RUN
INST. AIR COMPRESSOR UTILITIES	15	1	15						16	1	15	INST. AIR COMPRESSOR CONTROLS
AIR DRYER 1HP, DRYER, ONLINE, ALARM	20	1	17						18	3	45	SPARE
SPARE	15	1	19						20	3	45	SPARE
SPARE	15	1	21						22	3	45	SPARE
SPARE	15	1	23						24	1	15	SPARE
SPACE			25						26			
SPACE			27						28	3	100	MAIN
SPACE			29						30			
				SUBTOTAL								

VOLTAGE:	120/208	TOTAL kVA	
MAIN BREAKER:	100	TOTAL AMPS	
BUSES:	100		
PH & WIRES:	3PH 4W		

PANEL NAME:	EXISTING PANEL LP1		
LOCATION:	MAIN CONTROL PANEL		
MOUNTING:	SURFACE		
AIC RATING:			

NOTE: (1) DISCONNECT FY-690 DRAIN VAPORIZER FROM CIRCUIT.

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
#1 AIR COMPRESSOR START CIRCUIT	45	3	1						2	3	45	#2 AIR COMPRESSOR START
#1 AIR COMPRESSOR RUN CIRCUIT	75	3	3						4	3	45	#2 AIR COMPRESSOR RUN
THAW HEATER CONTROL NO. 2	15	1	5						6	1	15	DVR CONTROL
AIR DRYER	15	1	7						8	1	15	ANALYZER POWER
AIR COMPRESSOR 75 H.P.	75	3	9						10	1	15	CNTRL PNL PLANT NO. 2 UTILITY CIRCS.
TURBINE OIL HEATER	20	1	11						12	3	45	#1 AIR COMPRESSOR START CIRCUIT
#1 AIR COMPRESSOR 75 HP	75	3	13						14	3	45	#1 AIR COMPRESSOR RUN CIRCUIT
INST. AIR COMP. UTIL	15	1	15						16	1	15	INST. AIR COMP. CONTROLS
SPARE	15	1	17						18	3	45	SPARE
SPARE	15	1	19						20	3	45	SPARE
SPARE	15	1	21						22	3	45	SPARE
SPARE	15	1	23						24	1	15	SPARE
SPACE			25						26			
SPACE			27						28	3	100	MAIN
SPACE			29						30			
				SUBTOTAL								

VOLTAGE:	120/208	TOTAL kVA	
MAIN BREAKER:	100	TOTAL AMPS	
BUSES:	100		
PH & WIRES:	3PH 4W		
NOTES:			

PANEL NAME:	EXISTING PANEL LP2		
LOCATION:	MAIN CONTROL PANEL		
MOUNTING:	SURFACE		
AIC RATING:			

NOTE:

1. EXISTING PANELBOARD INFORMATION SHOWN ON THIS DRAWING IS BASED ON HARD COPY SCHEDULES WITH HAND WRITTEN DESCRIPTION ONLY AND DO NOT INCLUDE THE ACTUAL kVA VALVES (NOT INCLUDED IN SCHEDULE).

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
(1) DPU 15	15	1	1	0.48				0.48	2	1	15	(1) WESTATION
(1) NETWORK ENCLOSURE	15	1	3	0.48	0.48	0.48			4	1	15	SPARE
(1) DROP 15/65	15	1	5	0.24	0.24				6	1	15	SPARE
	15	1	7					0.48	8	1	15	
				SUBTOTAL				SUBTOTAL				

VOLTAGE:	120/208	TOTAL kVA	
MAIN BREAKER:	50	TOTAL AMPS	
BUSES:	100		
PH & WIRES:	3PH 4W		

PANEL NAME:	EXISTING PX-145		
LOCATION:	CONTROL ROOM		
MOUNTING:	SURFACE		
AIC RATING:	10 kAIC		

NOTE: (1) CIRCUIT TO BE REMOVED AND RELOCATED TO PANELBOARD W-44-02-UPS-LP1

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
SPARE	20	1	31						32	1	20	SPARE
SPARE	20	1	33						34	1	20	SPARE
SPARE	20	1	35						36	1	20	SPARE
SPARE	20	1	37						38	1	20	SPARE
SPARE	20	1	39						40	1	20	SPARE
SPARE	20	1	41						42	1	20	SPARE
OUTSIDE LTG & TIMER CONTROL	20	1	43						44	1	20	SPARE
OUTSIDE LTG	20	1	45						46	1	20	SPARE
SPARE	20	1	47						48	1	20	SPARE
SPARE	20	1	49						50	1	20	RELAY PNL
SPACE		1	51						52	1	20	I/O INTERFACE PNL
SPACE		1	53						54	1	20	DPU 15
SHUT DOWN LP1 PNL	50	3	55						56	3	50	SHUT DOWN LP2 PNL
			57						58			
			59						60			
SPACE		1	61						62	1		SPACE
SPACE		1	63						64	1		SPACE
SPACE		1	65						66	1		SPACE
SPACE		1	67						68	1		SPACE
SPACE		1	69						70	1		SPACE
SPACE		1	71						72	1		SPACE
				Ckt				SUBTOTAL				

VOLTAGE:	120/208	TOTAL kVA	
MAIN BREAKER:	225	TOTAL AMPS	
BUSES:	225		
PH & WIRES:	3PH 4W		
NOTES:			

PANEL NAME:	EXISTING PANEL LA-2 SECTION 2		
LOCATION:	CONTROL ROOM		
MOUNTING:	FLUSH		
AIC RATING:			

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME

REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME

REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME

USER: #USER#####
DATE: #####DATE#####
FILE: ##########################FILE##########################

PLOT SCALE: PLOT@SCALE

Donna Rammell

Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:49:35-07'00'

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

EBMUD

DESIGN BY:	D. RAMMELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON
PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

PANELBOARD SCHEDULES DEMOLITION

SCALE NONE
DATE 28JUN24

SD428-W4400-E230D
DRAWING NUMBER

01
REV.

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
RIO-15-1 MAC 1-1 PNL CNTRL	**20**	**1**	**1**	**0.25**				**2.42**	**2**	**1**	**30**	**RIO-15-3 TURB/CRYO PLANT 1 PNL UTILITY AC**
SPARE	**20**	**1**	**3**					**0.25**	4	1	**20**	**RIO-15-3 TURB/CRYO PLANT 1 PNL CNTRL**
01 THAW HEATER CONTROL NO. 1	15	1	5						**6**	1	**20**	**SPARE**
SPARE	**20**	**1**	**7**					**0.60**	**8**	**1**	**20**	**ANALYZERS AIT-312-1, AIT-352-1 & AIT-355-1**
RIO-15-1 MAC 1-1 PNL UTILITY AC	**20**	**1**	**9**	**0.50**					10	1	15	CNTRL PNL PLANT NO. 1 UTILITY CIRCS.
TURBINE OIL HEATER	20	1	11					**0.25**	**12**	**1**	**20**	**RIO-15-2 MAC 1-2 PNL CNTRL**
SPARE	**20**	**1**	**13**						**14**	**1**	**20**	**SPARE**
INST. AIR COMPRESSOR UTILITIES	15	1	15						16	1	15	INST. AIR COMPRESSOR CONTROLS
SPARE	**20**	**1**	**17**					**0.50**	**18**	**1**	**20**	**RIO-15-2 MAC 1-2 PNL UTILITY AC**
SPARE	15	1	19						**20**	**1**	**20**	**SPARE**
SPARE	15	1	21						**22**	**1**	**20**	**SPARE**
SPARE	15	1	23						24	1	15	SPARE
SPACE			25						26			
SPACE			27						28	3	100	MAIN
SPACE			29						30			
				SUBTOTAL								
VOLTAGE:	120/208			TOTAL kVA						PANEL NAME:		EXISTING PANEL LP1
MAIN BREAKER:	100			TOTAL AMPS						LOCATION:		MAIN CONTROL PANEL
BUSES:	100									MOUNTING:		SURFACE
PH & WIRES:	3PH 4W									AIC RATING:		
NOTES:												

MAIN BREAKER:	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
RIO-23-1 MAC 2-1 PNL CNTRL	**20**	**1**	**1**	**0.25**				**2.42**	**2**	**1**	**30**	**RIO-23-3 TURB/CRYO PLANT 2 PNL UTILITY AC**
SPARE	**20**	**1**	**3**					**0.25**	4	1	**20**	**RIO-23-3 TURB/CRYO PLANT 2 PNL CNTRL**
01 THAW HEATER CONTROL NO. 2	15	1	5						**6**	1	**20**	**SPARE**
SPARE	**20**	**1**	**7**					**0.60**	**8**	**1**	**20**	**ANALYZERS AIT-312-2, AIT-352-2 & AIT-355-2**
RIO-23-1 MAC 2-1 PNL UTILITY AC	**20**	**1**	**9**	**0.50**					10	1	15	CNTRL PNL PLANT NO. 2 UTILITY CIRCS.
TURBINE OIL HEATER	20	1	11					**0.25**	**12**	**1**	**20**	**RIO-23-2 MAC 2-2 PNL CNTRL**
SPARE	**20**	**1**	**13**						**14**	**1**	**20**	**SPARE**
INST. AIR COMP. UTIL	15	1	15						16	1	15	INST. AIR COMP. CONTROLS
SPARE	**20**	**1**	**17**					**0.50**	**18**	**1**	**20**	**RIO-23-2 MAC 2-2 PNL UTILITY AC**
DCS DROP 23/73 PNL UTILITY	**20**	**1**	**19**	**0.41**					**20**	**1**	**20**	**SPARE**
SPARE	15	1	21						**22**	**1**	**20**	**SPARE**
SPARE	15	1	23						24	1	15	SPARE
SPACE			25						26			
SPACE			27						28	3	100	MAIN
SPACE			29						30			
				SUBTOTAL								
VOLTAGE:	120/208			TOTAL kVA						PANEL NAME:		EXISTING PANEL LP2
MAIN BREAKER:	100			TOTAL AMPS						LOCATION:		MAIN CONTROL PANEL
BUSES:	100									MOUNTING:		SURFACE
PH & WIRES:	3PH 4W									AIC RATING:		
NOTES:												

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	KVA	CKT #	POLE	BRKR	DIRECTORY
(1) DPU 15	**20**	**1**	**1**	0.63	**2.07**		1.44	**2**	**1**	**20**	**(1) WESTATION**
(1) NETWORK ENCLOSURE	**20**	**1**	**3**	1.92		**2.33**	**0.41**	4	**1**	**20**	**RIO-15-1 MAC 1-1 PNL CNTRL**
(1) DROP 15/65	**20**	**1**	**5**	0.63	**1.04**		**0.41**	**6**	**1**	**20**	**RIO-15-2 MAC 1-2 PNL CNTRL**
RIO-23-1 MAC 2-1 PNL CNTRL	**20**	**1**	**7**	**0.41**		**0.82**	**0.41**	**8**	**1**	**20**	**RIO-15-3 TURB/CRYO PLANT 1 PNL CNTRL**
RIO-23-2 MAC 2-2 PNL CNTRL	**20**	**1**	**9**	**0.41**	**0.82**		**0.41**	**10**	**1**	**20**	**DCS DROP 23/73 PNL CNTRL**
RIO-23-3 TURB/CRYO PLANT 2 PNL CNTRL	**20**	**1**	**11**	**0.41**		**0.66**	**0.25**	**12**	**1**	**20**	**FIRE ALARM CONTROL PNL**
SPARE	**20**	**1**	**13**					**14**	**1**	**20**	**SPARE**
SPARE	**20**	**1**	**15**					**16**	**1**	**20**	**SPARE**
SPARE	**20**	**1**	**17**					**18**	**1**	**20**	**SPARE**
SPARE	**20**	**1**	**19**					**20**	**1**	**20**	**SPARE**
				SUBTOTAL	**3.93**	**3.81**	SUBTOTAL				
VOLTAGE:	**120/240**			TOTAL kVA	**7.74**					**PANEL NAME:**		**W-44-02-UPS-LP1**
MAIN BREAKER:	**100**			TOTAL AMPS	**32**					**LOCATION:**		**CONTROL ROOM**
BUSES:	**100**									**MOUNTING:**		**SURFACE**
PH & WIRES:	**1PH 3W**									**AIC RATING:**		**10 kAIC**
NOTE: (1) CIRCUIT RELOCATED FROM EXISTING PANELBOARD PN-UPS												

DIRECTORY	BRKR	POLE	CKT #	KVA	KVA LOADS A	B	C	KVA	CKT #	POLE	BRKR	DIRECTORY
SPARE	20	1	31						32	1	20	SPARE
SPARE	20	1	33						34	1	20	SPARE
SPARE	20	1	35						36	1	20	SPARE
SPARE	20	1	37						38	1	20	SPARE
SPARE	20	1	39						40	1	20	SPARE
SPARE	20	1	41						42	1	20	SPARE
OUTSIDE LTG & TIMER CONTROL	20	1	43						44	1	20	SPARE
OUTSIDE LTG	20	1	45						46	1	20	SPARE
SPARE	20	1	47						**48**	**1**	**20**	**SPARE**
SPARE	20	1	49						50	1	20	RELAY PNL
DCS DROP 23/73 PNL UTILITY	**20**	**1**	**51**	**0.41**					52	1	20	I/O INTERFACE PNL
DCS DROP 23/73 PNL UTILITY AC	**20**	**1**	**53**	**0.75**					54	1	20	DPU 15
			55						56			
SHUT DOWN LP1 PNL	50	3	57						58	3	50	SHUT DOWN LP2 PNL
			59						60			
(1) W-44-02-UPS-01	**100A**	**2**	**61**						62	1		SPACE
			63						64	1		SPACE
SPACE		1	65						66	1		SPACE
SPACE		1	67						68	1		SPACE
SPACE		1	69						70	1		SPACE
SPACE		1	71						72	1		SPACE
				SUBTOTAL				SUBTOTAL				
VOLTAGE:	120/208			TOTAL kVA						PANEL NAME:		EXISTING PANEL LA-2 SECTION 2
MAIN BREAKER:	225			TOTAL AMPS						LOCATION:		CONTROL ROOM
BUSES:	225									MOUNTING:		FLUSH
PH & WIRES:	3PH 4W									AIC RATING:		
NOTES: (1) CIRCUIT BREAKER TO MATCH MAKE AND MODEL OF PANELBOARD												

REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME

REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME

USER: #USER#####
DATE: ##########
FILE: ##########

PLOT SCALE: PLOTSCALE

Donna Rammell

Digitally signed by Donna Rammell
DN: C=US, E=drammell@woodardcurran.com, CN=Donna Rammell
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 14:49:52-07'00'

REGISTERED PROFESSIONAL ENGINEER
DONNA LYNN RAMMELL
No. 16928
Exp. 06-30-25
ELECTRICAL
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	D. RAMMELL
DRAWN BY:	L. MAXWELL
DESIGN CHECKED BY R.P.E. NO. 16928	D. RAMMELL
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. E16072	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

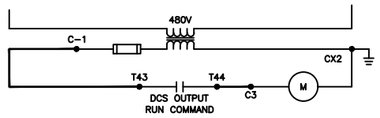
ELECTRICAL

PANELBOARD SCHEDULES

SCALE NONE
DATE 28JUN24
SD428-W4400-E230
DRAWING NUMBER
01
REV.

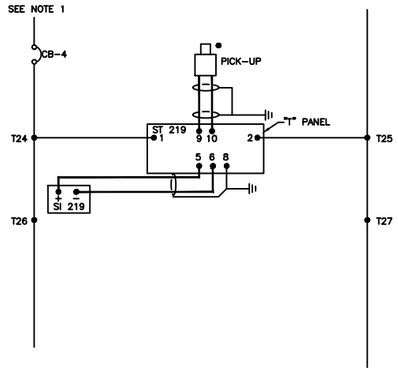
REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME
REF 4: REF#FILENAME
REF 5: REF#FILENAME
REF 6: REF#FILENAME
REF 1: REF#FILENAME
REF 2: REF#FILENAME
REF 3: REF#FILENAME
PLOT SCALE: PLOTXSCALE
USER: &USERNAME
DATE: &DATE&TIME
FILE: &FILENAME

EXPANDER OIL PUMP



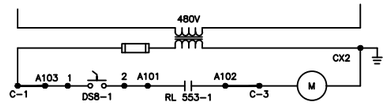
(62)

TURBINE #1 TACHOMETER

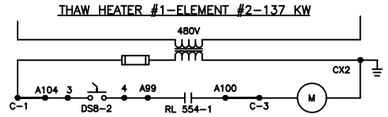


(63)

THAW HEATER #1-ELEMENT #1 53 KW



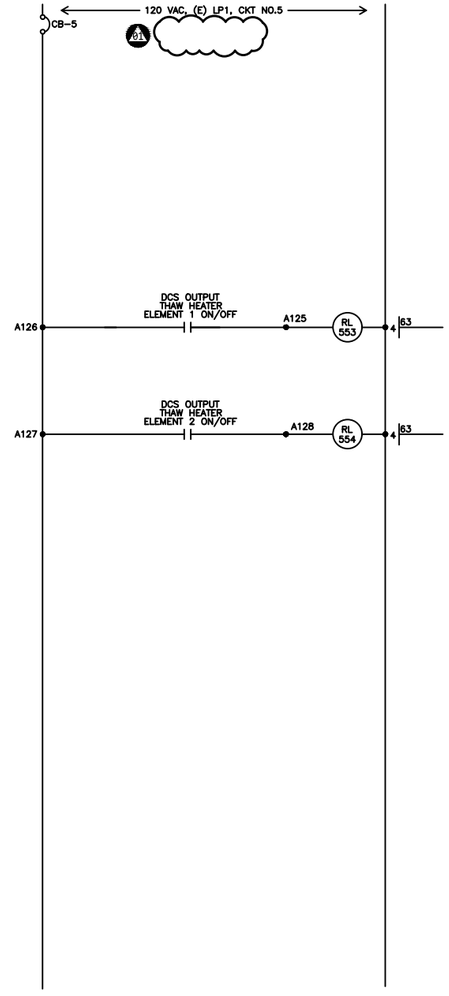
THAW HEATER #1-ELEMENT #2-137 KW



(64)

THAW HEATER #1 CONTROL

IB #1



PANEL TERMINAL LEGEND:

'A' - MAIN INSTRUMENT PANEL / MAIN CONTROL PANEL
'B' - COLUMN JUNCTION BOX
'BB' - VALVE SKID JUNCTION BOX
'C' - MAC MOTOR STARTER
'D' - MAC RIO PANEL
'DD' - AIR COMPRESSOR JUNCTION BOX
'F' - TURBINE DUCT JUNCTION BOX
'T' - TURBINE/CRYO RIO PANEL
'TT' - TURBINE

NOTES:

1. REFER TO DWG. SD428-W4400-E507-510

01

Kyle E. Tracy

Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:21:54-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

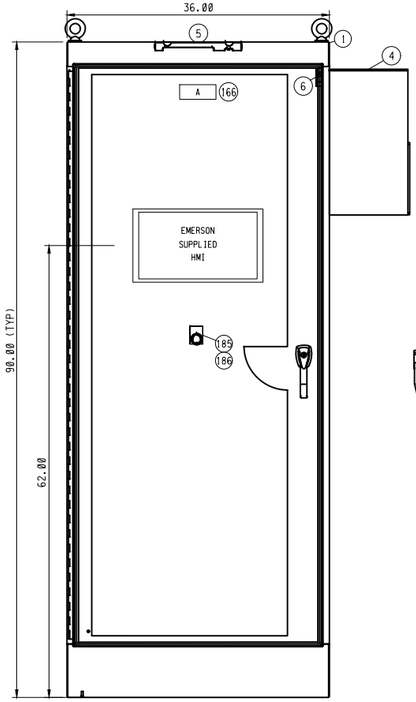
EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
TURBINE/CRYO PLANT 1
CONTROL SCHEMATIC

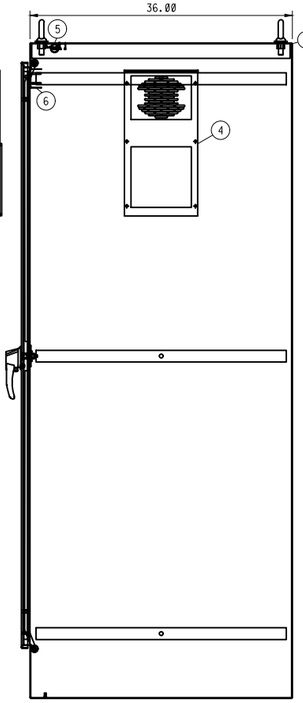
SCALE NONE
DATE 28JUN24

SD428-W4400-E317
DRAWING NUMBER

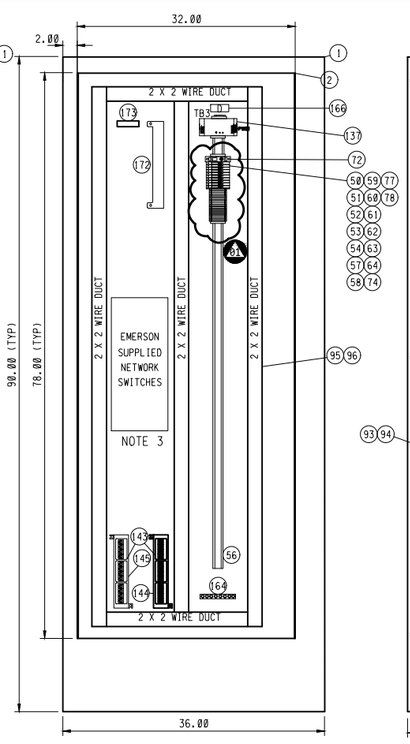
01
REV.



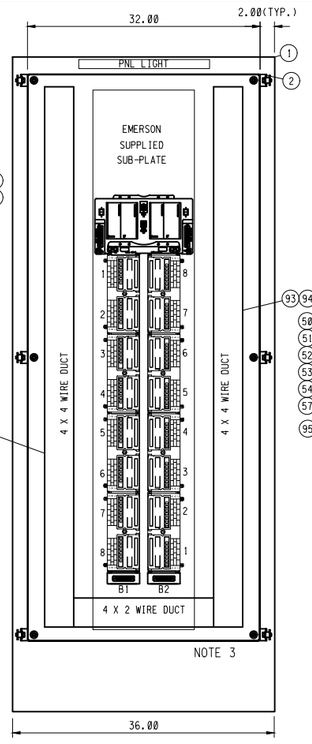
ENCLOSURE EXTERIOR FRONT VIEW
(NOTES 1 & 2)



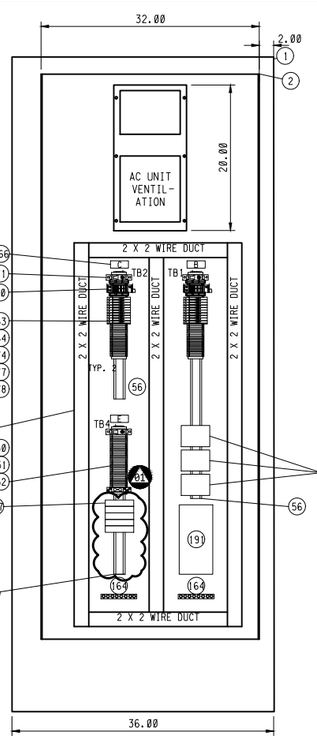
ENCLOSURE EXTERIOR SIDE VIEW
(NOTES 1 & 2)



LEFT PANEL



BACK PLATE



RIGHT PANEL

NOTES:

1. ENCLOSURE SHALL SIT ON A 4" HEIGHT HOUSEKEEPING PAD.
2. ENCLOSURE SHALL BE SS316, TYPE NEMA 4X, AND HAVE PROVISION FOR PADLOCK.
3. SUBPLATE, HMI, AND NETWORK SWITCHES SHALL BE SUPPLIED BY EMERSON AND INSTALLED BY THE CONTRACTOR AFTER COMPLETION OF PANEL. CONTRACTOR SHALL COORDINATE WITH EMERSON FOR RECEIVING THE EQUIPMENT AND INSTALLATION SEQUENCE AND SCHEDULE. EMERSON SHALL SUPPLY ETHERNET AND FIBER PATCH CORDS. CONTRACTOR SHALL PROVIDE AND INSTALL POWER CONNECTIONS TO EMERSON EQUIPMENT AS DIRECTED BY EMERSON.
4. NAMEPLATE SHALL BE BLACK WITH WHITE LETTERS WITH ADHESIVE BACK. TEXT SIZE TO BE .375
5. AREA RESERVED FOR CONDUIT ENTRY.
6. ENCLOSURE LIGHT AND INTRUSION SWITCH SHALL BE MOUNTED WITH STAINLESS STEEL SCREWS, NUTS AND NEOPRENE BONDED SEALING WASHERS TO MAINTAIN THE NEMA 4X RATING OF ENCLOSURE. (SEALING WASHER MANUFACTURER & ITEM NUMBER: THE HILLMAN GROUP

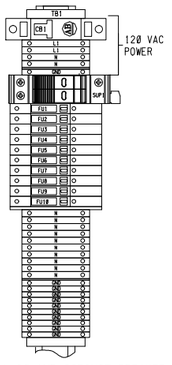
NAMEPLATE SCHEDULE (NOTE 4)

ITEM	DIMENSION	DESCRIPTION	FABRICATION COMMENTS
A	5" x 2"	RIO-15-1 MAC 1-1 PANEL	NOTE 4
B	2.5" x 1"	TB1	NOTE 4
C	2.5" x 1"	TB2	NOTE 4
D	2.5" x 1"	TB3	NOTE 4
E	2.5" x 1"	TB4	NOTE 4

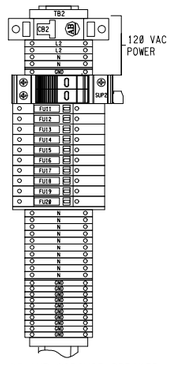
BILL OF MATERIALS

ITEM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION	DESIGNATION
				ENCLOSURE & RELATED EQUIPMENT	
1	1	HAMMOND MANUFACTURING	HMF36X24X8SS	ENCLOSURE, NEMA 4X, 36.00"X 24.00"X 8.00", 316SS	ENCLOSURE
3	1	HAMMOND MANUFACTURING	91PTM	INTERNAL PANEL, 79"X 20"	BACK PANEL
7	2	SIEMENS CONTROL	3CC-90MFP31	3CC PANEL, 79" X 20"	3CC PANELS
4	1	HAMMOND MANUFACTURING	CTS20B24TSNH3S	AC UNIT 2000 BTU/HR - 115V - NEMA 4X	AC UNIT
6	1	HOFFMAN	LED4455X	ENCLOSURE LIGHT	LT-01
5	1	HOFFMAN	A.LF3959	ENCLOSURE DOOR SWITCH	SW-01
				TERMINAL BLOCKS & RELATED EQUIPMENT	
86	56	ALLEN BRADLEY	1492-J4	TERMINAL BLOCK 4 TIER	TB1, TB2, TB3, TB4
87	10	ALLEN BRADLEY	1492-EB35	TERMINAL BLOCK END BARRIER, 1 TIER	TB1, TB2, TB3, TB4
87	10	ALLEN BRADLEY	1492-EAJ35	END ANCHOR	TB1, TB2, TB3, TB4
83	5	ALLEN BRADLEY	1492-CJJ35-10	TERMINAL BLOCK JUMPER, 10 POLE	TB1, TB2
84	5	ALLEN BRADLEY	1492-JG3	TERMINAL BLOCK, GROUNDING	TB1, TB2, TB3
85	1	ALLEN BRADLEY	1492-DR4	DIN RAIL, RAIL(M)	TB1, TB2, TB3
87	20	ALLEN BRADLEY	1492-H4	FUSED TERMINAL BLOCK, NEON INDICATOR	FU1-FU20
88	6	ALLEN BRADLEY	1492-H6	FUSED TERMINAL BLOCK, LED INDICATOR	FU21-FU26
89	3	ALLEN BRADLEY	1492-N27	FUSED TERMINAL BLOCK END BARRIER	FU10, FU20, FU30
90	3	ALLEN BRADLEY	1492-N45	FUSE BLOCK SIDE JUMPERS 10 POLE	FU1-FU10, FU11-20, FU21-FU30
91	3	ALLEN BRADLEY	1492-SJ5	FUSE BLOCK SIDE JUMPER INSULATING SHEETS	FU1-FU10, FU11-20, FU21-FU30
92	1	ALLEN BRADLEY	1492-MSK12	CROSSWIND TERMINAL BLOCK BLANK MARKING TAGS, 144CT	TB1, TB2, TB3
93	2	ALLEN BRADLEY	1492-MSK10	TERMINAL BLOCK BLANK MARKING TAGS, 0 TIER, 144 CT	TB1, TB2, TB3
94	1	ALLEN BRADLEY	1492-MSK512	FUSE BLOCK BLANK MARKING TAGS, 144 CT	FU1-FU30
95	3	ALLEN BRADLEY	1489-M1D300	CIRCUIT BREAKER, 10AMP, SINGLE POLE	CB1, CB2, CB3
71	2	ALLEN BRADLEY	1489-M1D100	CIRCUIT BREAKER, 1AMP, SINGLE POLE	CB3, CB7
72	1	ALLEN BRADLEY	1489-M1D500	CIRCUIT BREAKER, 5AMP, SINGLE POLE	CB4
73	1	BUSSMANN	AGC-3	FUSE, 3A, 250V, FAST ACTING	CB1, TB1, CB11, TB1, CB21, TB1
96	4	PHOENIX CONTACT	2905348	VAL-SEC-T2-I-3-175-FM, 120VAC SURGE PROTECTOR	SHIP, SURG PLUG I SPARE
81	1	ALLEN BRADLEY	700-HC32Z1	GENERAL PURPOSE SLIM LINE RELAY, 120VAC	PS100
82	1	ALLEN BRADLEY	700-HA31	RELAY SOCKET	PS100
				WIREDUCT	
97	18FT	PANDUIT	F-LPAS.5B	WIRING DUCT, 4"W X 4"H	
98	18FT	PANDUIT	C-SA4S	WIRING DUCT COVER, 4"W	
99	48FT	PANDUIT	F-LPS1.5B	WIRING DUCT, 2"W X 2"H	
94	48FT	PANDUIT	C-SA2S	WIRING DUCT COVER, 2"W	
				POWER SUPPLIES	
137	1	PHOENIX CONTACT	2866761	POWER SUPPLY, 200-230VAC IN, 24VDC, 10 AMP	PWR
				COMPUTING ITEMS	
143	1	EMERSON	3.991134.01	MM-CON PATCH PANEL, 12 PORTS	
144	1	EMERSON	1.991191.01	MM-CON MODULE FOR FO-ST	
145	3	PANDUIT	C-WJ88W-M	MM-CON MODULE FOR THE 10G-EG UTP JACK	
				MISCELLANEOUS PANEL EQUIPMENT	
104	1	PANDUIT	USGB1.5X4.5-E	GROUND BAR	
105	4	PANEL FABRICATOR		NAMEPLATE, PHENOLIC, ENGRAVED	SEE SCHEDULE ON EQUIPMENT LAYOUT
170	1	EMERSON	3.27X.109.01	RTO ASSEMBLY	
172	1	PHOENIX CONTACT	2864081	TEMP UNIT MCR-FL-TS-I-I-SW	
180	3	DIGITAL METALS	939-93-70-02-00	VIBRATION TRANSMITTER	
186	1	ALLEN BRADLEY	9300-PXXTA01	30MM PUSH BUTTON, PROJECTING, MUSHROOM HEAD, RED	
186	1	ALLEN BRADLEY	9300-PXXTA02	30MM PUSH BUTTON, LEGEND PLATE, JUMBO, CUSTOM TEXT, "SYSTEM STOP"	
187	1	WILCOXON	IT301	LOOP-CONFIGURABLE INTELLIGENT VIBRATION TRANSMITTER	
191	1	REL	REL-2500-A	RTO MOBILE	PROVIDED BY ELECTRICAL CONTRACTOR

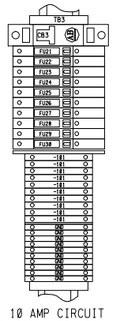
TERMINAL BLOCK LAYOUTS



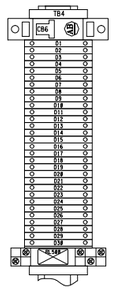
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



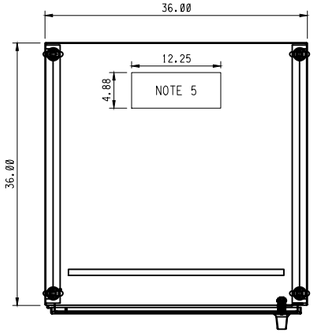
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(10) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(10) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(30) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(1) 120V RELAY
(2) END ANCHORS



ENCLOSURE EXTERIOR TOP VIEW

Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:22:06-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	LM	JC	DCR

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95946	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

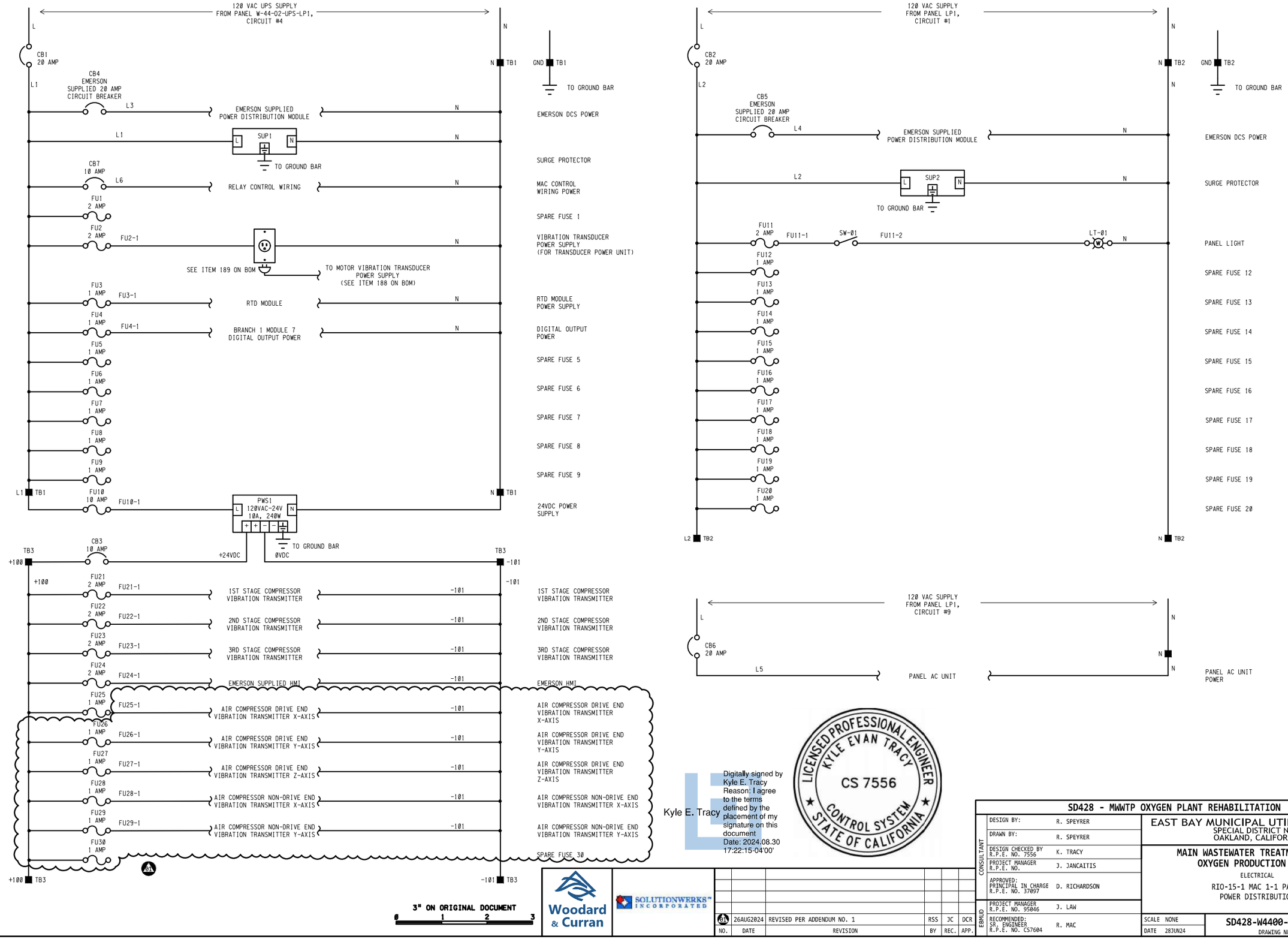
MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
RIO-15-1 MAC 1-1 PANEL
EQUIPMENT ELEVATION

SCALE NONE
DATE 28JUN24
SD428-W4400-E503
DRAWING NUMBER
01
REV.

REF 1: REF1#TLEWME
REF 2: REF2#TLEWME
REF 3: REF3#TLEWME
REF 4: REF4#TLEWME
REF 5: REF5#TLEWME
REF 6: REF6#TLEWME
REF 7: REF7#TLEWME
REF 8: REF8#TLEWME
REF 9: REF9#TLEWME

PLOT SCALE: PLOTSCALE
USER: ##USERNAME##
DATE: ##CURRENTDATE##
FILE: ##FILENAME##

REF 7, REF7#FILENAME
REF 8, REF8#FILENAME
REF 4, REF4#FILENAME
REF 5, REF5#FILENAME
REF 6, REF6#FILENAME
REF 1, REF1#FILENAME
REF 2, REF2#FILENAME
REF 3, REF3#FILENAME
PLOT SCALE: PLOT@SCALE
USER: @#USER@@@@
DATE: @@@@MONTH@@@@@
FILE: ##########################FILENAME##########



Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:22:15-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

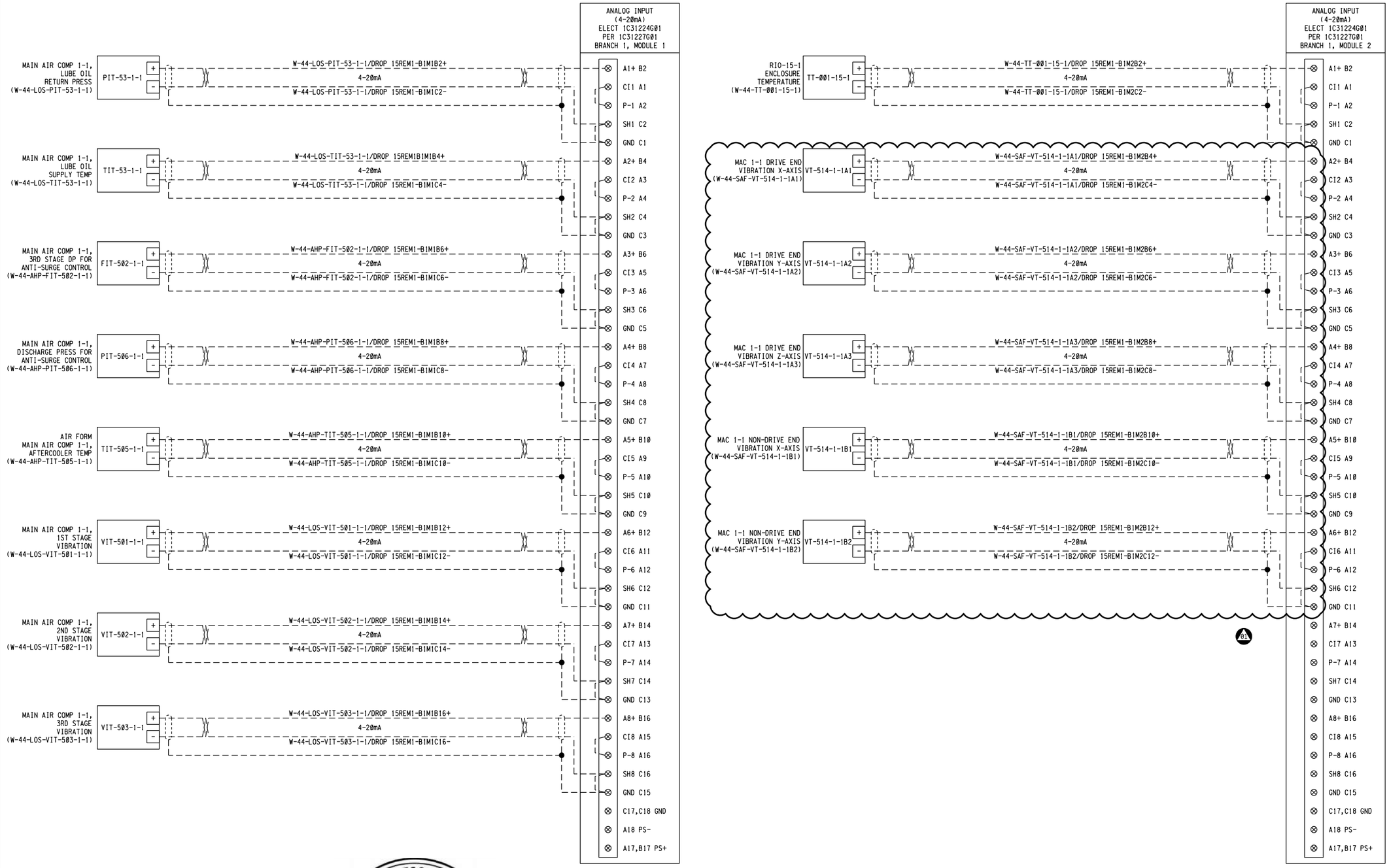
EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
RIO-15-1 MAC 1-1 PANEL
POWER DISTRIBUTION

SCALE NONE
DATE 28JUN24
SD428-W4400-E503-E510
DRAWING NUMBER
01
REV.



REF 7:
REF 8:
REF 9:

REF 1: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\wdar.consultant-dgn
REF 2:
REF 3:
REF 4:
REF 5:

PLOT SCALE: 0.166666711
USER: robert
DATE: 26-AUG-2024 15:04
FILE: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\SD428-W44-E-503-511.dgn

Kyle E. Tracy

Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:22:24-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	X. SUN
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL
RIO-15-1 MAC 1-1 PANEL
I/O MODULE SCHEMATIC

SCALE NONE
DATE 28JUN24

SD428-W4400-E503-511
DRAWING NUMBER

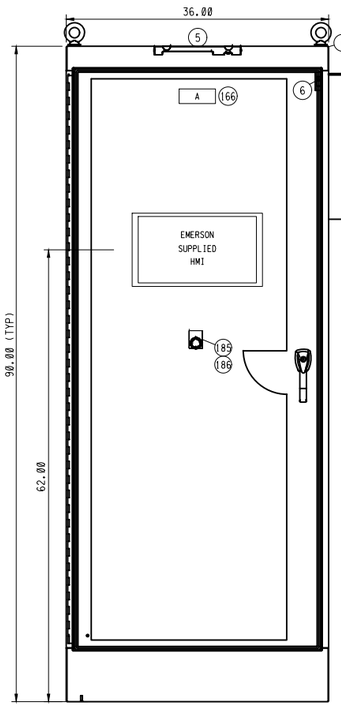
01
REV.

REF 7: REF#FILENAME
REF 8: REF#FILENAME
REF 9: REF#FILENAME

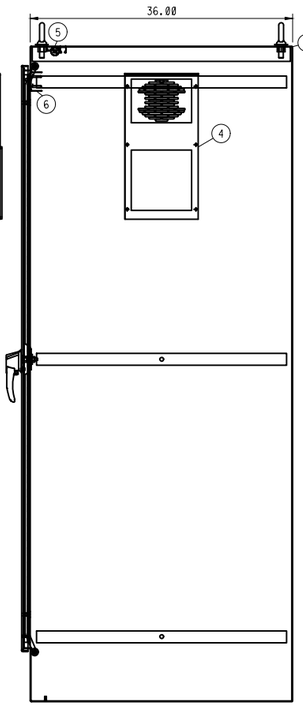
REF 4: REF#FILENAME
REF 5: REF#FILENAME
REF 6: REF#FILENAME

USER: ##USERNAME##
DATE: ##CURRENTDATE##
FILE: ##FILENAME##

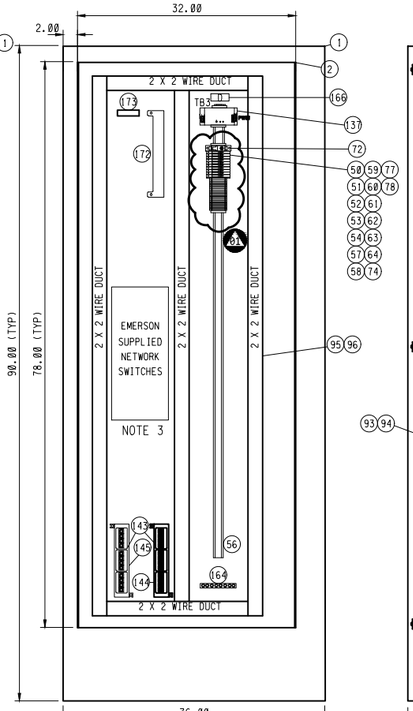
PLOT SCALE: PLOTSCALE



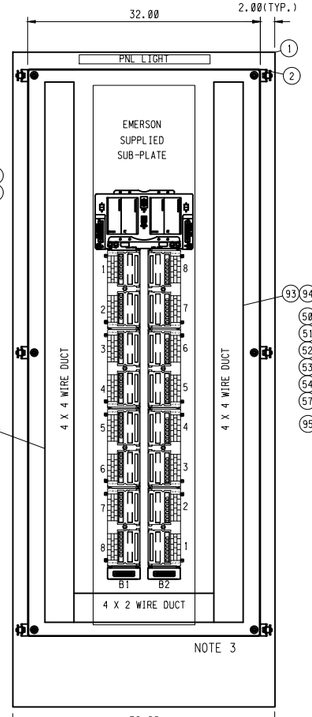
ENCLOSURE EXTERIOR FRONT VIEW
(NOTES 1 & 2)



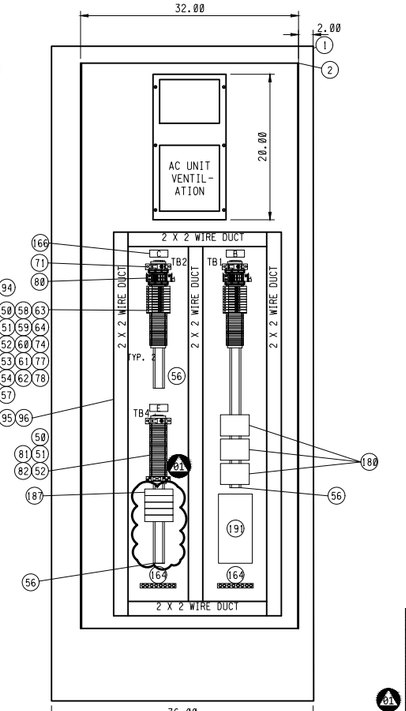
ENCLOSURE EXTERIOR SIDE VIEW
(NOTES 1 & 2)



LEFT PANEL



BACK PLATE



RIGHT PANEL

NOTES:

1. ENCLOSURE SHALL SIT ON A 4" HEIGHT HOUSEKEEPING PAD.
2. ENCLOSURE SHALL BE SS316, TYPE NEMA 4X, AND HAVE PROVISION FOR PADLOCK.
3. SUBPLATE, HMI, AND NETWORK SWITCHES SHALL BE SUPPLIED BY EMERSON AND INSTALLED BY THE CONTRACTOR AFTER COMPLETION OF PANEL. CONTRACTOR SHALL COORDINATE WITH EMERSON FOR RECEIVING THE EQUIPMENT AND INSTALLATION SEQUENCE AND SCHEDULE. EMERSON SHALL SUPPLY ETHERNET AND FIBER PATCH CORDS. CONTRACTOR SHALL PROVIDE AND INSTALL POWER CONNECTIONS TO EMERSON EQUIPMENT AS DIRECTED BY EMERSON.
4. NAMEPLATE SHALL BE BLACK WITH WHITE LETTERS WITH ADHESIVE BACK. TEXT SIZE TO BE .375
5. AREA RESERVED FOR CONDUIT ENTRY.
6. ENCLOSURE LIGHT AND INTRUSION SWITCH SHALL BE MOUNTED WITH STAINLESS STEEL SCREWS, NUTS AND NEOPRENE BONDED SEALING WASHERS TO MAINTAIN THE NEMA 4X RATING OF ENCLOSURE. (SEALING WASHER MANUFACTURER & ITEM NUMBER: THE HILLMAN GROUP

NAMEPLATE SCHEDULE (NOTE 4)

ITEM	DIMENSION	DESCRIPTION	FABRICATION COMMENTS
A	5" x 2"	RIO-23-1 MAC 2-1 PANEL	NOTE 4
B	2.5" x 1"	TB1	NOTE 4
C	2.5" x 1"	TB2	NOTE 4
D	2.5" x 1"	TB3	NOTE 4
E	2.5" x 1"	TB4	NOTE 4

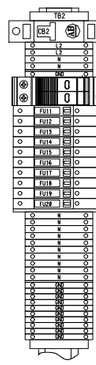
BILL OF MATERIALS

ITEM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION	DESIGNATION
				ENCLOSURE & RELATED EQUIPMENT	
1	1	HAMMOND MANUFACTURING	HMP1608368HI	ENCLOSURE, NEMA 4X, 80.00" x 24.00" x 36.00", 316SS	ENCLOSURE
2	1	HAMMOND MANUFACTURING	01HPSW	INTERNAL PANEL, 75" X 32"	BACK PANEL
3	1	EATON/AB CONTROL	SCE-60MP32I	SUBPANEL, 75" X 30"	SUBPANEL B
4	1	HAMMOND MANUFACTURING	07RS36HA1HMAKR	AC UNIT 3600 BTU/HR, 115V, NEMA 4X	AC UNIT
5	1	HOFFMAN	LEDA1230	ENCLOSURE LIGHT	LT-01
6	1	HOFFMAN	A_PTE60	ENCLOSURE DOOR SWITCH	INT-01
				TERMINALS & RELATED EQUIPMENT	
60	16	ALLEN BRADLEY	1492-J4	TERMINAL BLOCK 1 TIER	TB1, TB2, TB3, TB4
61	16	ALLEN BRADLEY	1492-EB35	TERMINAL BLOCK END BARRIER, 1 TIER	TB1, TB2, TB3, TB4
62	16	ALLEN BRADLEY	1492-EAH35	TERMINAL BLOCK END ANCHOR	TB1, TB2, TB3, TB4
63	4	ALLEN BRADLEY	1492-CJA5-10	TERMINAL BLOCK JUMPER, 10 POLE	TB1, TB2
64	16	ALLEN BRADLEY	1492-J35	TERMINAL BLOCK, GROUNDING	TB1, TB2, TB3
65	16	ALLEN BRADLEY	1492-DR5	DIN RAIL, RAIL	TB1, TB2, TB3
67	20	ALLEN BRADLEY	1492-H4	FUSED TERMINAL BLOCK, NEON INDICATOR	FU1-FU20
68	3	ALLEN BRADLEY	1492-H5	FUSED TERMINAL BLOCK, LED INDICATOR	FU21-FU23
69	2	ALLEN BRADLEY	1492-N27	FUSED TERMINAL BLOCK END BARRIER	FU19, FU20, FU30
70	3	ALLEN BRADLEY	1492-N49	FUSE BLOCK SIDE JUMPER 10 POLE	FU1-FU10, FU11-20, FU21-FU30
71	2	ALLEN BRADLEY	1492-SJ3	FUSE BLOCK SIDE JUMPER INSULATING SHEATH	FU1-FU10, FU11-20, FU21-FU30
72	1	ALLEN BRADLEY	1492-WEAK12	SPEAKING TERMINAL BLOCK BLANK MARKING TABS, 144CT.	TB1, TB2, TB3
73	2	ALLEN BRADLEY	1492-WEA3	TERMINAL BLOCK BLANK MARKING TABS, 2 TIER, 144CT.	TB1, TB2, TB3
74	1	ALLEN BRADLEY	1492-WSB72	FUSE BLOCK BLANK MARKING TABS, 100 CT.	FU1-FU20
75	2	ALLEN BRADLEY	1489-M1C020	CIRCUIT BREAKER, 20AMP, SINGLE POLE	CB1, CB2, CB5
76	3	ALLEN BRADLEY	1489-M1C030	CIRCUIT BREAKER, 30AMP, SINGLE POLE	CB3, CB7
77	1	ALLEN BRADLEY	1492-FB1C30	FUSE BLOCK, 30AMP, 1 POLE	FU31, FU32, FU33, FU34, FU35
78	3	PHOENIX CONTACT	3166348	VAL-SEC-T2-1S-175-FM, 120VAC SURGE PROTECTOR	SUPP, SUPP, PLUS-1-SPARE
81	1	ALLEN BRADLEY	700-HC032J	GENERAL PURPOSE 8 LINE RELAY 120VAC	RL600
82	1	ALLEN BRADLEY	700-HN121	RELAY SOCKET	RL600
				WIRE DUCT	
83	18FT	PANDUIT	F2X2LG8	WIRING DUCT, 4"W x 4"H	
84	18FT	PANDUIT	C4X2X6	WIRING DUCT COVER, 4"W	
85	48FT	PANDUIT	F2X2LG8	WIRING DUCT, 2"W x 2"H	
86	48FT	PANDUIT	C2X2X6	WIRING DUCT COVER, 2"W	
				POWER SUPPLY	
137	1	PHOENIX CONTACT	3166753	POWER SUPPLY, 2NP 120VAC IN 24VDC 10 AMP	PWR9
				COMMUNICATIONS	
143	1	EMERSON	8.200.1330.05	MINI-COM PATCH CORD, 12 PORTS	
144	1	EMERSON	1.200.1109.01	MINI-COM MODULE FOR RO ST	
145	3	PANDUIT	CJACSBEG6S	MINI-COM MODULE FOR THE 10E/E UTP JACK	
				MISCELLANEOUS PANEL EQUIPMENT	
164	8	PANDUIT	UGB2/6/4&6	GROUND BAR	
166	4	PANEL FABRICATOR		NAMEPLATE, PHENOLIC, ENGRAVED	SEE SCHEDULE ON EQUIPMENT LAYOUT
170	1	EMERSON	2.270.0800.01	RTU ASSEMBLY	
172	1	PHOENIX CONTACT	2.864.887	TERM JOINT BOX FL TB 1.5/4-PE	
180	8	KINETY SYSTEMS	6.50-10-10-33-00	VIBRATION TRANSMITTER	
186	1	ALLEN BRADLEY	800H-PBTF431	30MM PUSH-PULL/TWIST W/INDUCTION, MUSHROOM HEAD, RED	
189	1	ALLEN BRADLEY	800H-2GX2GJP	30MM PUSH BUTTON, LEGEND PLATE, JUMBO, CUSTOM TEXT, "EMSTOP STOP"	
191	1	MILLCREEK	JT30I	USER CONFIGURABLE INTELLIGENT VIBRATION TRANSMITTER	
193		GEL	GEL 2600-A	RTU MOD W/LP	PROVIDED BY ELECTRICAL CONTRACTOR

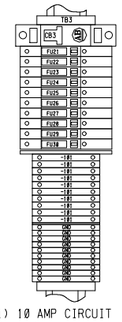
TERMINAL BLOCK LAYOUTS



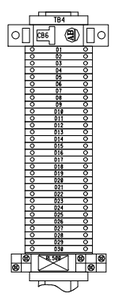
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



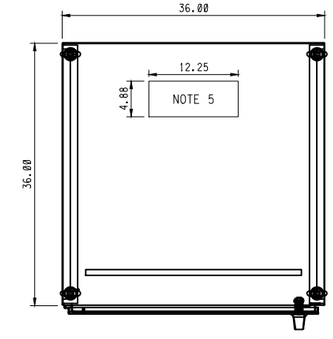
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(10) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(10) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(30) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(1) 120V RELAY
(2) END ANCHORS



ENCLOSURE EXTERIOR TOP VIEW

Kyle E. Tracy

Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:22:35-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

CONSULTANT

DESIGN BY:	R. SPEYRER	
DRAWN BY:	R. SPEYRER	
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY	
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS	
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON	
PROJECT MANAGER R.P.E. NO. 95946	J. LAW	
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC	

EBMUD

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL

RIO-23-1 MAC 2-1 PANEL
EQUIPMENT ELEVATION

SCALE NONE
DATE 28JUN24

SD428-W4400-E504
DRAWING NUMBER

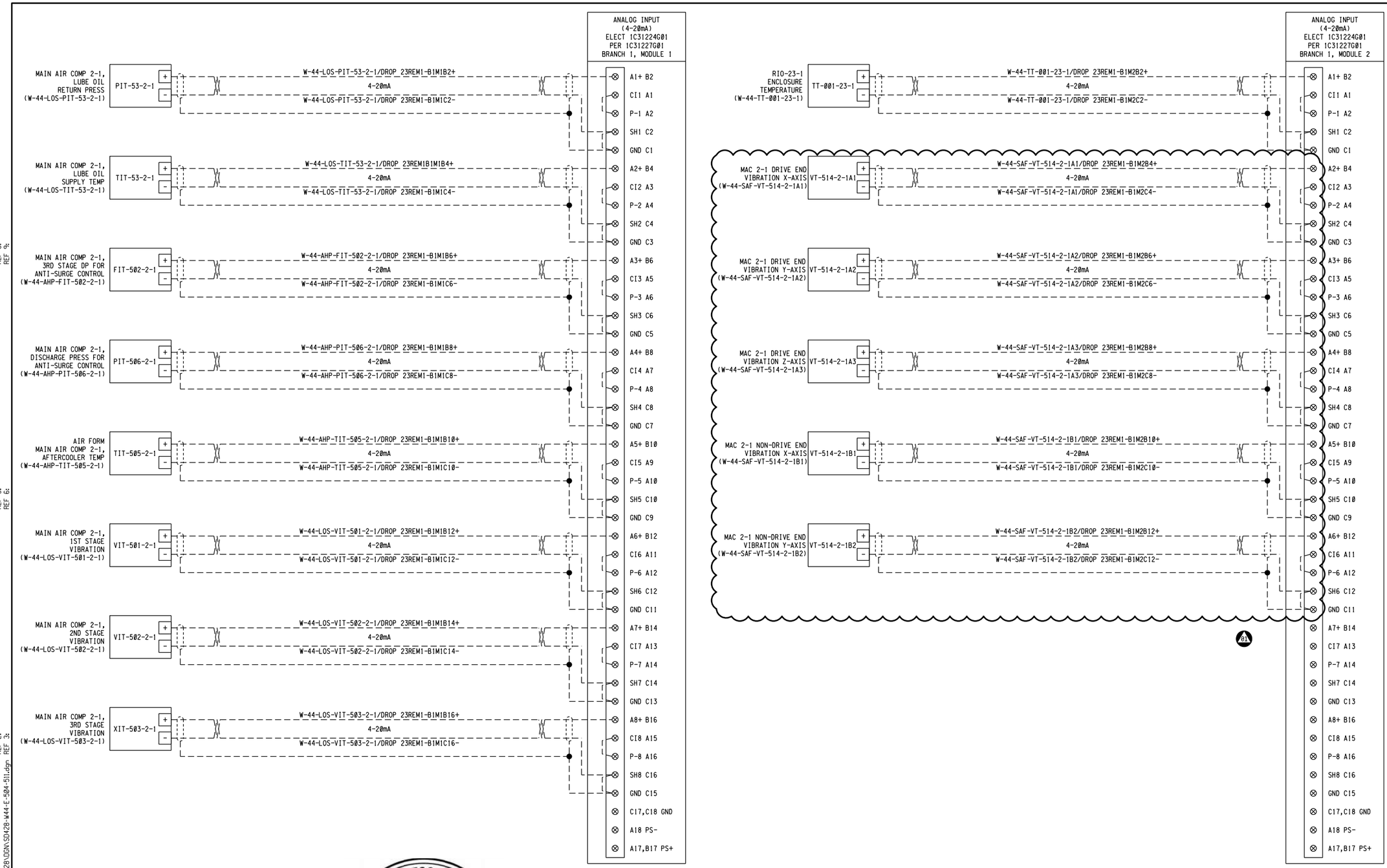
01
REV.

REF 7: REF4#TLEWWE
REF 8: REF4#TLEWWE
REF 9: REF4#TLEWWE

REF 4: REF4#TLEWWE
REF 5: REF4#TLEWWE
REF 6: REF4#TLEWWE

REF 1: REF4#TLEWWE
REF 2: REF4#TLEWWE
REF 3: REF4#TLEWWE

PLOT SCALE: PLOT@SCALE
USER: &USER@@@@
DATE: &&&&&MONTH&&&&&
FILE: &&&&&&



REF 7;
REF 8;
REF 9;

REF 1: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\wdbr.consultant-8BIT.dgn
REF 2:
REF 3:
REF 4:
REF 5:
REF 6:

USER: robert
DATE: 26AUG2024 15:04
FILE: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\SD428-W44-E-504-511.dgn
PLOT SCALE: 0.166666'=1"

Kyle E. Tracy

Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:22:53-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	X. SUN
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

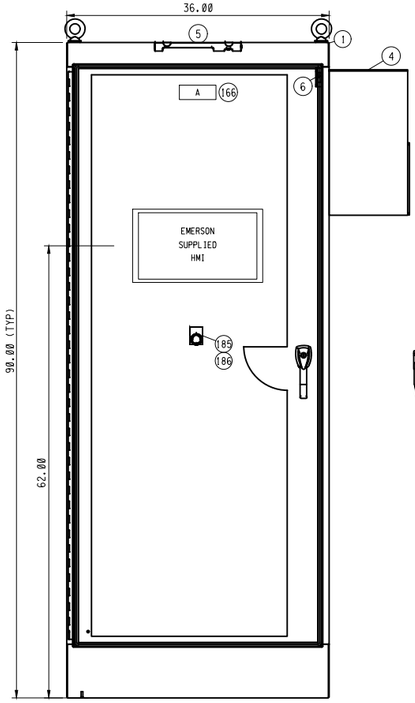
MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL
RIO-23-1 MAC 2-1 PANEL
I/O MODULE SCHEMATIC

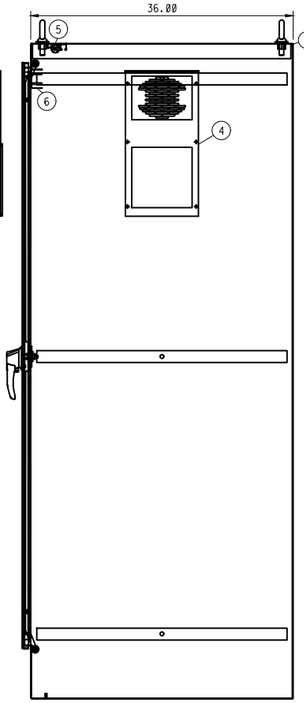
SCALE NONE
DATE 28JUN24

SD428-W4400-E504-511
DRAWING NUMBER

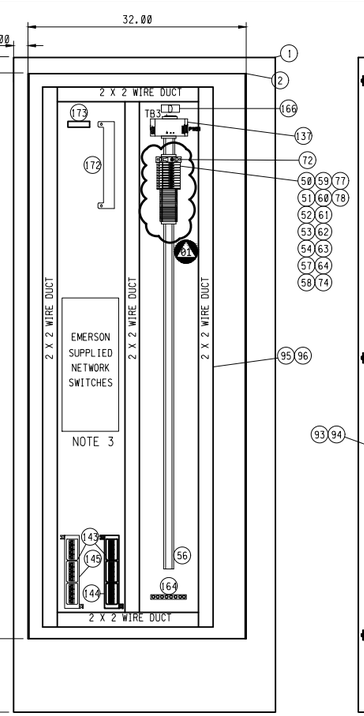
01
REV.



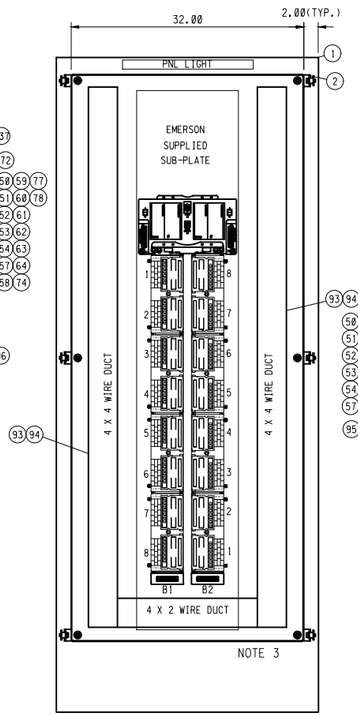
ENCLOSURE EXTERIOR FRONT VIEW
(NOTES 1 & 2)



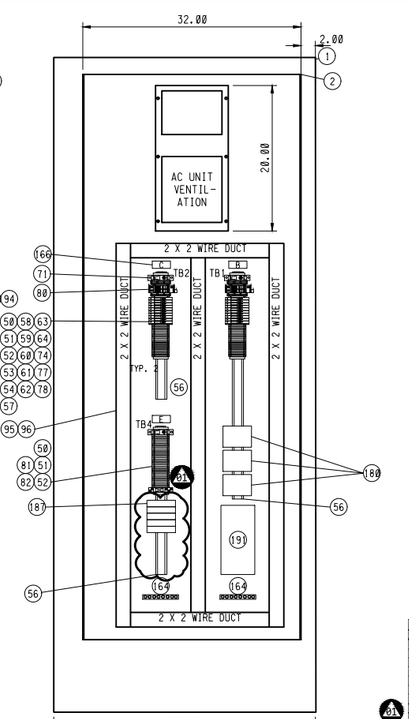
ENCLOSURE EXTERIOR SIDE VIEW
(NOTES 1 & 2)



LEFT PANEL



BACK PLATE



RIGHT PANEL

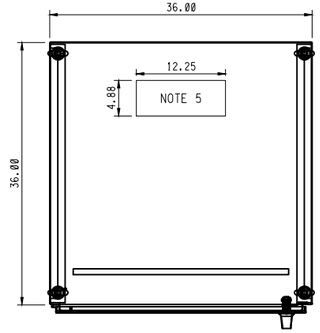
NOTES:

1. ENCLOSURE SHALL SIT ON A 4" HEIGHT HOUSEKEEPING PAD.
2. ENCLOSURE SHALL BE SS316, TYPE NEMA 4X, AND HAVE PROVISION FOR PADLOCK.
3. SUBPLATE, HMI, AND NETWORK SWITCHES SHALL BE SUPPLIED BY EMERSON AND INSTALLED BY THE CONTRACTOR AFTER COMPLETION OF PANEL. CONTRACTOR SHALL COORDINATE WITH EMERSON FOR RECEIVING THE EQUIPMENT AND INSTALLATION SEQUENCE AND SCHEDULE. EMERSON SHALL SUPPLY ETHERNET AND FIBER PATCH CORDS. CONTRACTOR SHALL PROVIDE AND INSTALL POWER CONNECTIONS TO EMERSON EQUIPMENT AS DIRECTED BY EMERSON.
4. NAMEPLATE SHALL BE BLACK WITH WHITE LETTERS WITH ADHESIVE BACK. TEXT SIZE TO BE .375
5. AREA RESERVED FOR CONDUIT ENTRY.
6. ENCLOSURE LIGHT AND INTRUSION SWITCH SHALL BE MOUNTED WITH STAINLESS STEEL SCREWS, NUTS AND NEOPRENE BONDED SEALING WASHERS TO MAINTAIN THE NEMA 4X RATING OF ENCLOSURE. (SEALING WASHER MANUFACTURER & ITEM NUMBER: THE HILLMAN GROUP

NAMEPLATE SCHEDULE (NOTE 4)			
ITEM	DIMENSION	DESCRIPTION	FABRICATION COMMENTS
A	5" x 2"	RIO-23-1 MAC 2-1 PANEL	NOTE 4
B	2.5" x 1"	TB1	NOTE 4
C	2.5" x 1"	TB2	NOTE 4
D	2.5" x 1"	TB3	NOTE 4
E	2.5" x 1"	TB4	NOTE 4

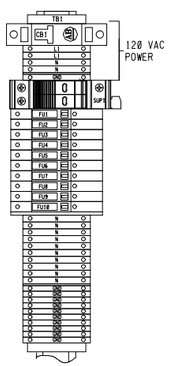
BILL OF MATERIALS

ITEM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION	DESIGNATION
				ENCLOSURE & RELATED EQUIPMENT	
1	1	HAMMOND MANUFACTURING	HMP36X30X8SS	ENCLOSURE, NEMA 4X, W.36.00" X D.30.00", 316SS	ENCLOSURE
2	1	HAMMOND MANUFACTURING	8HDIT1N	INTERNAL PANEL, 75" X 31"	BLICK PANEL
3	2	SAGINAW CONTROL	SCE-36SBF20	SIDE PANEL, 75" X 30"	SIDE PANELS
4	1	HAMMOND MANUFACTURING	1CT30X24LTGHASS	AC UNIT 2500 BTU/HR - 115V - NEMA 4X	AC UNIT
5	1	HOFFMAN	LFSA18SM	ENCLOSURE LIGHT	LT-01
6	1	HOFFMAN	ALF3RD	ENCLOSURE DOOR SWITCH	SW-01
				TERMINAL BLOCKS & RELATED EQUIPMENT	
30	36	ALLEN BRADLEY	1492-J4	TERMINAL BLOCK 1 TIER	TB1, TB2, TB3, TB4
31	4	ALLEN BRADLEY	1492-EB1J2	TERMINAL BLOCK END BARRIER, 1 TIER	TB1, TB2, TB3, TB4
32	10	ALLEN BRADLEY	1492-EAJ2	TERMINAL BLOCK END ANCHOR	TB1, TB2, TB3, TB4
33	8	ALLEN BRADLEY	1492-CJJ2-10	TERMINAL BLOCK JUMPER, 10 POLE	TB1, TB2
34	2	ALLEN BRADLEY	1492-J63	TERMINAL BLOCK, 6 MOUNTING	TB1, TB2, TB3
35	1	ALLEN BRADLEY	1492-SP3	DIN RAIL, 35MM	TB1, TB2, TB3
37	20	ALLEN BRADLEY	1492-J14	FUSED TERMINAL BLOCK, NEON INDICATOR	FU1-FU20
38	3	ALLEN BRADLEY	1492-H3	FUSED TERMINAL BLOCK, LED INDICATOR	FU21-FU23
39	2	ALLEN BRADLEY	1492-N37	FUSED TERMINAL BLOCK END BARRIER	FU19, FU20, FU23
40	2	ALLEN BRADLEY	1492-N49	FUSE BLOCK SIDE JUMPERS 19 POLE	FU1-FU10, FU11-20, FU21-FU23
41	2	ALLEN BRADLEY	1492-N49	FUSE BLOCK SIDE JUMPER INSULATING SLEEVE	FU1-FU10, FU11-20, FU21-FU23
42	1	ALLEN BRADLEY	1492-MSF12	GROUNDING TERMINAL BLOCK BLANK MARKING TAGS, 144 CT.	TB1, TB2, TB3
43	2	ALLEN BRADLEY	1492-MSB2	TERMINAL BLOCK BLANK MARKING TAGS 2 TIER, 144 CT.	TB1, TB2, TB3
44	1	ALLEN BRADLEY	1492-MSBX12	FUSE BLOCK BLANK MARKING TAGS 10-3 CT.	FU1-FU23
47	3	ALLEN-BRADLEY	1489-M1C200	CIRCUIT BREAKER, 20AMP, SINGLE POLE	CB1, CB2, CB3
48	3	ALLEN-BRADLEY	1489-M1C100	CIRCUIT BREAKER, 10AMP, SINGLE POLE	CB1, CB2, CB3
49	1	BUSSMANN	AGC-10	FUSE, 10A, 32V FAST ACTING	SUPPLY FUSE
50	1	BUSSMANN	AGC-3	FUSE, 3A, 32V FAST ACTING	SUPPLY FUSE
89	3	PHOENIX CONTACT	2908548	VAL-SEC-T2-1S-175-FM, 1SVDC SURGE PROTECTOR	SUP1, SUP2, SUP3 / SPARE
91	1	ALLEN-BRADLEY	700-HK32A1	GENERAL PURPOSE RELAY, 120VAC	RL550
92	1	ALLEN-BRADLEY	700-HN121	RELAY SOCKET	RL550
				WIREDUCT	
93	18FT	PANDUIT	F4X4L6	WIRING DUCT, 4"W x 4"H	
94	18FT	PANDUIT	C4X6	WIRING DUCT COVER, 4"W	
95	48FT	PANDUIT	F2X2L6	WIRING DUCT, 2"W x 2"H	
96	48FT	PANDUIT	C2X6	WIRING DUCT COVER, 2"W	
				POWER SUPPLY	
137	1	PHOENIX CONTACT	2866763	POWER SUPPLY, 540-120VAC IN, 24VDC, 10 AMP	PWR1
				COMPUTING ITEMS	
145	3	EMERSON	8.001.1336.06	MINI-COM PATCH PANEL, 12 PORTS	
146	1	EMERSON	1.001.1.18401	MINI-COM MODULE FOR FO ST	
148	1	PANDUIT	C.AEQNEAW	MINI-COM MODULE FOR TIA 568 6TP JACK	
				MISCELLANEOUS PANEL EQUIPMENT	
154	2	PANDUIT	E.92E2/0.4 1-6	GROUND BAR	
155	4	PANEL CLOSE/CATOR	NAMEPLATE, PHENOLIC, ENGRAVED		SEE SCHEDULE ON EQUIPMENT LAYOUT
170	1	EMERSON	8.77K3.0000.01	RTU ASSEMBLY	
172	1	PHOENIX CONTACT	2954587	TERMINAL BLOCK, TB-5.2-PV-5-K	
180	3	WINTLY MFG CO.	950-15-20-03-00	VIBRATION TRANSMITTER	
186	1	ALLEN-BRADLEY	800H-PR2TA41	30MM PUSH PULL/TWIST, NONSHUTTON, MUSHROOM HEAD, RED	
187	1	ALLEN-BRADLEY	800H-XB3G4	30MM PUSH BUTTON LEGEND PLATE, JUMBO, CUSTOM TEXT, "EMERGENCY STOP"	
188	1	ALLEN-BRADLEY	800H-N6004JM	"RESTING STOP"	
189	1	NO. COUNTS	27613	100K COMPACT/MOUNTABLE INTELLIGENT VIBRATION TRANSMITTER	
191	1	RFL	RFL 3600 A	RTU MODULE	PROVIDED BY RFL/ELECTRICAL CONTRACTOR

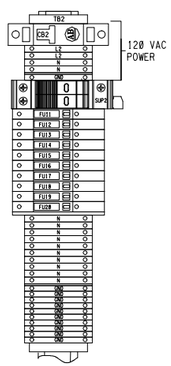


ENCLOSURE EXTERIOR TOP VIEW

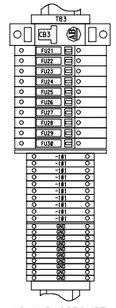
TERMINAL BLOCK LAYOUTS



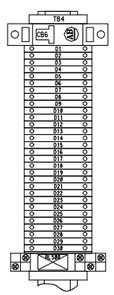
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(10) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(10) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(30) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(1) 120V RELAY
(2) END ANCHORS

Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:23:02-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95946	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

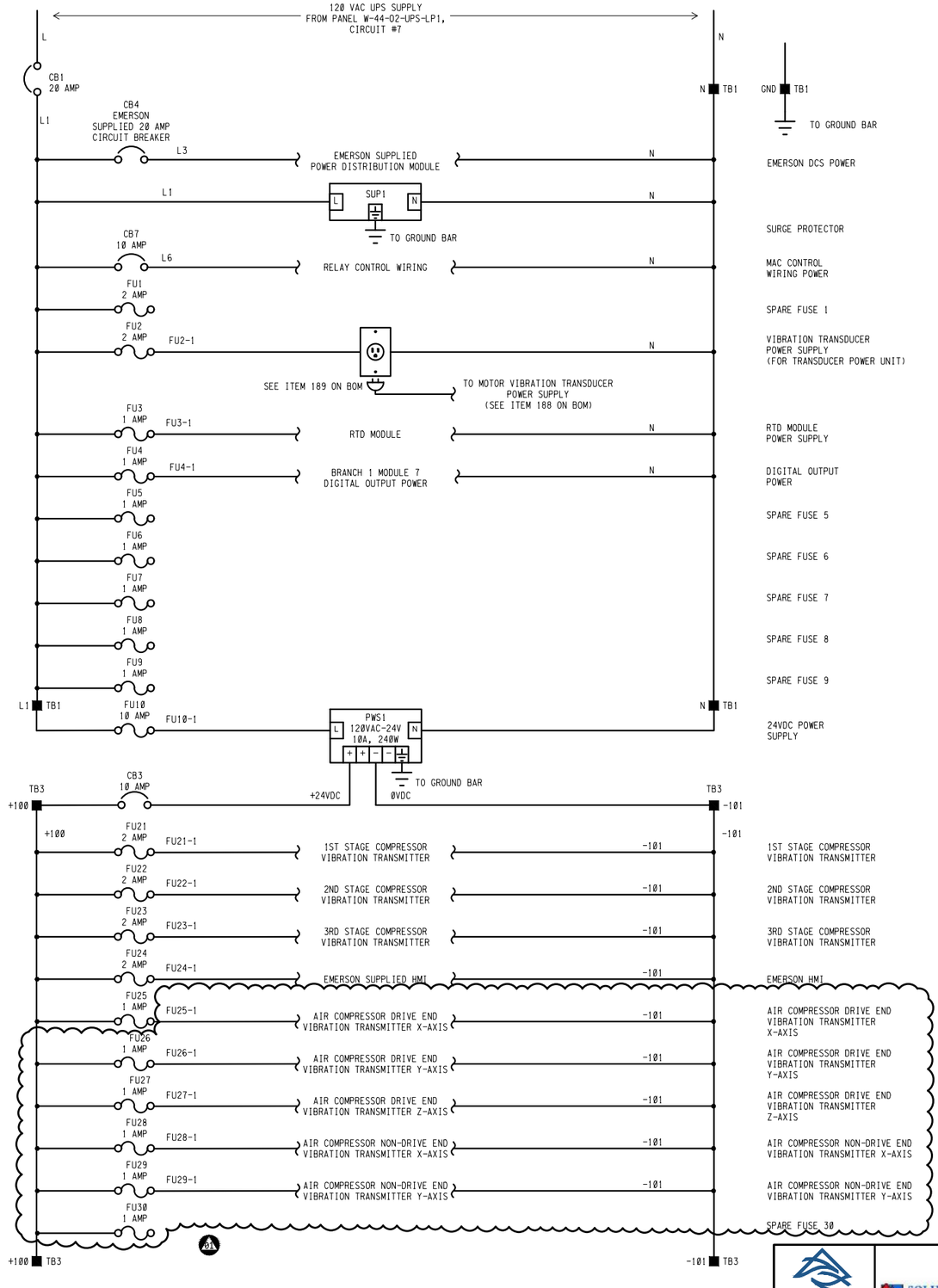
EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
RIO-15-2 MAC 1-2 PANEL
EQUIPMENT ELEVATION

SCALE NONE	SD428-W4400-E505	01
DATE 28JUN24	DRAWING NUMBER	REV.

REF 1: REF1#FILENAME
REF 2: REF2#FILENAME
REF 3: REF3#FILENAME
REF 4: REF4#FILENAME
REF 5: REF5#FILENAME
REF 6: REF6#FILENAME
REF 7: REF7#FILENAME
REF 8: REF8#FILENAME
REF 9: REF9#FILENAME

USER: ##USER##
DATE: ##DATE##
FILE: ##FILENAME##
PLOT SCALE: PLOTSCALE



REF 7: REF4#TLEWWE
REF 8: REF4#TLEWWE
REF 9: REF4#TLEWWE

REF 4: REF4#TLEWWE
REF 5: REF4#TLEWWE
REF 6: REF4#TLEWWE

REF 1: REF4#TLEWWE
REF 2: REF4#TLEWWE
REF 3: REF4#TLEWWE

USER: ##USERNAME##
DATE: ##CURRENTDATE##
FILE: ##########################FILENAME##########################
PLOT SCALE: PLOT@SCALE

Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:23:10-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

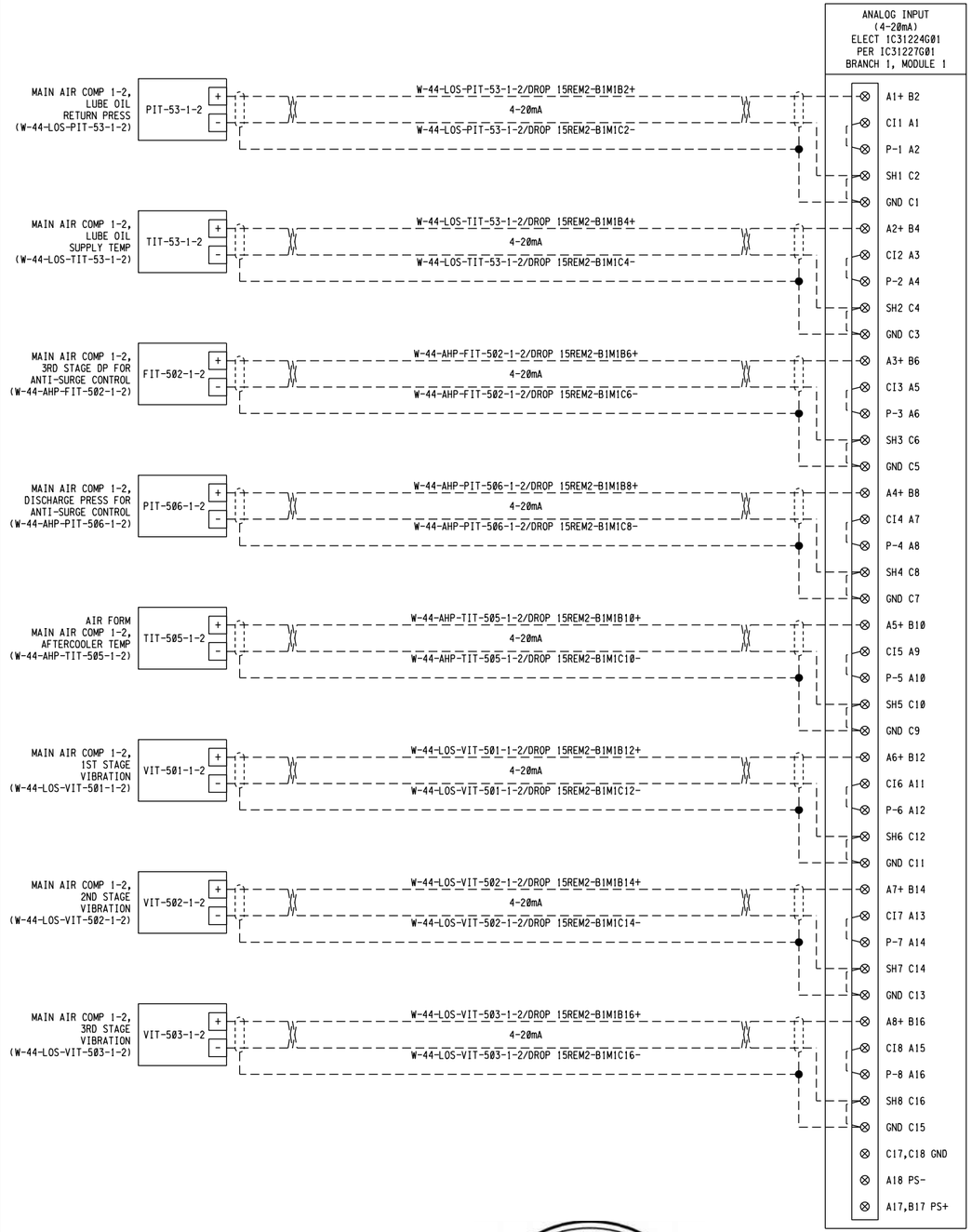
EBMUD

PROJECT MANAGER R.P.E. NO. 95046	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
RIO-15-2 MAC 1-2 PANEL
POWER DISTRIBUTION

SCALE NONE
DATE 28JUN24
SD428-W4400-E505-E510
DRAWING NUMBER
01
REV.



REF 7:
REF 8:
REF 9:

REF 1: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\wdbr.consultant-BBR20.dgn
REF 2:
REF 3:
REF 4:
REF 5:
REF 6:

USER: robert
DATE: 26AUG2024 15:04
FILE: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\SD428-W44-E-505-511.dgn
PLOT SCALE: 0.166667:1

Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:23:19-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
Ø1	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	X. SUN
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

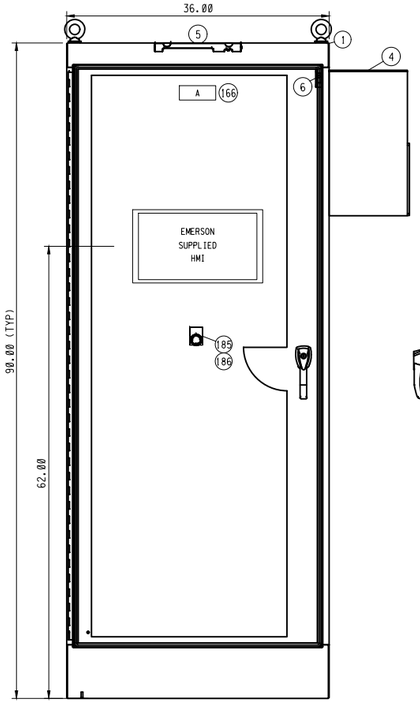
MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL
RIO-15-2 MAC 1-2 PANEL
I/O MODULE SCHEMATIC

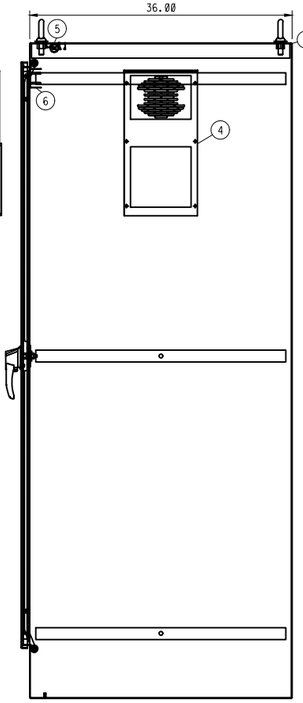
SCALE NONE
DATE 28JUN24

SD428-W4400-E505-511
DRAWING NUMBER

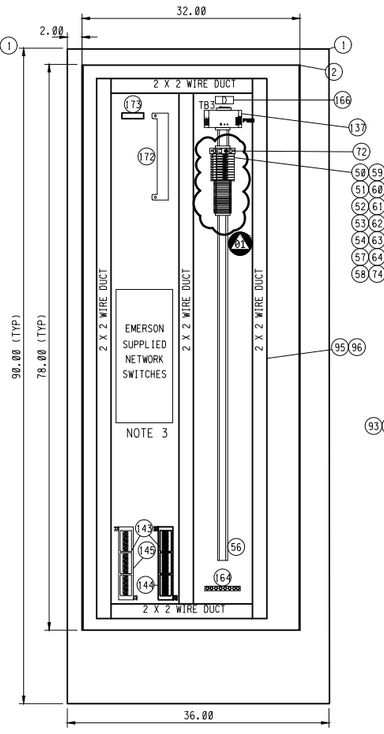
Ø1
REV.



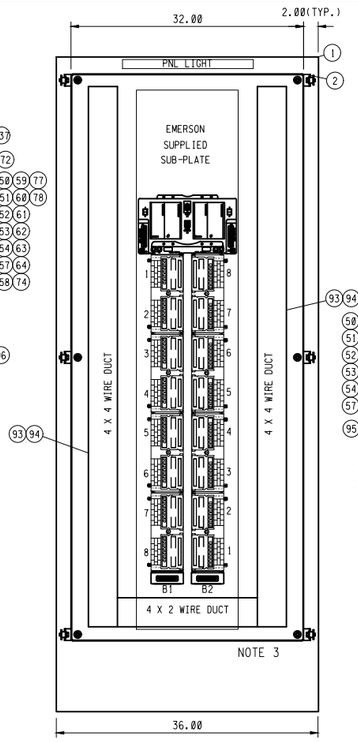
ENCLOSURE EXTERIOR FRONT VIEW
(NOTES 1 & 2)



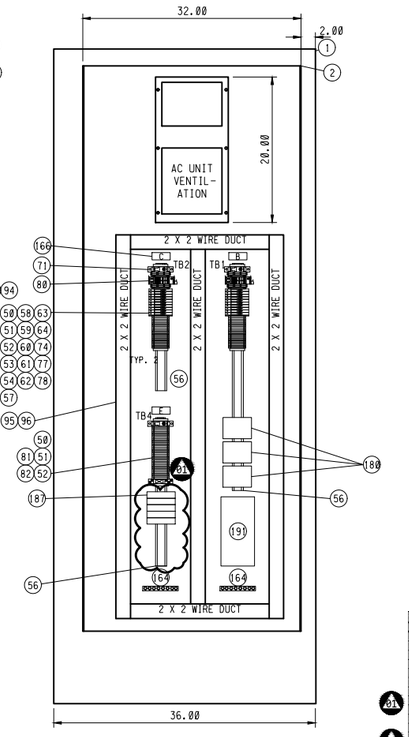
ENCLOSURE EXTERIOR SIDE VIEW
(NOTES 1 & 2)



LEFT PANEL



BACK PLATE



RIGHT PANEL

NOTES:

1. ENCLOSURE SHALL SIT ON A 4" HEIGHT HOUSEKEEPING PAD.
2. ENCLOSURE SHALL BE SS316, TYPE NEMA 4X, AND HAVE PROVISION FOR PADLOCK.
3. SUBPLATE, HMI, AND NETWORK SWITCHES SHALL BE SUPPLIED BY EMERSON AND INSTALLED BY THE CONTRACTOR AFTER COMPLETION OF PANEL. CONTRACTOR SHALL COORDINATE WITH EMERSON FOR RECEIVING THE EQUIPMENT AND INSTALLATION SEQUENCE AND SCHEDULE. EMERSON SHALL SUPPLY ETHERNET AND FIBER PATCH CORDS. CONTRACTOR SHALL PROVIDE AND INSTALL POWER CONNECTIONS TO EMERSON EQUIPMENT AS DIRECTED BY EMERSON.
4. NAMEPLATE SHALL BE BLACK WITH WHITE LETTERS WITH ADHESIVE BACK. TEXT SIZE TO BE .375
5. AREA RESERVED FOR CONDUIT ENTRY.
6. ENCLOSURE LIGHT AND INTRUSION SWITCH SHALL BE MOUNTED WITH STAINLESS STEEL SCREWS, NUTS AND NEOPRENE BONDED SEALING WASHERS TO MAINTAIN THE NEMA 4X RATING OF ENCLOSURE. (SEALING WASHER MANUFACTURER & ITEM NUMBER: THE HILLMAN GROUP

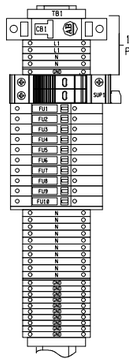
NAMEPLATE SCHEDULE (NOTE 4)

ITEM	DIMENSION	DESCRIPTION	FABRICATION COMMENTS
A	5" x 2"	RIO-23-2 MAC 2-2 PANEL	NOTE 4
B	2.5" x 1"	TB1	NOTE 4
C	2.5" x 1"	TB2	NOTE 4
D	2.5" x 1"	TB3	NOTE 4
E	2.5" x 1"	TB4	NOTE 4

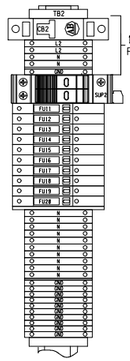
BILL OF MATERIALS

ITEM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION	DESIGNATION
				****ENCLOSURE & RELATED EQUIPMENT****	
1	1	HAMMOND MANUFAC TURING	1447BK24SS6FG	ENCLOSURE, NEMA 4X, 90.00"H x 24.00"L x 20.00"L, 316SS	ENCLOSURE
2	1	HAMMOND MANUFAC TURING	1447FW	INTERNAL PANEL, 76" X 20"	BACK PANEL
3	2	SAGINAW CONTROL	SCE-16SB6P20	SIDE RAIL EL, 76" X 20"	SIDE PANELS
4	1	HAMMOND MANUFAC TURING	2E7300S1570NHSS	AC UNIT 2500 BTU/HR - 115V - NEMA 4X	AC UNIT
5	1	HOFFMAN	LEDA1850	ENCLOSURE LIGHT	LT-01
6	1	HOFFMAN	A1F30SS	ENCLOSURE DOOR SWITCH	SW-01
				****TERMINAL BLOCKS & RELATED EQUIPMENT****	
86	16	ALLEN BRADLEY	1492-J4	TERMINAL BLOCK 1 TIER	TB1, TB2, TB3, TB4
87	16	ALLEN BRADLEY	1492-EB35	TERMINAL BLOCK END BARRIER, 1 TIER	TB1, TB2, TB3, TB4
92	16	ALLEN BRADLEY	1492-RAIL35	TERMINAL BLOCK END ANCHOR	TB1, TB2, TB3, TB4
93	4	ALLEN BRADLEY	1492-CJM5-10	TERMINAL BLOCK JUMPER, 10 POLE	TB1, TB2
94	4	ALLEN BRADLEY	1492-J35	TERMINAL BLOCK, 5 ROUNDING	TB1, TB2, TB3
95	1	ALLEN BRADLEY	1492-DR6	DIN RAIL, 6.56IN	TB1, TB2, TB3
97	20	ALLEN BRADLEY	1492-H4	FUSED TERMINAL BLOCK, NEON INDICATOR	FU1-FU20
98	5	ALLEN BRADLEY	1492-H6	FUSED TERMINAL BLOCK, LED INDICATOR	FU21-FU25
99	3	ALLEN BRADLEY	1492-N37	FUSED TERMINAL BLOCK END BARRIER	FU15, FU20, FU30
99	3	ALLEN BRADLEY	1492-N46	FUSE BLOCK END JUMPERS, 10 POLE	FU1-FU10, FU11-20, FU21-FU30
101	3	ALLEN BRADLEY	1492-N46	FUSE BLOCK END JUMPER INSULATING SLEEVE	FU1-FU10, FU11-20, FU21-FU30
102	1	ALLEN BRADLEY	1492-MSF312	GROUNDING TERMINAL BLOCK FLASH MARKING TAGS, 144CT	TB1, TB2, TB3
103	2	ALLEN BRADLEY	1492-MB28	TERMINAL BLOCK FLASH MARKING TAGS 2 TIER, 144 CT	TB1, TB2, TB3
104	1	ALLEN BRADLEY	1492-MMK312	FUSE BLOCK FLASH MARKING TAGS, 312 CT.	FU1-FU30
77	3	ALLEN BRADLEY	1489-M1D200	CIRCUIT BREAKER, 20AMP, SINGLE POLE	CB1, CB2, CB3
72	2	ALLEN BRADLEY	1489-M1D100	CIRCUIT BREAKER, 10AMP, SINGLE POLE	CB4, CB5
73	1	ALLEN BRADLEY	1489-M1D050	CIRCUIT BREAKER, 5AMP, SINGLE POLE	CB6
89	2	PHOENIX CONTACT	3200348	FUSE, 10A, 250V, 5X20MM, SLOW BLOW	FU1, FU2, FU3, FU4, FU5, FU6, FU7, FU8, FU9, FU10, FU11, FU12, FU13, FU14, FU15, FU16, FU17, FU18, FU19, FU20, FU21, FU22, FU23, FU24, FU25
90	1	ALLEN BRADLEY	700-HA32A1	GENERAL PURPOSE RELAY, 120VAC	K1, K2
91	1	ALLEN BRADLEY	700-HA21	RELAY SOCKET	K1, K2
				****WIREDUCT****	
93	18FT	PANDUIT	F4X4LG6	WIRING DUCT, 4"W X 4"H	
94	18FT	PANDUIT	C.5LG.5	WIRING DUCT COVER, 4"W	
95	48FT	PANDUIT	F2X2LG6	WIRING DUCT, 2"W X 2"H	
96	48FT	PANDUIT	C.2LG.5	WIRING DUCT COVER, 2"W	
				****POWER SUPPLIES****	
107	1	PHOENIX CONTACT	2866753	POWER SUPPLY, 85-132VAC IN, 24VDC, 10 AMP	PWR
				****COMPUTING****	
143	1	EMERSON	3.001.0005	MINI-COM PATCH PANEL, 12 PORTS	
148	1	EMERSON	1.001.1801	MINI-COM MODULE FOR FO ST	
149	1	PANDUIT	C.A6.08S6W	MINI-COM MODULE FOR TIA 568-B 6TP JACK	
				****MISCELLANEOUS PANEL EQUIPMENT****	
164	2	PANDUIT	E.92G5.6.14.6	GROUND BAR	
166	4	PANEL FABRICATOR		NAMEPLATE, PHENOLIC, ENGRAVED	SEE SCHEDULE ON EQUIPMENT LAYOUT
172	1	EMERSON	2.1750.3893.01	RTU ASSEMBLY	
173	1	PHOENIX CONTACT	2864387	TERMINAL BLOCK, TB-5.08-3-SK	
180	2	BENTLY NEVADA	990-03-20-02-00	VIBRATION TRANSMITTER	
185	1	ALLEN-BRADLEY	800H-PDT3AH	30MM PUSH BUTTON, EXTENDED, MUSHROOM HEAD, RED	
186	1	ALLEN-BRADLEY	800H-1G5A4	30MM PUSH BUTTON LEGEND PLATE, JUMBO, CUSTOM TEXT, "EMERGENCY STOP"	
187	1	WILCOXON	IT-301	HIGH CONFIGURABLE INTELLIGENT VIBRATION TRANSMITTER	
191	1	SEL	SEL-2600 A	RTU MODULE	PROVIDED BY ELECTRICAL CONTRACTOR

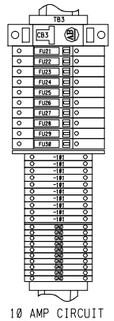
TERMINAL BLOCK LAYOUTS



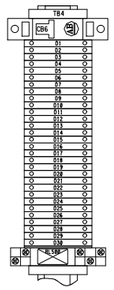
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



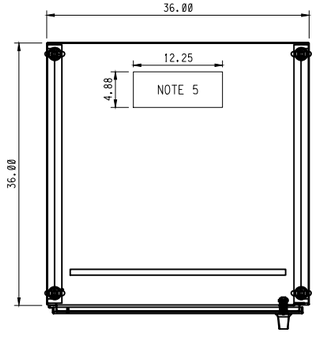
(1) 20 AMP CIRCUIT BREAKER
(1) 120 VAC SURGE PROTECTOR
(14) 1-TIER TERMINALS
(2) 1-TIER END BARRIERS
(11) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(1) 120VAC RELAY
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(10) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(10) GROUNDING TERMINALS
(10) FUSE BLOCKS
(1) FUSE BLOCK END BARRIERS
(2) END ANCHORS



(1) 10 AMP CIRCUIT BREAKER
(30) 1-TIER TERMINALS
(1) 1-TIER END BARRIERS
(1) 120V RELAY
(2) END ANCHORS



ENCLOSURE EXTERIOR TOP VIEW

3" ON ORIGINAL DOCUMENT
0 1 2 3

Kyle E. Tracy
Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:23:27-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

SD428 - MWWTP OXYGEN PLANT REHABILITATION

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	R. SPEYRER
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95946	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. CS7604	R. MAC

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT
ELECTRICAL
RIO-23-2 MAC 2-2 PANEL
EQUIPMENT ELEVATION

SCALE NONE
DATE 28JUN24

SD428-W4400-E506
DRAWING NUMBER

01
REV.

REF 1: REF1#TLEWWE
REF 2: REF2#TLEWWE
REF 3: REF3#TLEWWE
REF 4: REF4#TLEWWE
REF 5: REF5#TLEWWE
REF 6: REF6#TLEWWE
REF 7: REF7#TLEWWE
REF 8: REF8#TLEWWE
REF 9: REF9#TLEWWE

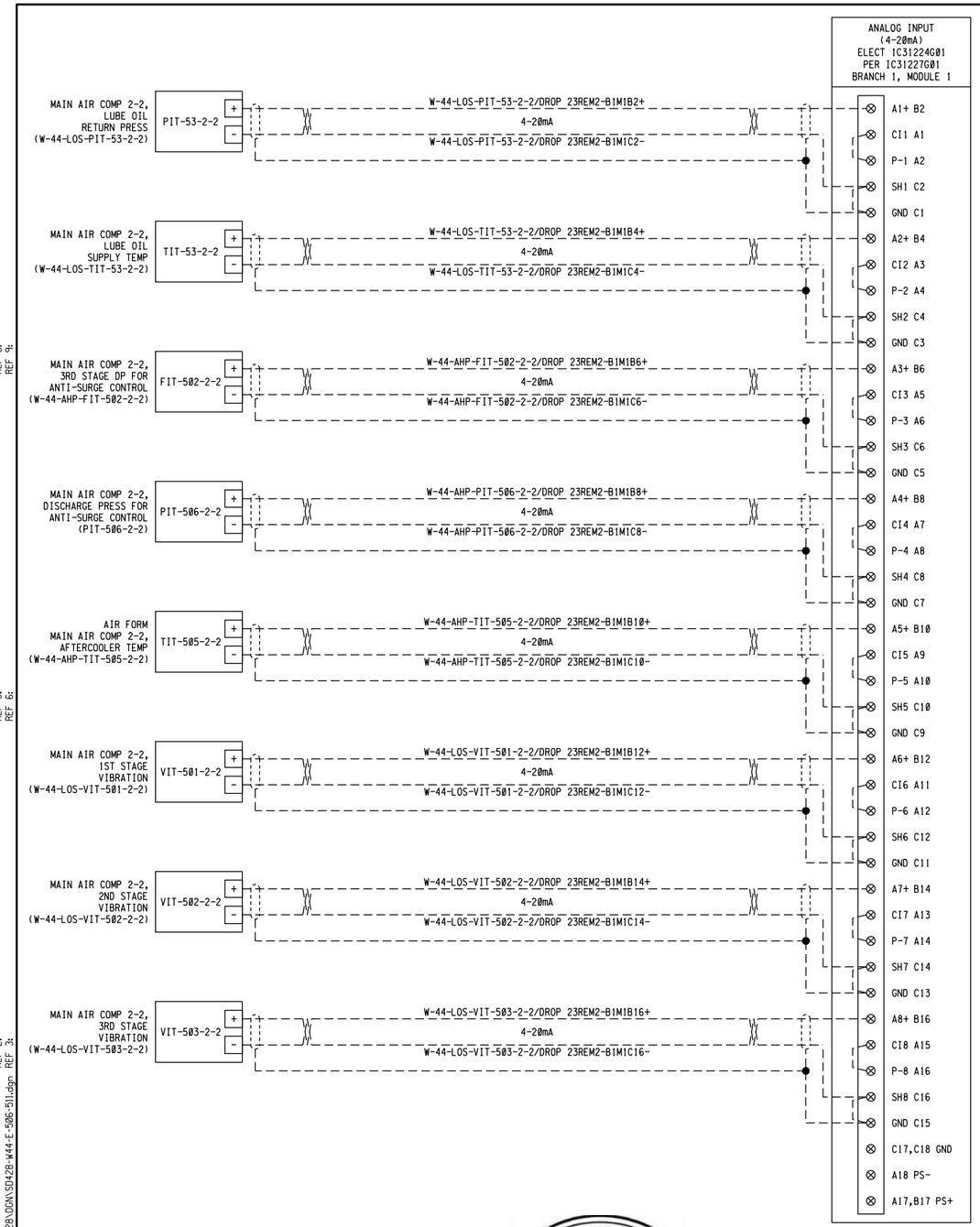
PLOT SCALE: PLOTSCALE
USER: ##USER####
DATE: ##DATE####
FILE: ##########FILE##########

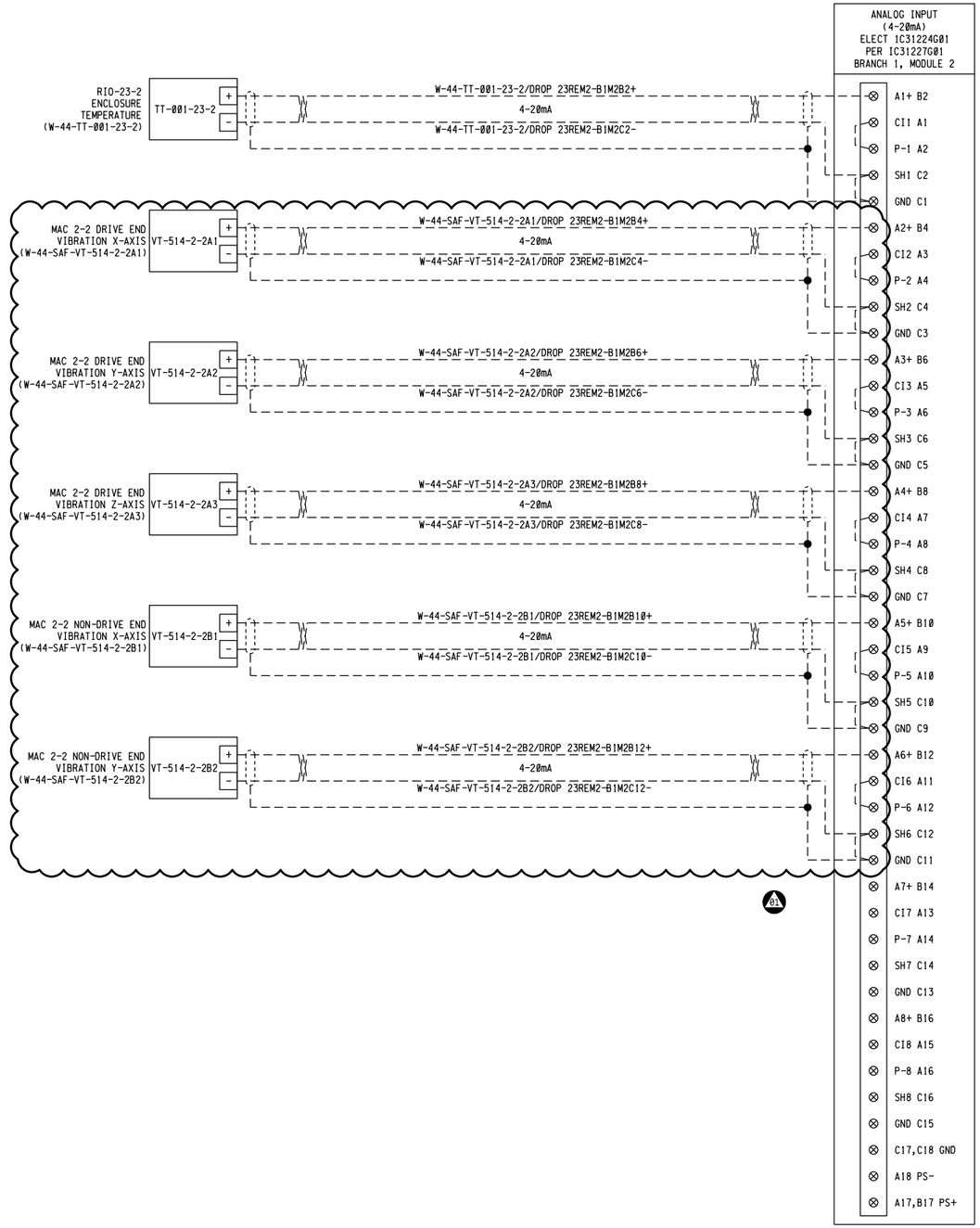
REF 7: REF4#TLEWWE
REF 8: REF4#TLEWWE
REF 9: REF4#TLEWWE

REF 4: REF4#TLEWWE
REF 5: REF4#TLEWWE
REF 6: REF4#TLEWWE

REF 1: REF3#TLEWWE
REF 2: REF3#TLEWWE
REF 3: REF3#TLEWWE

PLOT SCALE: PLOT@SCALE
USER: &USER@@@@
DATE: &&&&&DATE@@@@@
FILE: &&&&&





Kyle E. Tracy

Digitally signed by Kyle E. Tracy
Reason: I agree to the terms defined by the placement of my signature on this document
Date: 2024.08.30 17:23:44-04'00'

LICENSED PROFESSIONAL ENGINEER
KYLE EVAN TRACY
CS 7556
CONTROL SYSTEM
STATE OF CALIFORNIA

3" ON ORIGINAL DOCUMENT
0 1 2 3

Woodard & Curran

SOLUTIONWERKS™ INCORPORATED

NO.	DATE	REVISION	BY	REC.	APP.
01	26AUG2024	REVISED PER ADDENDUM NO. 1	RSS	JC	DCR

CONSULTANT

DESIGN BY:	R. SPEYRER
DRAWN BY:	X. SUN
DESIGN CHECKED BY R.P.E. NO. 7556	K. TRACY
PROJECT MANAGER R.P.E. NO.	J. JANCAITIS
APPROVED: PRINCIPAL IN CHARGE R.P.E. NO. 37097	D. RICHARDSON

EBMUD

PROJECT MANAGER R.P.E. NO. 95846	J. LAW
RECOMMENDED: SR. ENGINEER R.P.E. NO. 69681	R. MAC

SD428 - MWWTP OXYGEN PLANT REHABILITATION

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO.1
OAKLAND, CALIFORNIA

MAIN WASTEWATER TREATMENT PLANT
OXYGEN PRODUCTION PLANT

ELECTRICAL
RIO-23-2 MAC 2-2 PANEL
I/O MODULE SCHEMATIC

SCALE NONE
DATE 28JUN24

SD428-W4400-E506-511
DRAWING NUMBER

01
REV.

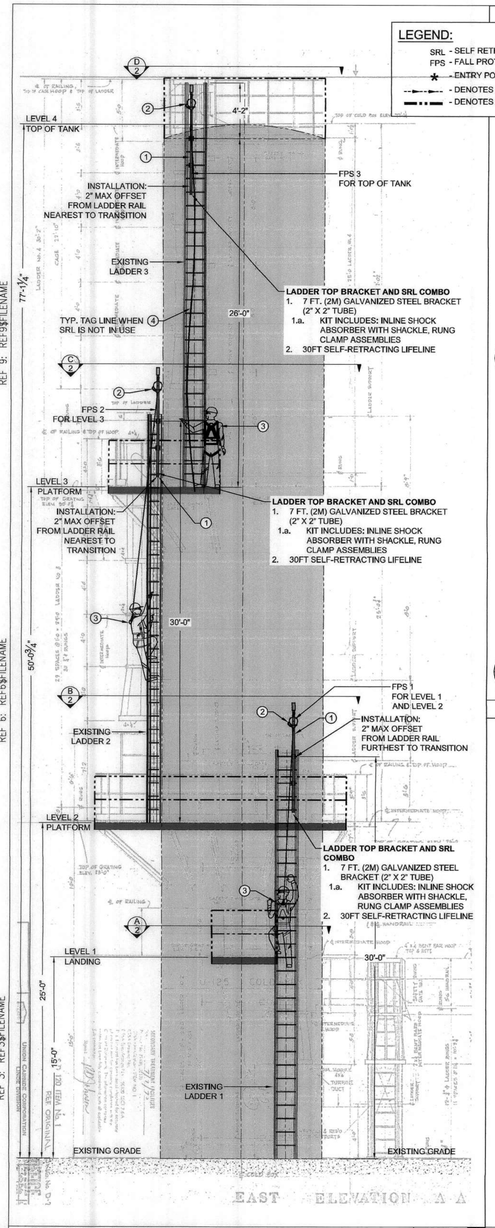
REF 1: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\wbdr.consultant-SD428.dgn
REF 2:
REF 3:
REF 4:
REF 5:
REF 6:
REF 7:
REF 8:
REF 9:

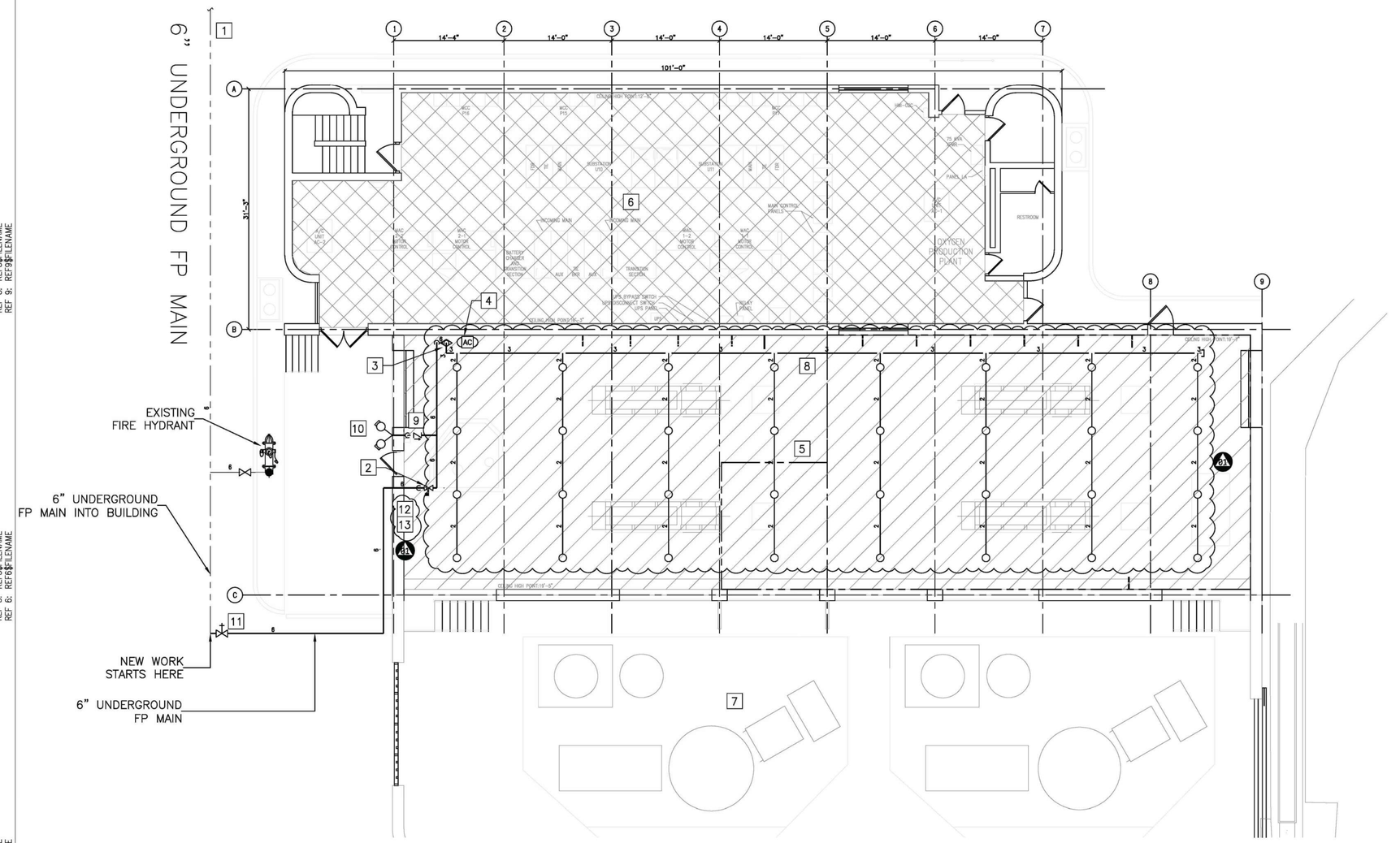
USER: robert
DATE: 28-AUG-2024 15:55
FILE: F:\Projects\Woodard Curran\EBMUD SD-428\DGN\SD428-W44-E-506-511.dgn
PLOT SCALE: 0.166666711

SD-428 Addendum No. 1

VOLUME IV - DRAWINGS

PT. 2


LEGEND:
SRL - SELF RETRACTING LINE
FPS - FALL PROTECTION SYSTEM
* - ENTRY POINT
- DENOTES ACCESS ROUTE
- DENOTES EXISTING GUARDRAIL
LEVEL 4
TOP OF TANK
FPS 3
FOR TOP OF TANK
INSTALLATION:
2" MAX OFFSET
FROM LADDER RAIL
NEAREST TO TRANSITION
EXISTING
LADDER 3
LADDER TOP BRACKET AND SRL COMBO
1. 7 FT. (2M) GALVANIZED STEEL BRACKET
(2" X 2" TUBE)
1.a. KIT INCLUDES: INLINE SHOCK
ABSORBER WITH SHACKLE, RUNG
CLAMP ASSEMBLIES
2. 30FT SELF-RETRACTING LIFELINE
TYP. TAG LINE WHEN
SRL IS NOT IN USE
FPS 2
FOR LEVEL 3
LEVEL 3
PLATFORM
LADDER TOP BRACKET AND SRL COMBO
1. 7 FT. (2M) GALVANIZED STEEL BRACKET
(2" X 2" TUBE)
1.a. KIT INCLUDES: INLINE SHOCK
ABSORBER WITH SHACKLE, RUNG
CLAMP ASSEMBLIES
2. 30FT SELF-RETRACTING LIFELINE
INSTALLATION:
2" MAX OFFSET
FROM LADDER RAIL
NEAREST TO
TRANSITION
77'-1¼"
26'-0"
30'-0"
50'-8¾"
FPS 1
FOR LEVEL 1
AND LEVEL 2
EXISTING
LADDER 2
INSTALLATION:
2" MAX OFFSET
FROM LADDER RAIL
FURTHEST TO TRANSITION
LEVEL 2
PLATFORM
LADDER TOP BRACKET AND SRL
COMBO
1. 7 FT. (2M) GALVANIZED STEEL
BRACKET (2" X 2" TUBE)
1.a. KIT INCLUDES: INLINE SHOCK
ABSORBER WITH SHACKLE,
RUNG CLAMP ASSEMBLIES
2. 30FT SELF-RETRACTING LIFELINE
LEVEL 1
LANDING
25'-0"
15'-0"
EXISTING
LADDER 1
EXISTING GRADE
EXISTING GRADE
EAST ELEVATION
REF 1: REF FILENAME
REF 2: REF FILENAME
REF 3: REF FILENAME
REF 4: REF FILENAME
REF 5: REF FILENAME
REF 6: REF FILENAME
REF 7: REF FILENAME
REF 8: REF FILENAME
REF 9: REF FILENAME
PLOT SCALE: PLOT$SCALE
USER: $USER$$$$
DATE: $DATE$$$$
FILE: $FILENAME$$$$



REF 7: REF7$FILENAME
REF 8: REF8$FILENAME
REF 9: REF9$FILENAME
REF 4: REF4$FILENAME
REF 5: REF5$FILENAME
REF 6: REF6$FILENAME
REF 1: REF1$FILENAME
REF 2: REF2$FILENAME
REF 3: REF3$FILENAME
PLOT SCALE: PLOT$SCALE
PLOT: $$$$